ICAR - Central Institute of Agricultural Engineering
Nabi Bagh, Berasia Road, Bhopal - 462038

Compendium of Agricultural Engineering Technologies

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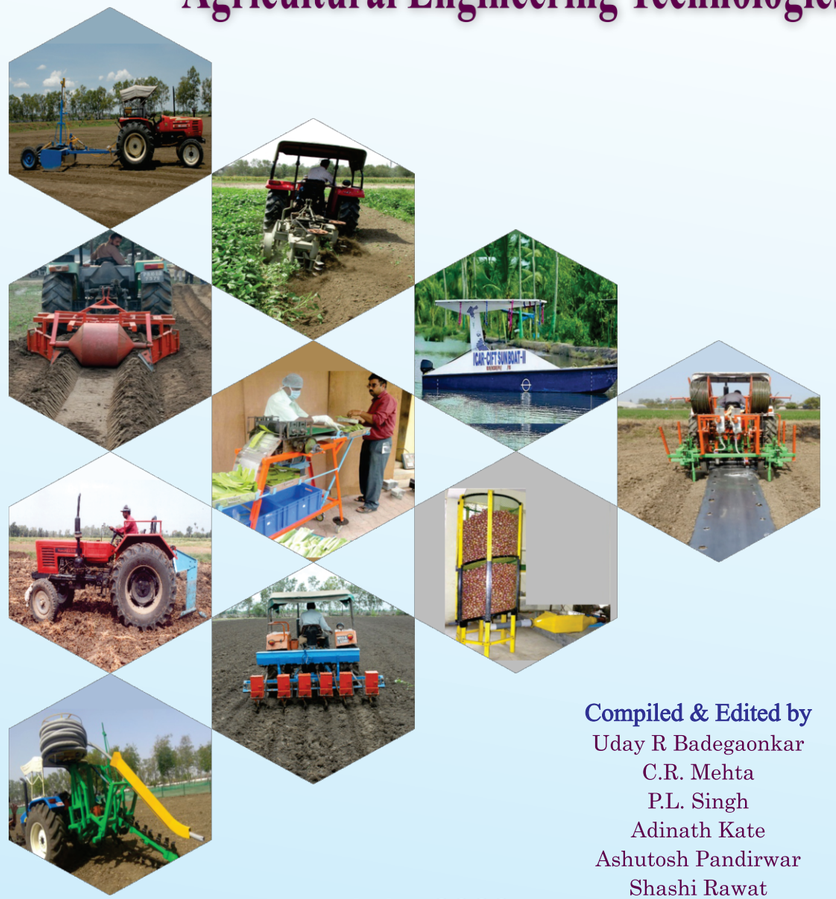

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July, 2023

ICAR - Central Institute of Agricultural Engineering
Nabi Bagh, Berasia Road, Bhopal - 462 038 (M.P.)
https://ciae.icar.gov.in

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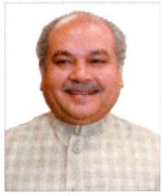

## संदेश

कृषि उत्पादन बढ़ाने के लिए कृषि में यांत्रिकरण का बहुत ही महत्वपूर्ण योगदान है। एक समय था, जब किसानों के लिए कृषि यंत्रों का आसानी से उपलब्ध न हो पाना सबसे बड़ी समस्या थी मगर आज किसानो की खेती के लिए आधुनिक और उन्नत कृषि यंत्र कृषि सब्सिडी के साथ उपलब्ध हैं। भारत में हाल के वर्षों में कृषि यांत्रिकरण में तेजी से वृद्धि हुई है। हरित क्रांति के बाद तो नवीन कृषि यंत्रों की उत्तरोत्तर मांग बढ़ रही है। दूसरे शब्दों में यंत्र शक्ति और व्यापारिक ऊर्जा का कृषि क्षेत्र में उपयोग बढ़ रहा है। यंत्रीकरण में उत्पादन एवं उत्पादकता दोनों बढ़ती है। यंत्रीकरण से कम समय में अधिक कार्य कुशलता के साथ किए जा सकते हैं।

देश की बढ़ती हुई आबादी की खाद्य समस्या को हल करने के लिए सघन खेती अति आवश्यक है। इस विधि से एक ही खेत में एक वर्ष में कई फसलें ली जा सकती हैं। इसके लिए उन्नत बीज, रासायनिक खाद, कीटनाशी दवा तथा पानी की समुचित व्यवस्था के साथ-साथ समय पर कृषि कार्य करने के लिए आधुनिक कृषि यंत्रों का प्रयोग भी अति आवश्यक है। कृषि क्षेत्र मे प्रायः सभी कार्य जैसे जुताई, बुवाई, सिंचाई, कटाई, मड़ाई एवं भंडारण आदि, कृषि यंत्रों से करना संभव है।

मुझे यह जानकर प्रसन्नता हो रही है कि भारतीय कृषि अनुसंधान परिषद के द्वारा कृषि फार्म मशीनीकरण, मूल्य वर्धन एवं कटाई उपरांत परिचालन तथा ऊर्जा प्रबंधन में अभियांत्रिकी हस्तक्षेपों के माध्यम से भारतीय कृषि को कहीं अधिक टिकाऊ, लाभप्रद और प्रतिस्पर्धी उद्यम बनने के लिए लगातार नई-नई तकनीकें विकसित की जा रही हैं। इन नई तकनीकों की जानकारी हमारे कृषक बंधुओं और कृषि व्यवसाय से जुड़े सभी वर्गों तक पहुंचाना और भी ज्यादा महत्वपूर्ण है और इस दिशा में परिषद द्वारा "Compendium of Agricultural Engineering Technologies" नामक प्रकाशन एक स्वागत योग्य कदम है।

मेरी ओर से परिषद को "Compendium of Agricultural Engineering Technologies" के सफलतापूर्वक प्रकाशन के लिए हार्दिक बधाई एवं शुभकामनाएं। मुझे पूरा विश्वास है कि यह प्रकाशन कृषि क्षेत्र से जुड़े सभी वर्गों के लिए उपयोगी साबित होगा तथा उनकी जरूरतें पूरी होंगी।

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## संदेश

कृषि में खेत की तैयारी करने से लेकर फसल की कटाई करने तक का काम आधुनिक कृषि यंत्रों से किया जा रहा है। परंपरागत खेती को बदलने के लिए सरकार किसानों को नई कृषि तकनीकों से जोड़ने के लिए प्रयासरत है। कृषि कार्य हेतु खाद, अच्छे बीज तथा कीटनाशकों के साथ ही आधुनिक कृषि यंत्रों की भी जरूरत होती है, क्योंकि इन आधुनिक कृषि उपकरणों की मदद से कम समय में और कम श्रम से खेती का काम होता है और फसल का उत्पादन भी अधिक होता है। कृषि उत्पादन बढ़ाने के लिए कृषि में यांत्रिकीकरण का बहुत महत्वपूर्ण योगदान है।

हमारे देश ने खाद्यान्नों के संदर्भ में जो आत्मनिर्भरता प्राप्त की है वह मुख्यतः विज्ञान और प्रौद्योगिकी की सफलता की कहानी है। अब दुर्गम क्षेत्रों के कृषक भी कृषि में नवीन विधियों तथा उन्नत तकनीकों से अवगत हो गए हैं और उनका प्रयोग करने को उत्सुक हो रहे हैं। आधुनिक प्रौद्योगिकी के प्रयोग से कृषि क्षेत्र में सक्षमता आई है। इससे कृषि के रूपांतरण और नवीनीकरण में सहायता प्राप्त हुई है। भारतीय कृषि अनुसंधान परिषद द्वारा भारतीय कृषि के आधुनिकीकरण के लिए लगातार नए अनुसंधान किए जा रहे हैं और मैं यह जानकर हर्षित हूँ कि परिषद द्वारा नए अनुसंधान कार्यों को कृषकों तक पहुंचाने का कार्य किया जा रहा है। मुझे खुशी है कि **"Compendium of Agricultural Engineering Technologies"** का प्रकाशन उसी दिशा में एक सार्थक प्रयास है।

कृषि अभियांत्रिकी वैज्ञानिकों के उल्लेखनीय अनुसंधान कार्यों को "Compendium of Agricultural Engineering Technologies" में शामिल किया गया है और मुझे आशा है कि यह प्रकाशन कृषि क्षेत्र से जुड़े सभी वर्गों एवं देश में कृषि यांत्रिकीकरण के विकास के लिए महत्वपूर्ण योगदान देगा।

**शुभकामनाओं सहित।**

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## Foreword

Agricultural engineering technologies are meant to make Indian agriculture sustainable, profitable and competitive enterprise through engineering interventions of farm mechanization, value addition and energy management in production and post-harvest operations. The development and manufacturing of agricultural machinery in India has come a long way in the past seven decades. From a meagre beginning made by some pioneers to manufacture and sell ploughs made of cast iron, the country has progressed to be the leader in the manufacturing of agricultural tractors in the world. India is on the threshold of witnessing a revolution in the adoption of agricultural machinery due to increased migration of rural workers to urban areas and increasing cost of farm labour. Moreover, there is a need to increase the productivity of land, which calls for timeliness of farm operations, possible through introduction of cutting edge technologies for mechanization of Indian Agriculture.

The agricultural engineering scientists and researchers have made remarkable contribution by designing and developing need-based and region-specific engineering technologies to enhance productivity and profitability in different farming systems.

In keeping with the need of the hour to create awareness about technologies and machinery, this Technology Compendium on agricultural engineering technologies addresses the needs of farmers, manufacturers, extension workers, scientists, engineers and Industry by providing relevant and sufficient information. The painstaking efforts of the authors in collecting and compiling this repository of information with appropriate photographs and available details about the technologies, is expected to go a long way in furthering the mechanization of agriculture in the country.

I congratulate the team at ICAR-CIAE and the Agricultural Engineering Division, ICAR for bringing out this much needed publication.

**(Himanshu Pathak)**

**11th April, 2023**
**New Delhi**

भाकृअनुप
ICAR

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# PROLOGUE

Agricultural Engineering and Technological inputs in agriculture have made significant contributions in increasing agricultural production and productivity through timely farm operations, precise application and better placement of inputs, conserving soil and water resources from further degradation, increasing irrigation potentialities and efficiencies, reducing losses of produce by providing improved storage structures and technologies. In future the Country will face more challenges in agriculture. On the one hand, it has to increase its production substantially from almost the same cultivated land to feed its growing population, and on the other hand, reduce cost of production, reduce post-harvest losses, add value to the farm produce and to maintain their quality to a high standard to compete with foreign goods, both, in the inland and export markets, owing to cut throat competition due to liberalization of trade and other implications of WTO. The biggest challenge is to make agriculture profitable. This will be possible only by reducing cost of cultivation through enhanced input use efficiency and by higher returns to the farmers through value addition in production catchment and adopting loss prevention measures.

Unlike other advanced countries which have greatly reduced the involvement of their people in agriculture, India cannot afford to displace large percentage of rural population from agriculture to other sectors of employment. India has, therefore, to generate more jobs in rural areas itself, through increased production, value addition and agro processing. The small farm mechanization, precision farming and post-harvest technology will play a major role in future to increase production and productivity, to lower cost of production and in generating more income and employment opportunities in rural areas, to transform rural India from only producer of food raw materials to producer-cum-primary processor.

Over the years, the Indian Agricultural Research System under the aegis of the Indian Council of Agricultural Research has served a very useful purpose. Agricultural engineering technologies developed under NARS are capable of covering all levels of farming and post-harvest operations, and these includes from simple and basic hand tools to more sophisticated and motorized equipment. Agricultural mechanization today has a very broad meaning. This broad meaning includes production, distribution and utilization of a variety of tools, machinery and equipment for the development of agricultural land, planting, harvesting and post-harvest operations.

The authors have justified the same by compiling the technical details of various engineering technologies suitable for various operations i.e land preparation, sowing-planting-transplanting, fertilizer application, interculture, plant protection and weeding, harvesting, threshing, agro-processing, value addition, transport, storage covering almost all segments of

agriculture from crop production to post-harvest. Benefits over the conventional one, its commercialization status and source of availability in respect of each technology has also been given to ease the adoption process.

I congratulate the entire team of engineering scientists for their great effort in bringing out this publication for the greater benefit of the farmers, manufacturers, extension workers, scientists, engineers and Industry engaged in agricultural profession.

Date :
Place : **(S.N. Jha)**

# PREFACE

Indian agriculture is multi-dimensional. On one hand it includes highly mechanized farms of Punjab, Haryana and western Uttar Pradesh and on other, it is characterized by small fragmented land holding, hill farming and shifting cultivation.

Number of unit operations are involved in agriculture, starting from land preparation and tillage to sowing, interculture, plant protection, irrigation, harvesting, threshing, transport, storage, processing, value addition and marketing. All these operations need improved tools, implements and equipment to achieve timeliness of operation, better input use efficiency, higher productivity and profitability and to provide comfort and convenience to the farmers/ farm workers. The overall production is affected by shortage and inefficient use of irrigation water. With the drudgery involved in agriculture, the new generation farmers prefer to be away from farming and migrate to urban areas. At present the cost of cultivation for many conventional crops is very high, making the profit margin negligible. High cost of production is due to high cost of inputs, their inefficient ways of application/ utilization and high cost of labour. Agricultural engineering and technological inputs can make significant contributions in such situations.

Good engineering technologies can:

- increase land productivity by facilitating timeliness and quality of cultivation;
- increase production by allowing farmers to go far second or multiple crops
- reduce the burden of labour shortage;
- decrease the environmental footprint of agriculture through adequate conservation agriculture practices; and
- reduce poverty and achieve food security while improving people's livelihoods.

Agricultural mechanization has also helped farms both small and large to earn more money on what they produce. First, time is saved by the mechanization process, which reduces the need to pay laborers over extended periods of time. Second, crop yields are higher, which results in more income. Third, it improves the profile of farms and helps them to work on a more global scale where they might have worked on a very small scale before.

Women play an important role in agriculture, and in some operations, up to 80 percent of the total farm labour comes from women. This implies that power sources (human, animal or engine-based) need to be adapted to such necessities from an ergonomic, social, cultural and economic point of view. The reduction of drudgery is a key element of engineering technologies and contributes to reducing women's hard workload by taking into consideration technologies apt to their needs and improving their access to appropriate forms of farm power.

This compilation has brought out the details of commercialized and ready for commercialization implements and machines, designed and developed by the scientists from various R & D Institutes, all across the country. Various engineering technologies suitable for different agro-climatic regions for the entire range of agricultural operations from land preparation to sowing, weeding, harvesting, post-harvest and upto storage and transport have been included in the Technology Compendium, catering to the need of personnel involved in agriculture and allied disciplines like dairy and fisheries. Benefits over the conventional one and source of availability in respect of each technology have also been detailed to facilitate and accelerate the technology transfer process. Farmers need to choose the appropriate technology to meet their needs effectively and efficiently, for any operation depending on the work to be done.

We are grateful to Dr. Himanshu Pathak, Secretary, DARE & Director General, ICAR; Dr. S. N. Jha, Deputy Director General (Agril. Engg.), Indian Council of Agricultural Research, New Delhi for their guidance, support and inspiration in bringing out the Compendium of Agricultural Engineering Technologies. We are thankful to Directors of CIPHET, Ludhiana; NRRI, Cuttack; CRIJAF, Barrackpore; SBI, Coimbatore; IISR, Lucknow; CIFA, Bhubaneswar; CIFT, Cochin; IIHR, Bangluru for providing the information required for preparation of this document. Special thanks are due to Dr. S. Balasubramaniam, Principal Scientist, RC-CIAE, Dr. Shashi Rawat, Principal Scientist and Dr. C.P. Sawant, CIAE, Bhopal for their contribution. We also thank Dr PP Ambalkar, Shri Deepak Tiwari, Shri Satendra Singh Lodhi, Shri Firoz and the staff of Technology Transfer Division and the administrative Staff of CIAE, Bhopal for their whole hearted support and help in the preparation of this compendium.

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# ABBRIVIATION

| Sl No | Abbreviation | Expanded Form |
|---|---|---|
| 1 | % | percentage |
| 2 | AICRP | All India Coordinated Research Project |
| 3 | AISI | American Iron and Steel Institute |
| 4 | ANGRAU | Acharya N. G. Ranga Agricultural University |
| 5 | ATP | Adenosine Triphosphate |
| 6 | AV | Agrivoltaic |
| 7 | BCS | Bonetti Castoldi Speroni |
| 8 | BOD | Biological Oxygen Demand |
| 9 | BOSCAV | Battery Operated Self Contained Aerating Vehicle |
| 10 | BSKKV | Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth |
| 11 | CAEPHT | College of Agricultural Engineering & Post Harvest Technology |
| 12 | CAEUAS | College of Agricultural Engineering University of Agricultural Sciences |
| 13 | CCSHAU | Chaudhary Charan Singh Haryana Agricultural University |
| 14 | CIAE | Central Institute of Agricultural Engineering |
| 15 | CIBA | Central Institute of Brackish water Aquaculture |
| 16 | CICR | Central Institute for Cotton Research |
| 17 | CIFA | Central Institute of Freshwater Aquaculture |
| 18 | CIFA | Central Institute of Freshwater Aquaculture |
| 19 | CIFT | Central Institute of Fisheries Technology |
| 20 | CIPHET | Central Institute of Post-Harvest Engineering and Technology |
| 21 | cm | centimeter |
| 22 | COD | Chemical Oxygen Demand |
| 23 | CRIJAF | Central Research Institute for Jute & Allied Fibre |
| 24 | CRP on EA | Consortia Research Platform on Energy in Agriculture |
| 25 | CSKHPKV | Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidyalaya |
| 26 | CTCRI | Central Tuber Crops Research Institute |
| 27 | CV | Coefficient of Variation |
| 28 | DARE | Department of Agricultural Research & Education |
| 29 | DC | Direct Current |
| 30 | DO | Dissolved Oxygen |
| 31 | DSR | Direct Seeded Rice |
| 32 | EAAI | Energy inAgriculture and Agro-based Industries |
| 33 | EPE | Expanded Polyethylene |
| 34 | EPN | Entomo Pathogenic Nematode |
| 35 | FIM | Farm Implements& Machinery |
| 36 | FRP | Fibre Reinforced Plastic |
| 37 | FYM | Farm Yard Manure |
| 38 | g | gram |
| 39 | GBPUAT | Govind Ballabh Pant University of Agriculture and Technology |
| 40 | GI | Galvanized Iron |
| 41 | GPS | Global Positioning System |
| 42 | GST | Goods and Service Tax |
| 43 | h | hour |

| | | |
|---|---|---|
| 44 | ha | hectare |
| 45 | HCA | Hydroxy Citric Acid |
| 46 | HDPE | High Density Polyethylene |
| 47 | hp | horse power |
| 48 | Hz | Hertz |
| 49 | ICAR | Indian Council of Agricultural Research |
| 50 | IIHR | Indian Institute of Horticultural Research |
| 51 | IISR | Indian Institute of Sugarcane Research |
| 52 | IIT | Indian Institute of Technology |
| 53 | IoT | Internet of Things |
| 54 | IRRI | International Rice Research Institute |
| 55 | JAU | Junagadh Agricultural University |
| 56 | KAU | Kerala Agricultural University |
| 57 | KCAET | Kelappaji College of Agricultural Engineering and Technology |
| 58 | kg | kilo gram |
| 59 | km | kilo meter |
| 60 | kmph | kilo metre per hour |
| 61 | kPa | kilo Pascal |
| 62 | kVA | kilovolt amperes |
| 63 | kW | Kilowatt |
| 64 | l | litre |
| 65 | LDPE | Low Density Poly Ethylene |
| 66 | LED | Light Emitting Diode |
| 67 | LFCS | Live Fish Carrier System |
| 68 | LOK | Lever Operated Knapsack |
| 69 | LPG | Liquified Petroleum Gas |
| 70 | LPM | Litre Per Minute |
| 71 | LSU | Louisiana State University |
| 72 | m | metre |
| 73 | m2 | metre square |
| 74 | m3 | metre cube |
| 75 | mg | milligram |
| 76 | min | minute |
| 77 | MJ | Mega Joule |
| 78 | mm | milimetre |
| 79 | mmHg | millimetre of Mercury |
| 80 | MPA | Mechanized Pond Applicator |
| 81 | MPKV | Mahatma Phule Krishi Vidyapeeth |
| 82 | MPUAT | Maharana Pratap University of Agriculture and Technology |
| 83 | MS | Mild Steel |
| 84 | MT | Metric tonne |
| 85 | N | Newton |
| 86 | NASC | Non-stakable Aerating Container |
| 87 | NEH | North Eastern Hill |
| 88 | Nm | Newton metre |
| 89 | No | Number |
| 90 | NRCB | National Research Centre for Banana |
| 91 | NRCG | National Research Centre for Grapes |
| 92 | NRRI | National Rice Research Institute |
| 93 | OUAT | Odisha University of Agricultural and Technology |

| | | |
|---|---|---|
| 94 | PAU | Punjab Agricultural University |
| 95 | PC | Polycarbonate |
| 96 | PDKV | Dr.Panjabrao Deshmukh Krishi Vidyapeeth |
| 97 | pH | Potential of Hydrogen |
| 98 | PHET | Post-Harvest Engineering & Technology |
| 99 | PJTSAU | Prof. Jaya Shankar Telangana State Agriculture University |
| 101 | PLC | Programmable Logic Controller |
| 102 | PP | Polypropylene |
| 103 | PTO | Power Take Off |
| 104 | PUF | Poly Urethane Foam |
| 105 | PV | Photovoltaic |
| 106 | PxP | Plant to Plant |
| 107 | q | Quintal |
| 108 | R&D | Research & Development |
| 109 | RC | Regional Centre |
| 110 | RCC | Reinforced Cement Concrete |
| 111 | ROPS | Roll-over Protective Structure |
| 112 | rpm | rotation per minute |
| 113 | RS | Regional Station |
| 114 | Rs | Rupees |
| 115 | RxR | Row to Row |
| 116 | s | second |
| 117 | SAC | Stakable Aerating Container |
| 118 | SBI | Sugarcane Breeding Institute |
| 119 | SHUATS | Sam Higginbottom University of Agriculture, Technology and Sciences |
| 120 | SKUAST | Sher-e-Kashmir University of Agricultural Sciences and Technology |
| 121 | SPAD | Soil Plant Analysis Development |
| 122 | SPRERI | Sardar Patel Renewable Energy Research Institute |
| 123 | SS | Stainless Steel |
| 124 | STO | Sett Treatment Device |
| 125 | t | Tonne |
| 126 | TNAU | Tamil Nadu Agricultural University |
| 127 | TPD | Tonnes Per Day |
| 128 | TR | ton of refrigeration |
| 129 | UAS | University of Agricultural Sciences |
| 130 | UV | Ultraviolet |
| 131 | V | Volt |
| 132 | VFD | Variable Frequency Device |
| 133 | VPKAS | Vivekananda Parvatiya Krishi Anusandhan Sansthan |
| 134 | VRAF | Variable Rate Fertilizer Applicator |
| 135 | W | Watt |
| 136 | wb | wet basis |

# Content

## 3. Weeding, Fertilizer Application & Plant Protection Equipment

## 4. Harvesting Equipment

## 5. Threshing Equipment

## 7. Miscellaneous Equipment

# LAND PREPARATION EQUIPMENT

# Bullock Operated Lug Wheel Puddler

## Utility

It is suitable for preparing seedbed for transplanting paddy through shallow puddling and levelling of puddled soil and also to uproot the weeds. It consists of rolling lug wheel, float, operator seat witch point on frame and beam. When the puddler is operated it disperses soil into water and puddles the field. Two passes of the puddler is adequate to develop the puddle bed.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | A pair of bullocks |
| Weight, kg | : | 90 |
| Working width, mm | : | 1200 |
| Cost of equipment, Rs. | : | 7,500 |
| Operational speed, km/h | : | 1.25-1.50 |
| Working depth, mm | : | 50-100 |
| Field capacity, ha/h | : | 0.10 |
| Field efficiency, % | : | 60-70 |
| Draft, N | : | 650 |
| Cost of operation, Rs./ha | : | 800-1000 |

## Benefits over conventional/traditional practices

- Two passes of the puddler are adequate to prepare the puddle bed.
- Higher field capacity and better puddling index can be achieved
- Two passes of lug wheel puddler saves 50% time and 60% cost of puddling per ha compared to 6 passes of traditional comb harrow puddler.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Metalweld Engineering Pvt Co Ltd, Indore-452010, Madhya Pradesh, Phone: 094251 01234
- Director, ICAR-CIAE, NabiBagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Bullock Operated Improved Blade Harrow

## Utility

Suitable for shallow tillage and seedbed preparation for sowing of different crops. A roller has been provided in place of traditional wooden skid, which reduces the draft requirement. The size of blade has been standardized as 60 cm for bullocks of Madhya Pradesh. Compared to traditional wooden blade harrow (Life=2 years), the life of the improved blade harrow is 5 years. For Madhya Pradesh, due to matching of blade size to draught ability, it is possible to achieve a higher field capacity.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | A pair of bullocks |
| Weight, kg | : | 65 |
| Working width, mm | : | 600 |
| Cost of equipment, Rs. | : | 5,000 |
| Working depth, mm | : | 50-100 |
| Field capacity, ha/h : | : | 0.07 |
| Draft,N | : | 550 |
| Cost of operation, Rs./ha | : | 500-600 |

## Benefits over conventional/traditional practices

- Higher field capacity (0.072 ha/h for improved blade harrow as compared to 0.059 ha/h for conventional blade harrow) resulting in 32% increased field capacity.
- Saving in time of operation and less animal fatigue

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Narayana Agril. Works, Dewas Indore Road, Dist. Dewas, Phone: 91155 69689
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Bullock Operated Two Gang Notch Type Disc Harrow

## Utility

It is bullock drawn implement which is used for puddling the field. This implement can be used in light as well as heavy soils by increasing and decreasing the weight. It has two gangs with 2 notch type disc mounted over each hollow drum. It has provision for adding weight (sand) inside the drum to get better penetration in the soil. The two gangs are coupled in such way that it, can be pulled by a pair of bullock.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | One pair of bullock |
| Weight, kg | : | 82 |
| Number of Gangs | : | 2 |
| Number of disc | : | 4 |
| Disc diameter, mm | : | 600 |
| Working width, mm | : | 750 |
| Angle for adjustment | : | 23-350 |
| Ground clearance, mm | : | 190 |
| Disc to disc distance, mm | : | 200 |
| Notch width, mm | : | 100 |
| Effective field capacity, ha/day | : | 0.35 |

## Benefits over conventional/traditional practices

- With the use of this implement crop residues will cut and mix with the top soil.
- Bigger soil clods will break down that gives uniform and leveled top surface.

**Design:** ICAR-NRRI, Cuttack

**Commercialization Status:** Commercialized

## Contact:

- Director, ICAR-National Rice Research Institute, Cuttack, Odisha, Phone: +91-671-2367757/67, Email: director.nrri@icar.gov.in

# Bullock Operated Drum Type Disc Harrow

## Utility

It is bullock drawn implement used for puddling. Two operations of float-harrow are sufficient to create field conditions ready for transplanting the seedlings. It has two gangs with 3 plane disc mounted over each hollow drum. This implement is used to improve the seed bed by greater pulverization of the soil by cutting crop residues and mix them with top soil which gives uniform and leveled top surface.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | One pair of bullock |
| Weight, kg | : | 90 |
| Number of Gangs | : | 2 |
| Number of discs | : | 6 |
| Disc diameter, mm | : | 680 |
| Working width, mm | : | 1200 |
| Disc to disc distance, mm | : | 190 |
| Angle for adjustment | : | 23-350 |
| Ground clearance, mm | : | 340 |
| Effective field capacity, ha/day | : | 0.4 |
| Pulverization percentage, % | : | 11 |

## Benefits over conventional/traditional practices

- The puddling time is decreased from 42 hours to 11 hours

**Design:** ICAR-NRRI, Cuttack

**Commercialization Status:** Commercialized

## Contact:

- Director, ICAR-National Rice Research Institute, Cuttack, Odisha, Phone: +91-671-2367757/67, Email: director.nrri@icar.gov.in

# Power Tiller Operated Bench Terracer-cum-Leveller for Hilly Region

## Utility

It is suitable for making new terraces and reshaping and levelling the old terraces in hill agriculture. The equipment consists of 1.0 m wide scraper unit fitted with steel blade at the bottom for cutting the soil. It is attached to the rear of the power tiller which holds the unit rigidly during the operation. For upward & downward movement of the terracer, power tiller tail wheel attachment is attached to the main frame. Two side guards are provided on both sides of the blade to avoid spilling of soil. Bottom skids are provided below the blade for maintaining uniform depth.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Power tiller |
| Weight, kg | : | 30 |
| Working width, mm | : | 1000 |
| Scraper capacity, cu. m | : | 0.6 |
| Cost of equipment, Rs. | : | 15,000 |
| Operational speed, km/h | : | 2.0-2.5 |
| Field capacity, ha/h | : | 0.12 |
| Field efficiency, % | : | 70-75 |
| Fuel consumption, l/h | : | 1.0 |
| Cost of operation, Rs./ha | : | 800-1000 |

## Benefits over conventional/traditional practices

- Higher field capacity.
- Lower cost of operation.
- Reduces labour requirement and human drudgery.

**Design:** CSK HPKV, Palampur (AICRP on FIM)

**Commercialization Status:** Commercialized

## Contact:

- Principal Investigator (FIM Project) & Head, Deptt. Of Agril. Engg. CSK HPKV, Palampur– 176 062, Phone: +91-1894-230406, +91-1894-283221(O), Email: dee@hillagric.ernet.in
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Power Tiller Operated Auger Digger

## Utility

It is a power tiller operated equipment developed for digging holes of 450-600 mm depth and 300 mm diameter for planting saplings. It is suitable for planting orchards and forests.

Manual digging of holes is very tiresome and time taking operation. Use of this equipment facilitates timely operation, saving of human labour and 50% cost saving compared to conventional system and reduces drudgery of human labour during pit digging It can be used for fencing development purpose also.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 6-7.5 kW Power tiller |
| Weight, kg | : | 125 |
| Auger dia, mm | : | 300 |
| Cost of equipment, Rs. | : | 25,000 |
| Pit depth, mm | | 450-600 |
| Pit dia, mm | : | 300 |
| Field capacity, no. of pits/h | : | 25-30 |
| Cost of operation, Rs./h | : | 200-250 |

## Benefits over conventional/traditional practices

- Saving of human labour and 50% cost saving compared to conventional system.
- Reduces drudgery of human labour during pit digging.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Vasundhara Krishi Yantra, Bhopal, Madhya Pradesh, Ranjit Singh Thakur (Director) Email: vkyu.bpl@gmail.com, Contact No. - 9893018158
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Power Tiller Banana Clump Removing Equipment

## Utility

It is an attachment to the front of a light weight power tiller. The equipment consists of the digging tool bit with a digging auger. A handle is provided to control the depth of operation. The power from the light weight power tiller is transferred to this equipment by means of a gear box of ratio 12:1. The required power is transmitted by means of series of belt and pulley mechanism.

| Specification & Performance results | | |
|---|---|---|
| Power, kW | : | 7.4 |
| Diameter of cut, mm | : | 300 |
| Max. Depth of cut, mm | : | 450 |
| Field capacity, clumps/h | : | 4 to 8 |
| Cost of equipment, Rs. | : | 25,000 |

## Benefits over conventional/traditional practices

- The process of removing the clumps in hill banana area is easier by using this attachment.
- The clump removing activity can be done quickly.

**Design:** ICAR-CIAE, RC, Coimbatore

**Commercialization Status:** Ready for commercialization

## Contact:

- The Head, ICAR-Central Institute of Agricultural Engineering – Regional Centre, Coimbatore, Mob. No.- 0422- 2472623; 2474276, Email: ciaerccbe@gmail.com

# Tractor Operated Check Basin Former

## Utility

There is huge labour involvement and cost to make check basin in addition to human drudgery, if done manually. The machine scraps the soil, collects and distributes the collected soil uniformly to form side bunds and cross bunds at regular interval of 6 m in a single pass. It can be easily raised/lowered for bund formation with the help of tractor three point linkage system.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 34-38 kW tractor |
| Height of main side ridge, mm | : | 220 |
| Base width of main side ridge, mm | : | 440 |
| Height of tie ridge, mm | : | 160 |
| Base width of tie ridge, mm | : | 320 |
| Earth work done per check basin, $m^3$ | : | 0.632 |
| Cost of machine, Rs. | : | 70,000 |
| Dimensions of check basin, m | : | 2 x 6 |
| Field efficiency, % | : | 78 |
| Labour requirement, man-h/ha | : | 6.4 |
| Man power required to prepare check basin of 6 x 2 m size in traditional manual method, man-h/ha | : | 160 |
| Cost of operation in traditional manual method, Rs./ha | : | 4500 |
| Cost of operation with machine, Rs./ha | : | 3075 |

## Benefits over conventional/traditional practices

- Gives 25-32% saving in cost of operation and 90% saving in time.
- Reduces human drudgery and maintain timeliness in operation.

**Design:** MPKV, Rahuri (AICRP on FIM)

**Commercialization Status:** Commercialized

## Contact:

- M/s Bhansali Agricultural Implements Pvt. Ltd., "DHANTRAYA", Gurudwara Road, Kopargaon- 423601, Dist. Ahmednagar (Maharashtra), Tel: +91-2423-223391 / 92 /93
- Principal Investigator, AICRP on FIM, Dr. ASCAET, Mahatma Phule Krishi Vidyapeeth, Rahuri – 413722, Dist. Ahmednagar (Maharashtra), Ph. No.: 02426-243219, Email: dormpkv@rediffmail.com

# Tractor Operated System for Controlled Level Pudlling

## Utility

The undulations in puddled field results in uneven depth of water, leading to non-uniform crop ripening and yield losses and also poses problems in mechanized transplanting. The tractor operated laser guided controlled puddling system creates a smooth precisely levelled puddled bed suitable for mechanized transplanting and good crop growth.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 26.11 kW tractor |
| Weight, kg | : | 450 |
| Cost of machine, Rs. | : | 5.5 lakh |
| Working width of rotary tiller, m | : | 2.6 |
| Effective field capacity, ha/h | : | 0.26 |
| Field efficiency, % | : | 65 |
| Labour requirement, man-days/ha | : | 20 |
| Cost of operation,Rs./ha | : | 2300 |

## Benefits over conventional/traditional practices

- Controlled puddling helps in maintaining the depth of operation of the puddling machinery by using laser level controller to improve productivity and to reduce water consumption.

**Design:** TNAU, Coimbatore (AICRP on FIM)

**Commercialization Status:** Commercialized

## Contact:

- Farm Implements India Pvt Ltd, Chennai, Tamil Nadu, Phone: +9144 28261676, +9144 28273493, Email: marketing@fiipl.in
- Principal Investigator (AICRP on FIM), Department of Farm Machinery and Power Engg., Tamil Nadu Agricultural University, Coimbatore – 641003 (Tamil Nadu), Ph. No.: 91-422-2457576

# Tractor Operated Irrigation Channel Former

## Utility

The irrigation channels are formed by manual labour using local hand tools. It involves lot of labor and drudgery. A tractor operated irrigation channel former can be used for making irrigation channels in orchards with much ease. It opens the furrow, inverts the soil on the sides, and simultaneously compacts the side walls to form a clean and compact channel for irrigation purpose.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 37.5 kW or more tractor |
| Width of soil shaper, mm | : | 380 |
| Diameter of soil shaper, mm | : | 610 |
| Height of furrow opener, mm | : | 575 |
| Forward speed, km/h | : | 2.1-2.8 |
| Top width of channel, mm | : | 610 |
| Depth of channel, mm | : | 245 |
| Slant height, mm | : | 290 |
| Rate of channel forming, m/h | : | 1.75-1.9 |
| Fuel consumption, l/h | : | 6.1 |
| Labour requirement, man-h/m | : | 0.05 |

## Benefits over conventional/traditional practices

- 65% and 60%, savings in labour and cost of operation respectively.

**Design:** PAU, Ludhiana(AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

## Contact:

- Principal Investigator (AICRP on FIM), Department of Farm Machinery & Power Engineering, Punjab Agricultural University, Ludhiana – 141004 (Punjab), Ph No. 0161 2401325, Email : hodfmpe@pau.edu

# Tractor Operated Ridge Plastering Machine

## Utility

The traditional practice of manual ridges formation and their maintenance consume lot of time and is expensive due to high labour wages. It takes approximately 30 and 45 min for clearing and plastering, respectively of one side of 18 m long bund by a manual labour. A tractor operated ridge plastering machine saves time, physical energy and make work easy for farmers.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 13.4 kW tractor |
| Weight, kg | : | 143 |
| Diameter of the ridge plastering disc, mm | : | 500 |
| Diameter of the compacting cylinder, mm | : | 155 |
| No. of blades on the periphery of the disc | : | 12 |
| Cost, Rs. | : | 1,50,000/- |
| Speed of operation, km/h | : | 2.27 |
| Speed of ridge plastering disc, rpm | : | 327 |
| Speed of rotary blades, rpm | : | 228 |
| Rate of bund forming, m/h | : | 0.8 |
| Cost of operation, Rs. | : | 700-800 for 1000 m long bund |

## Benefits over conventional/traditional practices

- Reduction in cost of operation of up to Rs. 2000/ha and also saves time by 80-85%

**Design:** PJTSAU, Rajendranagar, Hyderabad (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

## Contact:

- Head, Agricultural Research Institute, FIM Scheme, Prof. Jaya Shankar Telangana State Agricultural University, Rajendranagar, Hyderabad – 500030 (Telangana), Phone: +91 - 40 – 24015011

# Tractor Operated Trencher for Laying of Subsurface Drainage Pipe

## Utility

The irrigation channels are formed by manual labour using local hand tools. It involves lot of labor and drudgery. A tractor operated irrigation channel former can be used for making irrigation channels in orchards with much ease. It opens the furrow, inverts the soil on the sides, and simultaneously compacts the side walls to form a clean and compact channel for irrigation purpose.

| Specifications & Performance results | | |
|---|---|---|
| Digging mechanism | : | Chain with blades |
| Pipe laying | : | Boom with roller |
| Overall weight, kg | : | 680 |
| Field capacity, m/h | : | 250 |
| Field efficiency, % | : | 78-81 |
| Cost of operation, Rs/h | : | 1,967-2,000 |
| Cost of machine, Rs | : | 300,000/- |

## Benefits over conventional/traditional practices

- It can easily be detached and attached to the tractor
- Saves 87% and 79%, in cost of operation against manual and excavator method of trenching, respectively.
- Saves 96% and 93% in time and labour against manual and excavator method of trenching, respectively

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Usha Agro Industries,Vidisha, Madhya Pradesh, Mr. Mukesh Kumar Gupta, Ph No. 9009820183, Email: ushaagro.ind@gmail.com
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated Auger Plough for Green Manuring and Straw Incorporation

## Utility

The green manuring and straw incorporation involve high labour and cost in traditional practice. Green manure and straw need to be cut and incorporated effectively in the soil in single pass.

A tractor operated two bottom auger plough can chop the green manure crop and there after it is incorporated into the soil at appropriate depth through proper coverage with pulverized soil.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 37 kW or above tractor |
| Weight, kg | : | 465 |
| Cost of implement, Rs. | : | 1.00 lakh |
| Average size of cut, mm | : | 255-310 |
| Working depth, mm | : | 180 |
| Operating speed, km/h | : | 3.5 |
| Effective field capacity, ha/h | : | 0.25 - 0.28 |
| Fuel consumption, l/h | : | 6.68 - 8.22 |
| Soil pulverization index, mm | : | 5.60 - 10.40 |
| Mixing index, % | : | 93.69 - 96.22 |
| Cost of operation, Rs./h | : | 1030 |

## Benefits over conventional/traditional practices

- The machine can incorporate the green manure crops into the soil which helps in early decomposition of the manure crop and also results in reduction in requirement of chemical fertilizers.

**Design:** PAU, Ludhiana(AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

## Contact:

- Principal Investigator (AICRP on FIM), Department of Farm Machinery & Power Engineering, Punjab Agricultural University, Ludhiana – 141004 (Punjab), Ph No. 0161 2401325, Email : hodfmpe@pau.edu

# Tractor Operated Bed Furrow Former

## Utility

It is suitable for forming alternate beds and channels. It is ideal for planting crops like sorghum, maize, cotton on the beds and channels for efficient irrigation management. The bed and furrow forming unit is made of thick mild steel sheet and bent in required shape. Stiffeners are provided in the equipment to strengthen the bed and furrow forming unit. The implement is operated in the tilled soil.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 26 kW or more Tractor |
| Weight, kg | : | 115 |
| Size of forming unit | : | Three `V ' shaped former, depth 150 mm and top width 450 mm |
| Cost of equipment, Rs. | : | 20,000 |
| Operational speed, km/h | : | 3.0-3.5 |
| Field capacity, ha/h | : | 0.75-1.0 |
| Field efficiency, % | : | 40-45 |
| Width of coverage, m | : | 2.25 (3-furrows at 750 mm centre distance) |
| Cost of operation, Rs./ha | : | 1000 |

## Benefits over conventional/traditional practices

- Saves 97.5% labour and operating time.
- Saves 73% on cost of operation.

**Design:** PAU, Ludhiana(AICRP on FIM)

**Commercialization Status:** Commercialized

## Contact:

- Principal Investigator (AICRP on FIM), Department of Farm Machinery & Power Engineering, Punjab Agricultural University, Ludhiana – 141004 (Punjab)Ph No. 0161 2401325, Ph No. 0161 2401325, Email : hodfmpe@pau.edu

# Tractor Operated Peg Type Puddler

## Utility

Suitable for preparing good puddled bed for transplanting of paddy seedlings. It consists of rectangular frame, pegs and three point hitch system. The square pegs mounted on three bars are uniformly staggered in partial helical configuration, for better dispersion of soil. The puddler is operated in 50-100 mm of standing water. As the puddler moves, the pegs tear the soil, uproot the weeds, disperse the soil in water and level the field.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 26 kW or more Tractor |
| Weight, kg | : | 90 |
| Working width, mm | : | 2000 |
| Cost of equipment, Rs. | : | 15,000 |
| Working depth, mm | : | 150-200 |
| Field capacity, ha/h | : | 0.4 |
| Draft,N | : | 1000 |
| Cost of operation, Rs./h | : | 800-1000 |

## Benefits over conventional/traditional practices

- It saves two passes and Rs.2500-3000/ha.
- Command 12 ha more in a season of 100 h of use.
- Reduces drudgery and allows timeliness in operation.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Saptagiri Enterprises, Bellary, Karnataka, Ph. No. 9880783674 Email: ompateltapra@gmail.com
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated Pulverizing Roller Attachment to Cultivator

## Utility

It is used as an attachment behind the cultivator and is suitable for puddling as well as dry seedbed preparation in two runs, and creates good puddle. The roller consists of 6 pulverizing members whichare fixed in such a way that they give a helical shape. This is done to increase the ground Availability of the roller. Pulverizing roller attachment to cultivator with helical blades enhances soil pulverization.

| Specifications & Performance results | | |
|---|---|---|
| Power source,kW | : | 26 kW or more Tractor |
| Weight, kg | : | 125 |
| Cost of equipment, Rs. | : | 6,000-8000 |
| Working width, mm | : | 2000-2300 |
| Working depth, mm | : | 50-100 |
| Field capacity, ha/h | : | 0.4-0.5 |
| Field efficiency, % | : | 70 |
| Cost of operation, Rs./ha | : | 1800 |

## Benefits over conventional/traditional practices

- Gives better puddling in comparison to other tillage equipment.
- 20-35% saving in fuel and 20-30% saving in time.
- It saves 20-30 percent water requirement for paddy fields, due to better puddling.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated Mole Plough for Pipeless Drainage in Vertisols

## Utility

It is used for making pipe less drainage channels in the soil, 500-600 mm below the soil surface, at 6 m lateral distance between the two successive channels. Drainage channels facilitate Improved soil health and provides better environment for the crops to grow and less chances of weed infestation and associated soil degradation problems. Kharifcrop yields increased upto 50% over control. Due to improvement of soil physical properties, the rabi crop yields were also increased by 13-15%.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 55 kW Tractor |
| Weight, kg | : | 70 |
| Foot diameter, mm | : | 75 |
| Expander diameter, mm | : | 85 |
| Desired Soil Moisture at moling depth, % | : | 26-28% (dwb) |
| Clay content, % | : | > 40 at moling depth |
| Cost of equipment, Rs. | : | 15,000 |
| Moling depth, mm | : | 500-600 |
| Speed of operation, km/h | : | <1 |
| Field capacity, ha/h | : | 0.24 |
| Draft, N | : | 30000 |
| Cost of operation, Rs./ha | : | 3500-4000 (spaced at 4 m) |

## Benefits over conventional/traditional practices

- It saves about 90 per cent of time over conventional practices of surface drain construction.
- Saves about 60 per cent of labour cost.
- Life of mole drains is over 5 years, whereas surface drains are to be constructed every season.
- Labour requirement for weeding reduces by over 50 per cent, hence reduced input cost.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134, 0755-2521134; Email: directorciae@gmail.com

# SOWING, PLANTING AND TRANSPLANTING EQUIPMENT

# 4 - Row Women Friendly Direct Paddy Seeder

## Utility

The ergonomically-refined improved direct paddy seeder consists of two numbers of seed hoppers, a pair of ground wheels, main shaft and drums. It can sow four rows at a time.

| Specification & Performance results: | | |
|---|---|---|
| Power Source | : | Manual |
| Draft, N | : | 95 |
| Weight, kg | : | 7.2 |
| Working width, m | : | 0.8 |
| Speed of operation, m/s | : | 0.28 |
| Field capacity, ha/h | : | 0.06 |
| Labour requirement, man-days/ha | : | 1 |
| Cost, Rs | : | 4,700/- |
| Cost of operation, Rs/ha | : | 1,000/- |

## Benefits over conventional/traditional practices

- Total duration of crop is reduced by 10-15 days.
- About 40% saving in seed rate and 90% saving in cost and time compared to traditional transplanting method.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s KSNM Marketing SF No. 29/1B, Ona Palayam , Green Home Via, Dheenam Palayam Post, Coimbatore – 641109, Contact No.: +91 94890 61175, Email: info@ksnm.in, ms@ksnm.in
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# 8 - Row Direct Paddy Seeder

## Utility

The eight row improved direct paddy seeder can sow pre-germinated paddy seeds in eight rows at a time.

| Specification & Performance results: | | |
|---|---|---|
| Power Source | : | Manual |
| Weight, kg | : | 8.5 |
| Draft, N | : | 168 |
| Width, m | : | 1.6 |
| Speed of operation, m/s | : | 0.28 |
| Field capacity, ha/h | : | 0.13 |
| Labour requirement, man-days/ha | : | 1 |
| Cost, Rs | : | 4,700/- |
| Cost of operation, Rs/ha | : | 500/- |

## Benefits over conventional/traditional practices

- Total duration of crop is reduced by 10-15 days.
- About 40% saving in seed rate and 90% saving in cost and time compared to traditional transplanting method.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s KSNM Marketing SF No. 29/1B, Ona Palayam , Green Home Via, Dheenam Palayam Post, Coimbatore – 641109, Contact No.: +91 94890 61175, Email:info@ksnm.in, ms@ksnm.in
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# 8 - Row Manual Drum Seeder (Hyperboloid Shape)

## Utility

Drum Paddy Seeder is suitable for sowing sprouted paddy seed in puddled field. It is light weight pulling machine and also it is very easy to handle. It gives uniformity in seed sowing and line sowing and permits mechanical weeding. It reduces the manual effort and help farmers maximize their output. Each seed drum has two rows of planting. Four drums can be assembled to form 8 rows of sowing.

| Specifications & Performance results | | |
|---|---|---|
| Power requirement | : | One person |
| Weight, kg | : | 20 |
| Number of drums | : | 4 |
| Number of rows | : | 8 |
| Row to row spacing, mm | : | 200 |
| Shape of the seed drum | : | Hyperboloid |
| Diameter of the drum, mm | : | 200 |
| Working width, mm | : | 1400 |
| Effective field capacity (ha/h) | : | 0.093 |

## Benefits over conventional/traditional practices

- Reduces seed rate by 60-65% as compared to broadcast seeding.
- Uniformity in seed sowing and plant population.
- Optimum seed rate can be achieved.
- Crop matures 7-10 days earlier than the transplanted paddy.
- Light in weight and easy to handle.

**Design:** ICAR-NRRI, Cuttack

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Director, ICAR-National Rice Research Institute, Cuttack, Odisha-753006, Phone: +91-671-2367757/67, Email: director.nrri@icar.gov.in, crrictc@nic.in

# 3 - Row Manual Puddle Seeder

## Utility

It is a manual drawn seeder. It is suitable for sowing of pre-germinated rice seed in puddle field. It has float on the front to avoid sinkage of the machine. Metering device consists of plastic wheels with grooves on its periphery. The seed rate is controlled by varying the positioning of seed box.

| Specifications & Performance results | | |
|---|---|---|
| Power Requirement | : | One person |
| Weight, kg | : | 15 |
| Cost, Rs | : | 4000 |
| Number of rows | : | 3 |
| Row to row spacing, mm | : | 200 |
| Working width, mm | : | 600 |
| Metering roller | : | Plastic wheels having grooves |
| Number of ground wheel | : | 2 |
| Depth of sowing, mm | : | 30-80 adjustable |
| Field capacity (ha/h) | : | 0.15 |

## Benefits over conventional/traditional practices

- Suitable for sowing pre-germinated rice seed in puddle conditions.
- Saves labour, time and cost of operation.
- The labour requirement in weeding is reduced by 70% due to use of mechanical weeders.
- Uniformity in seed sowing and Plant population.

**Design:** ICAR-NRRI, Cuttack

**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-National Rice Research Institute, Cuttack, Odisha-753006, Phone: +91-671-2367757/67, Email: director.nrri@icar.gov.in, crrictc@nic.in

# 6 - Row Manual Drum Seeder

## Utility

Drum paddy seeder is used for sowing germinated paddy seed directly in wetland field. There is no need for transplantation. It gives uniformity in seed sowing and line sowing and permits mechanical weeding. Each seed drum has two rows of planting. Three drums can be assembled to form 6 rows of seed sowing. Wheels are provided at both ends.

| Specifications & Performance results | | |
|---|---|---|
| Power requirement | : | One person |
| Weight, kg | : | 14 |
| Cost, Rs | : | 7000/- |
| Number of seed drums | : | 3 |
| Number of rows | : | 6 |
| Row to row spacing, mm | : | 200 |
| Shape of the seed drum | : | Cylindrical |
| Diameter of the drum, mm | : | 200 |
| Diameter of the seed metering hole, mm | : | 10 |
| Working width, mm | : | 1000 |
| Effective field capacity (ha/h) | : | 0.04 |

## Benefits over conventional/traditional practices

- Reduces the manual effort and helps farmers maximize their output.
- Reduced seed rate by 55-60% as compared to broadcast seeding.
- Labour requirement in weeding is reduced by 70% due to use of mechanical weeders.
- Uniformity in seed sowing and plant population.
- Optimum seed rate can be achieved by adjusting the metering holes opening.
- Crop matures 7-10 days earlier than the transplanted paddy.

**Design:** ICAR-NRRI, Cuttack

**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-National Rice Research Institute, Cuttack, Odisha-753006, Phone: +91-671-2367757/67, Email: director.nrri@icar.gov.in, crrictc@nic.in

# 4 - Row Manual Drum Seeder

## Utility

Drum paddy seeder is suitable for sowing sprouted paddy seed in puddled field. It is light weight pulling machine and it is very easy to handle. It gives uniformity in seed sowing and line sowing and permits mechanical weeding. It reduces the manual effort and helps farmers to maximize their output. Each seed drum has two rows of planting. Two drums can be assembled to form 4 rows of sowing. Adjustable floats are provided for easy operation under puddled field condition.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | One person |
| Weight, kg | : | 10 |
| Number of drums | : | 2 |
| Number of rows | : | 4 |
| Row to row spacing, mm | : | 200 |
| Shape of the seed drum | : | Hyperboloid |
| Diameter of the drum, mm | : | 200 |
| Working width, mm | : | 600 |
| Diameter of the ground wheel, mm | : | 500 |
| Effective field capacity (ha/h) | : | 0.03 |

## Benefits over conventional/traditional practices

- Reduces seed rate by 60-65% as compared to broadcast seeding.
- Uniformity in seed sowing and plant population.
- Optimum seed rate can be achieved.
- Crop matures 7-10 days earlier than the transplanted paddy.
- Light in weight and easy to handle.

**Design:** ICAR-NRRI, Cuttack

**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-National Rice Research Institute, Cuttack, Odisha-753006, Phone: +91-671-2367757/67, Email: director.nrri@icar.gov.in, crrictc@nic.in

# 4 - Row Manual Rice Transplanter

## Utility

Manual rice transplanter can be used for timely transplanting of paddy and reduced cost of cultivation with better crop yield. The four row manual transplanter comprises of floats, a main frame assembly made of MS pipe that supported the seeding tray made of G.I. sheet, pushing lever tray indexing mechanism, picker bar assembly and handle.

| Specifications & Performance results | | |
|---|---|---|
| Power requirement | : | One person |
| Weight, kg | : | 20 |
| Adaptable seedlings | : | Mat type |
| Age of Seedlings | : | 21 days |
| Row to row distance, mm | : | 240 |
| Width of machine, mm | : | 1200 |
| No of rows | : | 4 |
| Hill to hill distance, mm | : | 10-12 |
| No.of hills/sqm | : | 38 |
| No.of plants/hill | : | 2-5 |
| Planting depth, mm | : | 30-45 |
| Missing hill, % | : | 8 |
| Field capacity, ha/h | : | 0.03 |
| Labour requirement, mandays/ha | : | 8 |

## Benefits over conventional/traditional practices

- Suitable for transplanting of 20-25 days old mat type rice seedlings.
- Saves 30-40% labour requirement and 40% cost in transplanting operation.
- Manual transplanter is more economical and labour saving compared to manual transplanting.

**Design:** ICAR-NRRI, Cuttack

**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-National Rice Research Institute, Cuttack, Odisha-753006, Phone: +91-671-2367757/67, Email: director.nrri@icar.gov.in, crrictc@nic.in

# Manual Gladiolus Planter

## Utility

The gladiolus is one of the most important floriculture crops sown in a large area and requires 16 man-days/ha for planting using traditional practices. For timely planting of gladiolus corm, a light weight, low cost manually operated gladiolus planter has been developed and evaluated for planting gladiolus corm having an average thickness of 28 mm and of major and intermediate dimensions of 37.25 mm and 35.0 mm, respectively.

| Specification & Performance results | | |
|---|---|---|
| Power source | : | Manual |
| No. of actuating finger per plate | : | 6 |
| Cost, Rs. | : | 7,500/- |
| Speed of operation, m/s | : | 0.28 – 0.42 |
| Effective field capacity, ha/h | : | 0.03 |
| Picking efficiency single, % | : | 73 |
| Multiple index | : | 0.2 |
| Missing,% | : | 0.07 |
| Seed position upright, % | : | 37-38 |
| incline, % | : | 53-59 |
| downward, % | : | 3-10 |
| Cost of operation, Rs./ha | : | 1,800/- |

## Benefits over conventional/traditional practices

- 44% savings in labour and 40% savings in cost of operation as compared to traditional manual planting.

**Design:** PAU, Ludhiana (AICRP on FIM)

**Commercialization Status:** Ready for commercialization

## Contact:

- Principal Investigator (FIM Project), Department of Farm Machinery & Power Engineering, Punjab Agricultural University, Ludhiana – 141004 (Punjab), Ph No. 0161 2401325, Email: hodfmpe@pau.edu
- Project coordinator, AICRP on FIM, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal-462038 Ph. : 0755-2521134, Email : pc_fim ciae@icar.gov.in

# Manual Jute Seeder

## Utility

A low cost and light weight manually operated four row seed drill 'Jute seeder' for sowing jute and other small seeded up-land crops has been developed considering the socio-economic conditions and nature of land holding of farmers.

The seed drill mainly consists of seed drum-cum-dispenser, main shaft, ground-cum-transportation wheels, frame, furrow openers and seed covering device.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Manual (One person) |
| Weight, kg | : | 14 |
| Cost, Rs. | : | 4,100/- |
| Working, m | : | 1.0 |
| Effective field capacity, ha/h | : | 0.25 |
| Depth of seed placement, mm | : | 10-15 |
| Field efficiency, % | : | 90-95 |
| Labour requirement, man-h/ha | : | 4 |
| Cost of operation, Rs./ha | : | 252/- |

## Benefits over conventional/traditional practices

- Visibility of seed quantity inside the box helps in addition of seed as per requirement.
- Easy in operation and reduction in drudgery.
- Permits mechanical weeding through CRIJAF Single wheel jute weeder reduces labour requirement of about 50% per hectare.
- Saving in cultivation cost about Rs. 16,000-18,000/- per hectare.
- Increase in fibre yield about 15-20%.

**Design:** ICAR-CRIJAF, Barrackpore, Kolkata

**Commercialization Status:** Commercialized

**Contact:**

- M/s Creative Displayer, 55(26) S.N. Banerjee Road, Barrackpore, W.B.700120
- Director, ICAR-Central Research Institute for Jute & Allied Fibres, Barrackpore, Kolkata-700 121, West Bengal. Phone: 033-25356121/6122; Fax: 033-25350415. E-mail: crijaf-wb@nic.in; Website: www.crijaf.org.in

# Manual Multi-Row Jute Seed Drill

## Utility

It is a low cost manual seed sowing machine for jute. During operation, seed falls directly through seed dispensing holes from the seed boxes to the furrow. The seed dispensing holes maintain plant to plant distance in the field. The spacing between furrow openers is 250 mm.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Manual (One person) |
| Weight, kg | : | 16 |
| Cost, Rs. | : | 4,300/- |
| Working, m | : | 1.0 |
| Effective field capacity, ha/h | : | 0.20 |
| Field efficiency, % | : | 84.97 to 90.70 |
| Labour requirement, man-h/ha | : | 5 |
| Cost of operation, Rs./ha | : | 320/- |

## Benefits over conventional/traditional practices

- Reduces seed requirement by about 50% of the broadcast sowing method.
- Line sown crop facilitates other post-sowing operations.
- Mechanical intercultural operations in line sown crop reduce labour and cost for weeding and thinning by more than 50 per cent.
- The overall fibre yield increases about 10-15% .
- Reduction in cost of cultivation.

**Design:** ICAR-CRIJAF, Barrackpore, Kolkata

**Commercialization Status:** Commercialized

**Contact:**

- M/s Jai Maa Tara Enterprises., Sodepur, Muragacha, North 24 Pgs., W.B. Pin-700110
- M/s Krishi Udyog, Samabaya Pally, Bally, Howrah, W.B. Pin-711205
- Director, ICAR-Central Research Institute for Jute & Allied Fibres, Barrackpore, Kolkata-700 121, West Bengal. Phone: 033-25356121/6122; Fax: 033-25350415, E-mail: crijaf-wb@nic.in; Website: www.crijaf.org.in

# Manual Single Row Seed Drill

## Utility

Row seeding is the most efficient means to sow the crops with optimum seed rate and also with maintained row to row spacing. Row seeding also promotes maximum tillering and better sunlight penetration. This is a small manually operated single row seed drill in which fluted roller metering mechanism is provided. Two ground wheels are provided on both sides of seed hoppers to drive the metering rollers. Seed are filled in a small hopper and a long beam is provided by which the implement can be pulled by one operator. Shovel type furrow openers are provided for easy operation.

| Specifications & Performance results | | |
|---|---|---|
| Power requirement | : | One labour |
| Number of rows | : | 1 |
| Weight, kg | : | 10 |
| Ground clearance, mm | : | 100 |
| Metering roller | : | Wooden roller |
| Number of seed metering holes | : | 5 |
| Seed rate, kg/ha | : | Adjustable |
| Number of ground wheel | : | 2 |
| Depth of sowing, mm | : | Adjustable up to 100 |
| Effective field capacity, ha/h | : | 0.008-0.01 |

## Benefits over conventional/traditional practices

- Minimizes the seed rate and gives better yield than broadcasting method.
- Simple seed metering and row to spacing can be adjusted as per requirements.
- Depth of seed placing is also adjustable for better germination of seeds.

**Design:** ICAR-NRRI, Cuttack

**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-National Rice Research Institute, Cuttack, Odisha-753006, Phone: +91-671-2367757/67, Email: director.nrri@icar.gov.in, crrictc@nic.in

# Manual Single Row Inclined Plate Planter

## Utility

Single row manually operated planter is a multi-crop planting equipment suitable for sowing of crops like groundnut, maize, pigeon pea, mustard, gram, soybean, etc. in small size fields

| Specification & Performance results | | |
|---|---|---|
| Power Source | : | Manual |
| Field capacity, ha/h | : | 0.05-0.08 |
| Field efficiency, % | : | 85-90 |
| Cost, Rs. | : | 2,000/- |
| Cost of operation, Rs./h | : | 30-60/- |

## Benefits over conventional/traditional practices

- It saves 20% seed and increases 20% in productivity due to uniform and accurate placement of seed.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

**Contact:**

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Manual Onion Seeder

## Utility

The seeder has seed chamber, main shaft and frame, wheels, seed closures and beam. The seed chamber having diameter of 150 mm and 50 mm width could drop required number of seeds at 2-3 km/h operating speed.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Manual |
| Weight, kg | : | 20 kg |
| Cost of machine, Rs. | : | 10,000/- |
| Capacity | : | 0.2 ha/h |

## Benefits over conventional/traditional practices

- Saving of time (60%), labour and cost over traditional practice.

**Design:** ICAR-IIHR, Bangalore

**Commercialization Status:** Commercialized

## Contact:

- M/s Dharma Technologies, Karnataka Ph: 0816-2292159, +919886737260 Email: info@dharmaagrotech.com
- M/s Varsha Associates, Sadashivanagar, Bangalore - 560 003 Tel (Off): 080 – 41236389; Mob: +9194483 96283; Fax: 08194 – 226648, E-mail: info@varshaagro.com; varshaassociates@gmail.com
- M/s Team Flame Engg& Solutions, Bangalore – 560 091, Mobile: +919844277339; E-mail: teamflame37@gmail.com
- Director, ICAR-IIHR, Hessaraghatta Lake Post, Bengaluru-560 089. E-mail director.iihr@icar.gov.in website:https://www.iihr.res.in

# Manual Pull Type 3- Row Planter

## Utility

It is a human operated pull type three row machine. With this machine small seeds and sorghum, millet, soybean, wheat etc. can be sown. It consists of a horizontal plate or a vertical plate based measuring system, which saves seed, fertilizer and operation cost compared to the traditional method.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Single man/women |
| Weight, kg | : | 22 |
| Working width, mm | : | 930 |
| Cost of equipment, Rs. | : | 7,700 |
| Operational speed, km/h | : | 1.47 |
| Working depth, mm | : | 20-25 |
| Field capacity, ha/h | : | 0.06-0.09 |
| Field efficiency, % | : | 65-68 |

## Benefits over conventional/traditional practices

- It is light weight low ground clearance multi-crop machine.
- Saves seeds and cost over traditional method.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- M/s Dharti agro engineering, Rajkot, Gujarat, Shri Chiman S Detroja Phone:7575035616 dhartiagro@rediffmail.com
- M/s Swastik Agro Industries, Rajnandgaon, Chhattisgarh, Mr. K. N. Dixit Email: paragb99@gmail.com Contact No.: 07744-281915, 9301899909
- M/s Vasundhara Krishi Yantra, Bhopal, Madhya Pradesh, Ranjit Singh Thakur (Director) Email: vkyu.bpl@gmail.com, Contact No. – 9893018158
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Manual Vegetable Transplanter

## Utility

It is a women friendly, hand held, light weight implement for transplanting of plug/pot type seedlings on ridges /raised beds or plastic mulch. Available in single row and double row configuration.

| Specifications & Performance results | | | |
|---|---|---|---|
| | | Single Row | Double Row |
| Power source | : | One Man/ Woman | One Man/ Woman |
| Weight, kg | : | 02 | 05 |
| Working width, mm | : | 500-600 | 610 |
| Cost of equipment, Rs. | : | 800/- | 1,600/- |
| Operational speed, km/h | : | 0.40 | 0.54 |
| Working depth, mm | : | 20-22 | 20-22 |
| Field capacity, seedlings per min | : | 15- 20 | 20-22 |
| Field efficiency, % | : | 40-45 | 60-75 |

## Benefits over conventional/traditional practices

- Light in weight, so that it can be easily carried to the field.
- Affordable and comparatively cheaper.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Dharti agro engineering, Rajkot, Gujarat, Shri Chiman S Detroja Phone:7575035616 dhartiagro@rediffmail.com
- M/s Vasundhara Krishi Yantra, Bhopal, Madhya Pradesh, Ranjit Singh Thakur (Director) Email: vkyu.bpl@gmail.com Contact No. – 9893018158
- Centre for Appropriate Technology Research and Development (CATRD), Bhopal, Madhya Pradesh, Shri S. R. Azad, Email-catrd.bpl@gmail.com, Phone - 9425009257, 9826160634
- Vainketesh Laxmi Krishi, Bhopal, Madhya Pradesh, E-mailvenkateshlaxmibhopal@gmail.com, Contact No: 9425017929, 9425607880
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Bullock Operated 3 - Row Seed Drill

## Utility

It is bullock operated seed drill suitable for sowing of paddy in dry fields. Row seeding also promotes maximum tillering and better sunlight penetration. Row seeding is the most efficient means to sow the crops with optimum seed rate and also with maintained row to row spacing. It consists of frame, 3 seed boxes, 3 seed metering cups, one axle, two ground wheels, float, three furrow openers and one handle fitted in the frame. The seed rate is controlled by varying the positioning of seed box.

| Specifications & Performance results | | |
|---|---|---|
| Power Requirement | : | A pair of bullock |
| Number of rows | : | 3 |
| Row to row spacing, mm | : | Adjustable, 250 mm |
| Working width, mm | : | Adjustable, 600 mm |
| Metering roller | : | Cup feed type |
| Depth of sowing, mm | : | Adjustable, 50 mm |
| Field capacity (ha/h) | : | 0.15 |
| Seed rate, (kg/ha) | : | Adjustable |

## Benefits over conventional/traditional practices

- It gives uniform row to row spacing for easy intercultural operation.
- Seed rate is also controlled by setting up height of seed boxes.
- Working width is easily adjusted as per need of crop spacing required.
- By changing the cup size this implement can be used for other crops also.

**Design:** ICAR-NRRI, Cuttack

**Commercialization Status:** Commercialized

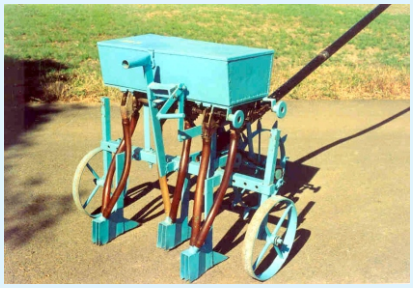
**Contact:**

- Director, ICAR-National Rice Research Institute, Cuttack, Odisha-753 006, Phone: +91-671-2367757/67, Email: director.nrri@icar.gov.in, crrictc@nic.in

# Bullock Operated 3 - Row Seed-cum-Fertilizer Drill

## Utility

The proper distribution of seed and fertilizer greatly depends on skill of operator and it is not possible to maintain uniformity of depth of placement. This machine could sow the entire crop and apply fertilizer in rows and would be very useful to the farmers for precise as well as timely sowing operations.



| Specification & Performance results: | | |
|---|---|---|
| Power Requirement | : | A pair of bullock |
| Weight, kg | : | 50 |
| Draft, N | : | 500 |
| Working width, mm | : | 225-700 |
| Operating speed, m/s | : | 0.56-0.7 |
| Labour requirement, man-days/ha | : | 0.5-1.25 |
| Field capacity, ha/h | : | 0.10-0.15 |
| Field efficiency, % | : | 65-70 |
| Cost, Rs | : | 9,000/- |
| Cost of operation, Rs/ha | : | 350-500/- |

## Benefits over conventional/traditional practices

- It helps in precise and timely sowing operation.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Suraj Sales Corporation, Ahemadabad, Phone: 07947422598
- M/s Shri Manak Industries, Bhopal, Mr. M.L. Vishwakarma, Email: manakindustriesbhopal@gmail.com, Contact No.: 91-755-2581683, 9993035566, 9425687798 8989821564
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Bullock Operated Single Row Inclined Plate Planter

## Utility

Animal drawn single row planter is multi-crop planting equipment suitable for sowing of crops like groundnut, maize, pigeon pea, mustard, gram, soybean, etc. in small size fields.

| Specification & Performance results | | |
|---|---|---|
| Power Source | : | A pair of bullocks |
| Field capacity, ha/h | : | 0.05-0.1 |
| Field efficiency, % | : | 80-85 |
| Cost of equipment, Rs. | : | 2,500 |
| Cost of operation, Rs./ha | : | 800-1000 |

## Benefits over conventional/traditional practices

- It saves 20% seed and increases 20% in productivity due to uniform and accurate placement of seed.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

**Contact:**

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Bullock Operated 3-Row Inclined Plate Planter

## Utility

It is multi-crop planting equipment suitable for sowing of crops like groundnut, maize, pigeon pea, mustard, gram, soybean, etc. The planter is provided with three modular design seed boxes with independent inclined plate type seed metering mechanism. Furrow openers are adjustable for sowing seeds at different row-to-row spacing. Shoe type furrow openers ensure low draft requirement of the machine. Seed plates can easily be changed for sowing different crops. The planter is also suitable for sowing of intercrops.

| Specification & Performance results: | | |
|---|---|---|
| Power source | : | Medium size pair of bullocks |
| Labour requirement, man-days/ha | : | 0.7-1 |
| Field capacity, ha/h | : | 0.16-0.2 |
| Field efficiency, % | : | 60-70 |
| Cost, Rs | : | 15,000/- |
| Cost of operation, Rs/ha | : | 300-400/- |

## Benefits over conventional/traditional practices

- Use of this equipment results in reduced human drudgery and saves farmer's time.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- M/s Vasundhara Krishi Yantra, Bhopal, Madhya Pradesh, Ranjit Singh Thakur (Director) Email: vkyu.bpl@gmail.com, Contact No. - 9893018158
- M/s Shri Manak Industries, Bhopal, Mr. M.L. Vishwakarma, Email: manakindustriesbhopal@gmail.com, Contact No.: 91-755-2581683, 9993035566, 9425687798 8989821564
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Bullock Operated Vertical Rotor Planter for Vertisols

## Utility

Farmers use traditional manual methods to plant cotton seed, which requires more time and labour. Bullock drawn vertical rotor type planter has been developed for planting of delinted cotton and other bold seeds at specified row and plant spacing and at desired depth in vertisols. Timely planting with no extra seed requirement and no seed damage can be achieved with this planter in vertisols. The planter incorporates arrangements to clean the sticking soils off the drive and depth guage wheels while in operation.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | A pair of bullocks |
| Weight, kg | : | 50 |
| Cost, Rs | : | 12000/- |
| Number of rows | : | 2 |
| Seed metering mechanism | : | Vertical rotor with seed pockets |
| Furrow openers | : | Shoe type |
| Row to row distance,mm | : | 300, 600, 900 Variable |
| Field capacity, ha/h | : | 0.2 |

## Benefits over conventional/traditional practices

- Accurate placing of delinted cotton seeds in rows.
- Maintains plant to plant spacing within rows.
- Uniform depth of seed placement especially in vertisols.

**Design:** ICAR-CICR, Nagpur

**Commercialization Status:** Commercialized

**Contact:**

- M/s Precision Tooling Engineers, Nagpur, Sh. M.G. Bhatt,Phone: 07104-236787, 237507, Fax: 07104-235307
- Director, ICAR-Central Institute for Cotton Research, Nagpur, Tel: (07103) 275536, Email: cicrnagpur@gmail.com, www.cicr.org.in

# Bullock Operated 4 - Row Groundnut Planter for Ananthapur Region of Andhra Pradesh

## Utility

The bullock drawn 4 row groundnut planter for Ananthapur region of Andhra Pradesh has been developed to reduce labour requirement during peak season.

| Specification & Performance results | | |
|---|---|---|
| Equipment width, mm | : | 120 |
| Row to row spacing, mm | : | 300 |
| Plant to plant spacing, mm | : | 100 |
| Weight, kg | : | 55 |
| Field capacity, ha/h | : | 0.25-0.31 |
| Cost of operation, Rs/h | : | 150 |

## Benefits over conventional/traditional practices

- Reduces drudgery and performs timely operation.

**Design:** AICRP on UAE

**Commercialization Status:** Ready for commercialization

## Contact:

- Project Coordinator, AICRP on UAE, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521172; Email: aicrponuae@gmail.com

# Bullock Operated Improved Wing Plough

## Utility

The bullock operated improved wing plough has been developed for shallow puddling at depth of 100 mm in rice cultivation. It is simple in design, light weight, easy to operate, require less draft and can be manufactured at regional level by local artisans.

| Specification & Performance results | | |
|---|---|---|
| Power Source | : | A pair of bullock |
| Weight, kg | : | 8 |
| Field capacity, ha/h | : | 0.025 |
| Cost, Rs. | : | 1,000/- |
| Cost of operation, Rs./ha | : | 1500/- |

## Benefits over conventional/traditional practices

- The field capacity of equipment is 40% higher over traditional plough working in the hilly region and life (5 years) is 50% more, requiring less repair and maintenance cost.
- The cost of operation is 40-50% lesser than traditional plough benefiting the farmers.
- The draught requirement is also 15 kg less compared to traditional plough.

**Design:** ICAR-CAEPHT, Gangtok (AICRP on UAE)

**Commercialization Status:** Ready for commercialization

**Contact:**

- Principal Investigator (FIM Project), College of Agricultural Engineering and Post-Harvest Technology CAEPHT, Ranipool, Sikkim 737135, Email: registrar.cau@gov.in

# Bullock Operated Zero-till Seed-cum-Fertilizer Drill

## Utility

Animal drawn zero-till seed-cum-fertilizer drill is available in 3 sizes (1/2/3 rows) and may be selected depending on pulling capacity of work animals. It has inverted 'T' type furrow openers and seed/fertilizer box with metering mechanism. Due to minimum disturbance of soil in zero tillage, this implement is able to prevent soil erosion, a major problem in hill region.

| Specification & Performance results | | |
|---|---|---|
| Power Source | : | A pair of bullock |
| Weight, kg | : | 40-60 |
| Draught, N | : | 400-600 |
| Field capacity, ha/h | : | 0.02-0.06 |
| Cost, Rs. | : | 4,000/- |
| Cost of operation, Rs./ha | : | 700-1800/- |

## Benefits over conventional/traditional practices

- As compared to the traditional practice of farmers there is saving in cost of operation by Rs. 1200-2300/ha, time by 60-85 h/ha and increased yield by 4-5%.

**Design:** AICRP on UAE

**Commercialization Status:** Ready for commercialization

**Contact:**

- Project Coordinator, AICRP on UAE, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521172; Email: aicrponuae@gmail.com

# Bullock Operated Single Row Zero-Till Drill

## Utility

A light weight zero-till seed drill developed for use in narrow terraces of Sikkim. The weight of equipment is 18.5 kg. Fluted roller metering system and inverted T furrow openers were used in the seed drill. Due to minimum disturbance of soil in zero tillage, this implement will be able to prevent soil erosion, a major problem in hill region.

| Specification & Performance results | | |
|---|---|---|
| Power Source | : | A pair of bullock |
| Weight, kg | : | 18.5 |
| Field capacity, ha/h | : | 0.03 |
| Cost, Rs. | : | 2,500/- |
| Cost of operation, Rs./ha | : | 1100/- |

## Benefits over conventional/traditional practices

- The use of seed drill results in 45% savings in labour requirement, 30-40% saving in time of operation and 64% saving in cost of operation under terrace farming of rice.

**Design:** CAEPHT, Ranipool, Sikkim (AICRP on UAE)

**Commercialization Status:** Ready for commercialization

**Contact:**

- Principal Investigator (FIM Project), College of Agricultural Engineering and Post-Harvest Technology CAEPHT, Ranipool, Sikkim 737135, Email: registrar.cau@gov.in

# Bullock Operated Raised Bed Planter with Seeding/ Planting Attachment

## Utility

Animal drawn raised bed planter with seeding/planting attachment has single bed former on which either 2 row seed-cum-fertilizer drill or inclined plate planting unit is mounted. It is suitable for seeding of different crops such as soybean, wheat gram, etc., as well as vegetable seeds, such as okra, pea, etc.

| Specification & Performance results | | |
|---|---|---|
| Power Source | : | A pair of bullocks |
| Weight, kg | : | 45 |
| Draught, N | : | 600 |
| Field capacity, ha/h | : | 0.05 |
| Cost, Rs. | : | 4,000/- |
| Cost of operation, Rs./ha | : | 1,000/- |

## Benefits over conventional/traditional practices

- The use of this implement results in 50% savings in cost of operation and 60% saving in labour cost.
- The estimated saving in irrigation cost is Rs. 300/- per irrigation.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

**Contact:**

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Bullock Operated Indira Seed Drill

## Utility

Bullock operated Indira seed drill developed for the purpose of promoting line sowing of paddy as an alternative to baisi system of rice cultivation in Chhattisgarh. It helps in achieving timeliness in farm operations and reduction in drudgery.

| Specification & Performance results: | | |
|---|---|---|
| Power Source | : | A pair of bullocks |
| Metering mechanism | : | Fluted roller type |
| Number of rows | : | 3 |
| Furrow opener | : | Shoe type |
| Draught, N | : | 555 |
| Field capacity, ha/h | : | 0.10 |
| Cost of equipment, Rs | : | 4,000 |
| Cost of operation, Rs/ha | : | 400-500 |

## Benefits over conventional/traditional practices

- As compared to broadcasting in baisi rice cultivation, line sowing of paddy results in 10-15% increased yields and it is possible to carry out weeding operations.

**Design:** MPUAT, Udaipur

**Commercialization Status:** Commercialized

## Contact:

- Principal Investigator (FIM Project), College of Technology & Engineering, Maharana Pratap University of Agriculture & Technology, Udaipur- 313001 (Rajasthan), Tel: 91-294-2470119, 2980604(R), Email : deempuatudr@gmail.com
- M/s M.M. Engineering Works, Udaipur, Tel: 0294 294 6294
- M/s Kalpana Enterprises, Udaipur, Phone: +91 9413772301, 0294 2491364

# Bullock Operated Multipurpose Tool Carrier with Attachments

## Utility

The wheeled type multipurpose tool carrier with attachments has been developed to achieve timeliness in farm operations. Operations possible with tool frame are ploughing, secondary tillage with cultivator, sowing, bed forming, and bund making. In addition, it has a trailer attachment as well as provision for attaching water.

| Specification & Performance results | | |
|---|---|---|
| Power Source | : | A pair of bullocks |
| Draught, N | : | 280-710 |
| Field capacity, ha/h | : | 0.05-0.32 |
| Cost of equipment, Rs | : | 30,000 |
| Cost of operation, Rs/ha | : | 50 |

## Benefits over conventional/traditional practices

- The main advantages are 300-400% increased field capacity and 250-350% command area.

**Design:** MPUAT, Udaipur

**Commercialization Status:** Commercialized

**Contact:**

- Principal Investigator (FIM Project), College of Technology & Engineering, Maharana Pratap University of Agriculture & Technology, Udaipur- 313001 (Rajasthan), Tel: 91-294-2470119,Email : deempuatudr@gmail.com
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- M/s Kalpana Enterprises, Udaipur, Phone: +91 9413772301, 0294 2491364

# Bullock Operated Onion Seeder

## Utility

The seeder has seed chamber, main shaft and frame, wheels, seed closures and beam. The seed chamber having diameter of 150 mm and 50 mm width could drop required number of seeds at 2-3 km/h operating speed.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | A pair of bullocks |
| Weight, kg | : | 30 kg |
| Cost of machine, Rs. | : | 25,000/- |
| Capacity | : | 0.4 ha/h |

## Benefits over conventional/traditional practices

- Saving of time (50%), labour and cost over traditional practice.

**Design:** ICAR-IIHR, Bangalore

**Commercialization Status:** Commercialized

## Contact:

- M/s Dharma Technologies, Karnataka Ph: 0816-2292159, +919886737260 Email: info@dharmaagrotech.com
- M/s Varsha Associates, Sadashivanagar, Bangalore - 560 003 Tel (Off): 080 – 41236389; Mob: +9194483 96283; Fax: 08194 – 226648, E-mail: info@varshaagro.com; varshaassociates@gmail.com
- M/s Team Flame Engg & Solutions, Bangalore – 560 091, Mobile: +919844277339; E-mail: teamflame37@gmail.com
- Director, ICAR-IIHR, Hessaraghatta Lake Post, Bengaluru-560 089. E-mail director.iihr@icar.gov.in website:https://www.iihr.res.in

# Bullock Operated 3 - Row Planter with Fertilizer Drill

## Utility

It is fitted with a descending plate based seed metering system. This machine is suitable for multiple crops like soybean, jowar, bajra, wheat, gram, etc.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Pair of Bullock |
| Weight, kg | : | 70 |
| Working width, mm | : | 1042 |
| Cost of equipment, Rs. | : | 17,500 /- |
| Operational speed, km/h | : | 1.5-2 |
| Working depth, mm | : | 40-50 |
| Field capacity, ha/h | : | 0.10 – 0.12 |
| Field efficiency, % | : | 65-68 |

## Benefits over conventional/traditional practices

- Light in weight, so that it can be easily carried to the field.
- Affordable and comparatively cheaper.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- M/s Dharti agro engineering, Rajkot, Gujarat, Shri Chiman S Detroja Phone:7575035616 dhartiagro@rediffmail.com
- M/s Swastik Agro Industries, Rajnandgaon, Chhattisgarh, Mr. K. N. Dixit Email: paragb99@gmail.com Contact No.: 07744-281915, 9301899909
- Centre for Appropriate Technology Research and Development (CATRD), Bhopal, Madhya Pradesh, Shri S. R. Azad, Email-catrd.bpl@gmail.com, Phone - 9425009257, 9826160634
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Power Tiller Operated Till Plant Machine

## Utility

The equipment can perform the job of roto-tilling as well as sowing of seeds and application of fertilizer. Operator can sit on the seed box without any inconvenience. Machine can be operated in heavy, medium and light soil as well as able to drill the seeds with reasonably good accuracy. The planting system is mounted on the rear of the rotavator with the help of special hitch designed for it. The power to planting attachment is transmitted from the spiked ground wheel with the help of chain and sprocket.

| Specification & Performance results | | |
|---|---|---|
| Power requirement, kW | : | 6-7 kW power tiller |
| Weight, kg | : | 80 |
| Working width, mm | : | 225-700 |
| Operating speed, m/s | : | 0.42-0.56 |
| Labour requirement, man-days/ha | : | 1-1.5 |
| Fuel consumption, l/h | : | 1.25 |
| Field capacity, ha/h | : | 0.08 - 0.12 |
| Cost of equipment, Rs. | : | 15,000/- |
| Cost of operation, Rs./ha | : | 1500-1600/- |

## Benefits over conventional/traditional practices

- Timely sowing and expanded utilization of power tiller.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

**Contact:**

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Power Tiller Operated Zero-Till Drill for Hilly Region

## Utility

In Himachal Pradesh, the farming is practiced in terraces and sloppy land. The soil resource has suffered from degradation over the past many years. The major contributor to this trend in soil organic matter loss is the tilling of soil with disc plough and cultivator in preparing the land for seeding. Therefore, a power tiller operated zero-till drill has been developed for hilly region.

| Specification & Performance results | | |
|---|---|---|
| Operating speed, m/s | : | 0.58 |
| Field capacity, ha/h | : | 0.09-0.10 |
| Cost, Rs. | : | 20,000/- |

## Benefits over conventional/traditional practices

- The cost of operation with zero-till drill was 60-63% lower as compared to traditional method.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

**Contact:**

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Power Tiller Operated Multi-Crop Seed Drill

## Utility

Five row power tiller operated seed drill can be used for dry sowing of crop like rice, wheat, green gram, and black gram etc. It is mounted on the back side of power tiller. Machine is consisting of seed box, fluted roller type seed metering mechanism, frame, furrow openers, ground wheel, power transmission system, ground wheel lifting mechanism, transport wheels and hitching mechanism.

| Specifications & Performance results | | |
|---|---|---|
| Power Source, kW | : | 6-7.5 kW Power tiller |
| Weight, kg | : | 67.5 |
| Number of rows | : | 5 |
| Type of furrow Opener | : | Shoe Type |
| Row to row Spacing, mm | : | 200 |
| Working depth | : | Adjustable |
| Seed rate, kg/ ha | : | Adjustable (0 to 100) |
| Transmission mechanism | : | Chain and sprocket mechanism |
| Effective field capacity, ha/h | : | 0.15 |
| Fuel consumption, l/h | : | 0.8 |

## Benefits over conventional/traditional practices

- No damage to rice seed in fluted roller when flaps are kept in down ward position.
- Accuracy in seed rate of green gram and black gram when flaps are kept in upward position.

**Design:** ICAR-NRRI, Cuttack

**Commercialization Status:** Commercialized

**Contact:**

- Director,ICAR-National Rice Research Institute, Cuttack, Odisha-753 006, Phone: +91-671-2367757/67, Email: director.nrri@icar.gov.in, crrictc@nic.in

# Power Tiller Operated Seed Drill for Rice and Groundnut

## Utility

Five row power tiller operated seed drill is useful for sowing rice and groundnut, etc. The seed drill consists of frame seed boxes, seed holding containers, seed metering mechanism, ground wheels support wheel, hitches and brackets and balancing weights. Seed metering mechanism has plastic metering wheels and grooves or cavities on their periphery. Two support wheels are fitted behind the main frame to give support to the machine during transport.

| Specifications & Performance results | | |
|---|---|---|
| Power Source, kW | : | 6-7.5 kW Power tiller |
| Overall width, m | : | 1.57 |
| Working width, m | : | 1.25 |
| Type of seed metering mechanism | : | Plastic wheels with 10 grooves on periphery |
| Furrow opener | : | Shoe type |
| Number of furrow opener | : | 5 |
| Row to row spacing, mm | : | Adjustable according to crop 200-250 |
| Number of seed boxes | : | 5 |
| Hill to hill spacing, mm | : | 150-160 |
| Effective field capacity, ha/h | : | 0.15 |
| Seed rate, kg/ha | : | Adjustable (20-150 ) |
| Cost of operation, Rs/ha | : | 1200/- |

## Benefits over conventional/traditional practices

- Different seed rates i.e. 0 to 150 kg/ha for rice and 0 to 135 kg/ha for groundnut could be achieved by adjusting the seed boxes at different heights above the seed containers.

**Design:** ICAR-NRRI, Cuttack

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Director,ICAR-National Rice Research Institute, Cuttack, Odisha, Phone: +91-671-2367757/67, Email: director.nrri@icar.gov.in, crrictc@nic.in

# Power Tiller Operated Seed-cum-Fertilizer Drill

## Utility

Designed for power tiller of 8-10 hp size to drill seed and fertilizer in row. It is suitable for sowing seeds of wheat, soybean, bengal gram, sorghum, etc. in medium and heavy soil.

| Specification & Performance results: | | |
|---|---|---|
| Power Source | : | Power tiller |
| Weight, kg | : | 120 |
| Working width, mm | : | 1,100 |
| Working depth, mm | : | 60 |
| Speed of operation, m/s | : | 0.56-0.83 |
| Field capacity, ha/h | : | 0.22-0.25 |
| Field efficiency, % | : | 70-75 |
| Fuel consumption, l/h | : | 1.1 |
| Cost of equipment, Rs | : | 18,000/- |
| Cost of operation, Rs/ha | : | 600-800/- |

## Benefits over conventional/traditional practices

- Sowing of seeds and fertilizer uniformly in rows leads to timely operation and superior plant stand.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- M/s Saptagiri Enterprises, Bellary, Karnataka, Ph. No. 9880783674 Email: ompateltapra@gmail.com
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Seed-cum-Fertilizer Drill for Relay Sowing of Wheat in Cotton Crop

## Utility

Sowing of wheat seeds manually in standing cotton crop is popular relay cropping system in states of Punjab and Haryana. To address the issue, the power weeder of BCS make has been modified to attach a four row seed drill for sowing of wheat in cotton-wheat relay cropping system.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW engine | : | 2.6 |
| Weight, kg | : | 50 |
| Cost, Rs. | : | 15,000/- |
| Forward speed, m/s | : | 0.48 |
| Average working depth, mm | : | 84 |
| Effective field capacity, ha/h | : | 0.12 |
| Field efficiency, % | : | 70 |
| Cost of operation, Rs./ha | : | 1,600/- |

## Benefits over conventional/traditional practices

- Net saving of Rs. 2460/ha in cost of operation for sowing wheat under relay cotton as compared to conventional practice.

**Design:** CCSHAU, Hisar(AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

## Contact:

- Principal Investigator (FIM Project), Department of Farm Machinery & Power Engg., CCS Haryana Agril. University, Hisar – 125004 (Haryana), Tel: 91-1662-231171-73 Fax: 91-1662-284304, 240255 Email: dr@hau.ac.in

# Power Tiller Operated Inclined Plate Planter

## Utility

In north eastern region, seeding of major crops is performed manually by broadcasting followed by ploughing using country plough. Few farmers also perform sowing by seed dropping through funnel attached with country plough. These methods consume high quantity of seeds and result in poor yields. Therefore, a power tiller operated light weight three row inclined plate planter has been developed for sowing of maize, soybean and pea crops in terraces and valley lands of NEH region.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Power tiller |
| Weight, kg | : | 45 |
| No. of rows | : | 3 |
| Row spacing, mm | : | 130 - 280 |
| Seed metering mechanism | : | Incline plate with cells |
| Cost, Rs. | : | 2,000/- |
| Average depth of sowing, mm | : | 46 |
| Row spacing, mm | : | 250 |
| Forward speed, m/s | : | 0.53 |
| Effective field capacity, ha/h | : | 0.12 |
| Average seed rate, kg/ha | : | 55 |
| Average plant population, plants/$m^2$ | : | 58 |
| Cost of operation, Rs./ha | : | 1,600/- |

## Benefits over conventional/traditional practices

- Saving of 52% in cost of sowing, 92% in labour and 85% in time for sowing in terrace condition as compared to manual sowing behind country plough.

**Design:** ICAR Research Complex for NEH Region, Umiam (Barapani) (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Principal Investigator (FIM Project), Division of Agril. Engg., ICAR Research Complex for NEH Region, Umiam (Barapani) – 793103 (Meghalaya), Tel: 91-364-2570276, E-mail : dayamangang@gmail.com

# Self-propelled 8 - Row Pre-germinated Rice Seeder

## Utility

Dry seeding of rice depends on quick onset of monsoon for its establishment and often results in poor yield due to weed infestation. Hand transplanting of rice is time consuming and involves high labour cost in addition to high human drudgery and inputs. To address the issue for seeding of paddy seeds, a self-propelled pre-germinated rice seeder with cup feed type metering mechanism has been developed.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 3 kW diesel engine |
| Weight, kg | : | 250 |
| No. of cups/roller | : | 4 |
| Seed hopper capacity, kg | : | 26 |
| Cost of implement, Rs. | : | 125,000/- |
| Working width, m | : | 1.90 |
| Speed of operation, m/s | : | 0.5 |
| Number of seeds at each hill | : | 3-5 |
| Effective field capacity, ha/h | : | 0.25 |
| Field efficiency, % | : | 72 |
| Fuel consumption, l/h | : | 0.7 |
| Labour requirement, man-days/ha | : | 1 |
| Cost of operation, Rs./ha | : | 900/- |

## Benefits over conventional/traditional practices

- Savings of 25% in cost and time as compared to manual eight row rice drum seeder.

**Design:** OUAT, Bhubneswar(AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Principal Investigator (FIM Project), College of Agril. Engg., Orissa University of Agriculture & Technology, Bhubaneswar – 751003 (Odisha), Phone: +91-671-2367757/67, Email: director.nrri@icar.gov.in, crrictc@nic.in 033-25350415, E-mail: crijaf-wb@nic.in; Website: www.crijaf.org.in

# Paddy Transplanter for SRI Method of Cultivation

## Utility

It is a self-propelled, riding type machine. It has only one lugged traction (front) wheel and the weight of the machine rests on the lugged wheel and float at the time of transplanting. For transportation, the front lugged wheel is replaced by pneumatic wheel and two small wheels are fixed at the rear of the float to support the weight of the machine. It reduces labour requirement during peak season and human drudgery

| Specification & Performance results: | | |
|---|---|---|
| Power Requirement, kW | : | 2.94 |
| Number of rows | : | 8 |
| Row to row spacing, mm | : | 40 |
| Plant to plant, mm | : | 240 |
| Missing index, % | : | 5-10 |
| Field capacity, ha/h | : | 0.18-0.25 |
| Cost, Rs | : | 200,000/- |

## Benefits over conventional/traditional practices

- Saves 65% labour and 40-50% cost of operation over traditional method.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- V.S.T. Tillers Tractors Ltd. P.B. No. 4801, Mahadevapura P.O., Whitefield Road, Bangalore – 560 048, Mr. KU Subbaiah, Contact No. – 080-67141111
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# 8 - Row Self-propelled Seeder

## Utility

It is an eight row, engine operated paddy seeder. It is suitable for sowing of sprouted paddy seeds in puddled field. The machine comprised of a light weight diesel engine, power transmission system, seed drum, main frame, float, ground wheel and tail wheel.

| Specifications & Performance results | | |
|---|---|---|
| Power Source, kW | : | 3.7 kW engine |
| Number of rows | : | 8 |
| Number of seed drums | : | 4 |
| Row to row spacing, mm | : | 200 |
| Shape of the seed drum | : | Hyperboloid |
| Seeds per hill | : | 5-6 |
| Effective field capacity, ha/h | : | 0.235 |
| Field efficiency, % | : | 85 |
| Seed rate, kg/ha | : | 32 |
| Cost of operation, Rs/ha | : | 1100/- |

## Benefits over conventional/traditional practices

- Pre-germinated paddy seeding eliminates nursery raising, transportation and physical damage to the seedlings.
- Reduces drudgery in transplanting and cost of cultivation.
- Better performance as compare to manual seeding and seeder having cylindrical shape drums.
- The sowing operation is faster, uniform and precise.

**Design:** ICAR-NRRI, Cuttack

**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-National Rice Research Institute, Cuttack, Odisha-753006, Phone: +91-671-2367757/67, Email: director.nrri@icar.gov.in, crrictc@nic.in

# Power Operated 8 - Row Cylindrical Shape Drum Seeder

## Utility

It is an eight row, engine operated cylindrical shape paddy seeder, for sowing of sprouted paddy seed in puddled field. The machine comprises of a light weight diesel engine, power transmission system, seed drum, main frame, float, ground wheel and tail wheel.

| Specifications & Performance results | | |
|---|---|---|
| Power Source, kW | : | 3.7 kW diesel engine |
| Number of rows | : | 8 |
| Number of seed drums | : | 4 |
| Row to row spacing, mm | : | 200 |
| Shape of the seed drum | : | Cylindrical |
| Seeds per hill | : | 4-6 |
| Effective field capacity, ha/h | : | 0.175 |
| Field efficiency, % | : | 68 |
| Seed rate, kg/ha | : | 32 |
| Cost of sowing, Rs./ha | : | 1350 |

## Benefits over conventional/traditional practices

- It eliminates nursery raising, transportation and physical damage to the seedlings.
- Reduces drudgery in transplanting and cost of cultivation.
- Better performance as compare to manual seeding.
- The sowing operation is faster, uniform and precise.

**Design:** ICAR-NRRI, Cuttack

**Commercialization Status:** Commercialized

## Contact:

- Director, ICAR-National Rice Research Institute, Cuttack, Odisha-753006, Phone: +91-671-2367757/67, Email: director.nrri@icar.gov.in, crrictc@nic.in

# Power Tiller Operated Ferti Drill

## Utility

Ferti drill is suitable for mixing the fertilizer while operating in the field. The mixer consists of rotating blades which are used to mix the fertilizer uniformly and drop in the field at desired depth especially in fruit orchards around the trees.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 11.18 kW power tiller |
| Weight, kg | : | 40 |
| Cost of machine, Rs. | : | 1,00,000 |
| Capacity, ha/h | : | 0.10 |

## Benefits over conventional/traditional practices

- Used to mix fertilizer uniformly, which reduces 30% of labour and time compared to traditional practice.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Sowing Attachment for Light Weight Power Tiller

## Utility

Farmers in northeast India still follow traditional methods of manually sowing as broadcasting or dibbling. Existing locally evolved tools give low output and involve excessive drudgery. Although a number of powered planters have been developed in the country for plain areas, these could not be adopted by the farmers of the hilly areas due to their heavy weight. Therefore, development of sowing attachment for light weight power tiller necessitated to utilized rice and maize fallow lands for cultivation of rabi crops for timely sowing operation. This sowing attachment could easily be operated on terraces and foothills and could be shifted from one place to another.

| Specifications & Performance results: | | |
|---|---|---|
| Power source, kW | : | 4.1 kW power tiller (BCS Make) |
| Weight, kg | : | 21 |
| Type of metering mechanism | : | Rotor type having cells on periphery |
| Type of furrow opener | : | Inverted T-Type |
| Number of row | : | 2 (250 to 500 mm row spacing) |
| Field capacity,ha/ h | : | 0.068 |
| Maximum draft, N | : | 600 |
| Estimated cost, Rs. | : | 6500/- |
| Saving in cost compared to manual, % | : | up to 64 |

**Design:** ICAR RC for NEH, Umiam, Meghalaya (AICRP on FIM)

**Commercialization Status:** Ready for commercialization

**Contact:**

- PI, AICRP on FIM, Division of System Research and Engineering, ICAR RC for NEH, Umiam, Meghalaya, Email: icarneh@gmail.com, Phone (0364) 2570257, Fax (0364) 2570355

# Power Operated Red Gram Protray Seeder

## Utility

Preparation of the nursery medium, filling it in protrays and dibbling the seeds in the protrays are laborious activities. Therefore, to reduce the labour requirement and to achieve timeliness in operation, a power operated portray seeder has been developed for seeding red gram in protrays. The operation of the red gram protray seeder is automated by programmable logic controller powered by 24 V stabilized power supply input against the requirement of 8 inputs and 12 outputs.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 1.1 kW electric motor |
| Weight, kg | : | 220 |
| Size of root trainer, mm | : | 490 x 290 |
| Flat conveyer width, mm | : | 300 |
| Cost of equipment, Rs. | : | 125,000/- |
| Output capacity, trays/h | : | 75 |
| Conveyer speed, m/s | : | 0.05 |
| Cost of operation, Rs./ha | : | 3,600/- |

## Benefits over conventional/traditional practices

- Reduces cost of labour as compared to traditional practice used for red gram seedlings.

**Design:** TNAU, Coimbatore (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Principal Investigator (AICRP on FIM), Department of Farm Machinery and Power Engg., Tamil Nadu Agricultural University, Coimbatore – 641003 (Tamil Nadu), Ph. No.: 91-422-2457576, E-mail: info@tnau.ac.in

# Tractor Operated Small Seed Planter

## Utility

The traditional method of onion sowing is arduous, time consuming and labour intensive operation. The high wage and more labour requirement are the hindrance to encourage onion cultivation. Therefore, a tractor operated six row planter has been developed for planting small seeds like onion.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 26 kW tractor |
| Seed metering mechanism | : | Inclined plate type |
| Seed hopper capacity, kg | : | 1.5 |
| Cost, Rs. | : | 80,000/- |
| Effective working width, m | : | 1.0 |
| Speed of operation, km/h | : | 0.55 |
| Effective field capacity, ha/h | : | 0.16 |
| Field efficiency, % | : | 85 |
| Fuel consumption, l/h | : | 4.5 |
| Quality feed index - Single, % | : | 59.7 |
| Multiple, % | : | 35.0 |
| Missing, % | : | 5.3 |

## Benefits over conventional/traditional practices

- Saving of about 50% in cost of operation and 81% in labour requirement as compared to traditional method of onion sowing.

**Design:** PAU, Ludhiana (AICRP on FIM)

**Commercialization Status:** Commercialized

**Contact:**

- M/s National Agro Industries, Transport Nagar, Ludhiana, Email: sales@nationalagro.com, Ph No. +91 8146 101 101
- Principal Investigator (FIM Project), Department of Farm Machinery & Power Engineering, Punjab Agricultural University, Ludhiana – 141004 (Punjab), Ph No. 0161 2401325, Email: hodfmpe@pau.edu

# Tractor Operated Garlic Planter

## Utility

The garlic cloves are costly and its timely sowing at appropriate depth in rows is very important for better emergence. The traditional manual method requires huge labour cost in planting and paucity of labour during peak season also delays the operation. To solve the problem of garlic cloves planting, a tractor mounted garlic planter has been developed.

| Specifications & Performance results | | |
|---|---|---|
| Power source, | : | 26 kW tractor |
| Seed metering mechanism | : | Actuating spoon |
| Seed hopper capacity, kg | : | 6 |
| Cost of equipment, Rs. | : | 150,000 |
| Seed rate, kg/ha | : | 371-474 |
| Effective working width, m | : | 1.0 |
| Speed of operation, km/h | : | 0.55-0.63 |
| Effective field capacity, ha/h | : | 0.18-0.21 |
| Fuel consumption, l/h | : | 4.0 |
| Labour requirement, man-days/ha | : | 10 |

## Benefits over conventional/traditional practices

- Saving of 82% in labour requirement as compared to manual planting.

**Design:** PAU, Ludhiana (AICRP on FIM)

**Commercialization Status:** Ready for commercialization

**Contact:**

- Principal Investigator (FIM Project), Department of Farm Machinery & Power Engineering, Punjab Agricultural University, Ludhiana – 141004 (Punjab), Ph No. 0161 2401325, Email: hodfmpe@pau.edu

# Tractor Operated Turmeric Rhizome Planter

## Utility

Traditional method of turmeric sowing is cumbersome and time consuming operation, which also requires large quantity of rhizome. The farmers are in need of a planting unit with higher work rate and lesser seed rate to accomplish unit operation timely with reduced labour and cost of cultivation. Therefore, three row tractor operated turmeric rhizome planter has been developed for making ridges and planting of turmeric rhizome.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 26-34 kW tractor |
| Weight, kg | : | 213 |
| Hopper capacity, kg | : | 20 |
| Cost, Rs. | : | 70,000/- |
| Rhizome requirement, kg/ha | : | 300-500 |
| Depth of operation, mm | : | 50-75 |
| Effective field capacity, ha/h | : | 0.15- 0.20 |
| Field efficiency, % | : | 80-85 |
| Operating speed, m/s | : | 0.42 |
| Miss index, % | : | 5 |
| Multiple index, % | : | 15 |
| Fuel consumption, l/h | : | 3.5 |
| Labour requirement, man-days/ha | : | 7 |
| Cost of operation, Rs./ha | : | 4,000/- |

## Benefits over conventional/traditional practices

- Reduces human drudgery and increases field coverage.
- Saves 500 kg/ha seed rhizomes as compared to manual planting.
- Saves 51% in cost of operation and 88% in labour requirement as compared to manual planting.

**Design:** TNAU, Coimbatore (AICRP on FIM)

**Commercialization Status:** Ready for commercialization

**Contact:**

- Principal Investigator (AICRP on FIM), Department of Farm Machinery and Power Engg., Tamil Nadu Agricultural University, Coimbatore – 641003 (Tamil Nadu), Phone No.:91-422-2457576, E-mail: info@tnau.ac.in

# Tractor Operated Tobacco Seedling Transplanter with Spot Application of Water

## Utility

This equipment consists of metering mechanism, operator's seat, furrow openers, seedling planting mechanism, water tank, system for spot application of water and soil compaction wheels. The nursery grown in the portrays can be dropped in the furrows through the metering mechanism by two operators sitting behind the equipment. The soil compaction wheels which follows the soil opener closes the soil thereby giving stability to the seedlings. Watering is done on the spot nearer to the seedling planted.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 30-35 kW Tractor |
| No. of row | : | 2 |
| Row to row spacing adjustment,m | : | 0.60-1 |
| Plant to plant spacing adjustment,m | : | 0.65, 0.70, 1 |
| No of watering attachment | : | 2 |
| Furrow closer wheel | : | 2 sets |
| Water tank capacity, lit | : | 200 |
| No of metering mechanism | : | 2 |
| Power transmission | : | Ground wheel (lugged/pneumatic) |
| Field capacity, ha/h | : | 0.2 to 0.3 |

## Benefits over conventional/traditional practices

- The quantity of water applied per plant is 200-250 ml.
- The plant establishment was more than 95 percent.
- The savings in cost is 65 percent and labour is 85 percent.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

**Contact:**

- Head, ICAR-Central Institute of Agricultural Engineering, Regional Centre, Coimbatore-641007,ciaerccbe@gmail.com
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated Cassava Stake Cutter Planter

## Utility

It consists of main frame, stake cutting system, stake planting mechanism, transmission system and ridger. The cutting system consists of two counter rotating shafts with two numbers of blades each placed at equal distance. The stake planting mechanism consists of a set of counter rotating rubber wheels. Both the stake cutting and stake planting mechanisms gets transmission from the Tractor PTO.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 27-30 kW Tractor |
| Weight, kg | : | 344 |
| Ridger | : | disc type |
| No of discs | : | 2 |
| Disc size(dia),mm | : | 560 |
| Number of rows | : | one |
| Cutting mechanism | : | counter rotating shafts with rectangular blades |
| Planting mechanism | : | counter rotating planting wheel |
| Field capacity, ha/h | : | 0.18 |

## Benefits over conventional/traditional practices

- The cost of operation of cassava planter is Rs. 3125/ha and it saves 60.40 percent in cost when compared to manual planting.
- The cost benefit ratio and payback period of developed planter worked out are 2.06 and 4.31 year, respectively.

**Design:** ICAR-CIAE, Bhopal
**Commercialization Status:** Commercialized

## Contact:

- M/s Bhansali Agro Tech, Ahmednagar, Maharashtra, Mr. Sanjay Bhansali, Contact No: 9822439621, 02423223391, E mail: bhansaliagrotech@gmail.com
- Head, ICAR-Central Institute of Agricultural Engineering, Regional Centre, Coimbatore-641007, Email : ciaerccbe@gmail.com

# Tractor Operated Sugarcane Seedling Transplanter

## Utility

The traditional method for sugarcane seedlings transplanting is arduous and time consuming. To reduce human drudgery and cost of operation, tractor operated semi-automatic sugarcane seedling transplanter has been developed.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 37 kW tractor |
| Weight, kg | : | 450 |
| Type of furrow openers | : | Disc type |
| Power transmission | : | Through ground drive wheel |
| Cost of equipment, Rs. | : | 200,000 |
| Effective working width, m | : | 1.5 |
| Depth of planting, mm | : | 148 – 150 |
| Row to row spacing, m | : | 1.5 |
| Plant to plant spacing, mm | : | 600 |
| Speed of operation, m/s | : | 0.71 |
| Effective field capacity, ha/h | : | 0.30 |
| Field efficiency, % | : | 81 |
| Labour requirement, man-days/ha | : | 1.3 |
| Cost of operation, Rs./ha | : | 2,000 |

## Benefits over conventional/traditional practices

- Reduces cost of transplanting by 50% over conventional.

**Design:** MPKV, Rahuri (AICRP on FIM)

**Commercialization Status:** Commercialized

**Contact:**

- M/s Balwant Shri Sai Agricultural and Food Processing Equipments, B-34, Kopargaon Industrial Estate, Kopargaon – 423 603, Dist. Ahmednagar (Maharashtra).
- Principal Investigator, AICRP on FIM, Dr. ASCAET, Mahatma Phule Krishi Vidyapeeth, Rahuri – 413722, Dist. Ahmednagar (Maharashtra), Ph. No.: 02426-243219, Email: dormpkv@rediffmail.com

# Rotary Till Drill with Disc Furrow Openers for Direct Sowing of Wheat

## Utility

Rice-wheat cropping system is prevalent in an area of 13.5 million ha across the Indo-Gangetic alluvial plains of North-West India. Due to small window period of 2-3 weeks between rice harvest and wheat sowing, burning of rice straw has become a common practice to clear the fields for sowing next crop. The incorporation of paddy straw with traditional implements like rotavator, disc harrow, cultivator etc. requires 6-8 operations. Therefore, a rotary till drill with disc type furrow openers has been developed for direct sowing of wheat in paddy harvested field using combine harvester.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 37.5 kW tractor or above |
| Weight, kg | : | 940 |
| Cost of implement, Rs. | : | 190,000/- |
| Working width, m | : | 1.80 |
| Forward speed, m/s | : | 0.49 - 0.56 |
| Effective field capacity, ha/h | : | 0.26 - 0.30 |
| Fuel consumption, l/h | : | 7.0 - 7.5 |
| Cost of operation, Rs./ha | : | 4,232/- |

## Benefits over conventional/traditional practices

- The equipment helps to incorporate paddy straw and sow wheat in paddy field harvested by combine simultaneously, thus prevents burning of paddy straw in the fields.

**Design:** PAU, Ludhiana (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Principal Investigator (FIM Project), Department of Farm Machinery & Power Engineering, Punjab Agricultural University, Ludhiana – 141004 (Punjab) Ph No. 0161 2401325, Ph No. 0161 2401325, Email: hodfmpe@pau.edu

# Tractor Operated Planter-cum-Boom Sprayer for Groundnut

## Utility

Farmers needed a single machine to apply herbicide and planting of groundnut crop in single pass. Therefore, a tractor operated planter-cum-herbicide applicator has been developed for sowing and spraying of herbicide, simultaneously in groundnut crop to save fuel, labour and time.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 26 kW tractor |
| Weight, kg | : | 450 |
| Number of rows | : | 8 |
| Row to row spacing, mm | : | 300 |
| Herbicide tank capacity, l | : | 440 (2 nos. of plastic drums) |
| Pump power, kW | : | 1.0-1.5 |
| Cost, Rs. | : | 100,000/- |
| Depth of sowing, mm | : | 40 – 50 |
| Effective working width, m | : | 2.4 |
| Effective field capacity, ha/h | : | 0.62 |
| Application rate of sprayer, l/ha | : | 500 – 610 |

## Benefits over conventional/traditional practices

- Net saving of Rs. 446/- per hectare over traditional method.

**Design:** PJTSAU, Rajendranagar, Hyderabad (AICRP on FIM)

**Commercialization Status:** Commercialized

## Contact:

- M/s KBN Engineering Works, Bus Stand Road, Ananthapur – 515001, Phone: 06384451677
- M/s SaiAgri Cooperation, 18-856, Triveni Talkies Road, Neeruganti Street, Ananthapur – 515001, Phone: 07947135460
- M/s Sri Venkata Naga Industries, Industrial State, Shiva Reddy Pet,Vikarabad – 501101, Rangareddy, Phone: +91 8416252090
- Head, Agricultural Research Institute, FIM Scheme, PJSTAU Rajendranagar, Hyderabad, Email: fimscheme@gmail.com, Phone: +91 - 40 - 24015011

# Tractor Operated Multi-crop Planter

## Utility

In traditional practice of sowing on beds, first ridges are formed with the help of bund maker and then seeds are planted manually. The practice is very time consuming and not economical for farmers. The plant to plant spacing is also not maintained in traditional method resulting into lower yield of crops. To solve the problem, a tractor operated multi-crop planter has been developed for sowing on beds. It is suitable for planting of small and bold seeds.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 34 kW tractor |
| Weight, kg | : | 425 |
| Cost of equipment , Rs | : | 80,000/- |
| Average width of sowing, m | : | 2.10 - 2.13 |
| Forward speed, m/s | : | 0.92 |
| Effective field capacity, ha/h | : | 0.29 - 0.31 |
| Field efficiency, % | : | 79 - 82 |
| Fuel consumption, l/h | : | 5.8 |
| Cost of operation, Rs/ha | : | 3,800/- |

## Benefits over conventional/traditional practices

- Saves inputs (water, fertilizer, seeds) as compared to sowing by seed drill.
- Increases yield by 8-10% due to presence of lesser weeds.

**Design:** CCSHAU, Hisar(AICRP on FIM)

**Commercialization Status:** Commercialized

**Contact:**

- M/s. Aman Vishavkarma Engg. Works, Village Baddo Patti, Bahabalpur, Hisar– 125004 (Haryana), Phone: 08043884333
- Principal Investigator (FIM Project), Department of Farm Machinery & Power Engg., CCS Haryana Agril. University, Hisar, Haryana, Email: dr@hau.ac.in, Ph No. :01662-284340

# Tractor Operated Potato-cum-Sugarcane Bud Planter

## Utility

In traditional practice, the planting of sugarcane and potato require 15 and 20 man-days/ha respectively, which is time consuming and arduous operation. Therefore, a potato-cum-sugarcane bud planter has been developed for planting of both sugarcane bud and potato and to save time and cost of operation.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 34 kW tractor |
| Weight, kg | : | 350 |
| Cost, Rs. | : | 100,000/- |
| Forward speed, m/s | : | 0.89 |
| Effective field capacity, ha/h | : | 0.49 |
| Field efficiency, % | : | 75 |
| Labour requirement, man–day/ha | : | 3 |
| Cost of operation, Rs./ha | : | 2,400/- |

## Benefits over conventional/traditional practices

- Saves cost of operation by Rs.6,433/ha for planting of sugarcane buds as compared to traditional practice.

**Design:** CCSHAU, Hisar(AICRP on FIM)

**Commercialization Status:** Commercialized

**Contact:**

- M/s. New Super Agriculture Engineers, Phool Bagh Colony, Meerut City, Uttar Pradesh, Phone: 07947142802
- Principal Investigator (FIM Project), Department of Farm Machinery & Power Engg., CCS Haryana Agril. University, Hisar, Haryana, Email: dr@hau.ac.in, Ph No. : 01662-284340)

# Tractor Operated Planter for Tissue Culture Banana

## Utility

Conventional planting of banana is done manually by making pit and planting the tissue culture banana plants, which is arduous and tedious work. Therefore, a tractor operated planter for tissue culture banana has been developed to achieve timeliness in operation and accurate plant spacing, thus leading to higher productivity.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 33 kW tractor or above |
| Type of furrow opener | : | Chisel type |
| Seedling dispensing unit | : | Oscillating spoon type |
| Press wheel | : | 2 Nos. Adjustable depth (50 -100 mm) and width (100 – 200 mm) |
| Cost, Rs. | : | 50,000/- |
| Effective field capacity, ha/h | : | 0.19 |
| Plant to plant spacing, m | : | 1.52 |
| Depth of planting, mm | : | 200 |
| Cost of the operation, Rs/ha | : | 3,500/- |

## Benefits over conventional/traditional practices

- Reduces human drudgery and increases field coverage.
- Saves 50% in time, 81% in cost of operation and 90% in labour requirement as compared to traditional practice.

**Design:** TNAU Coimbatore (AICRP on FIM)

**Commercialization Status:** Ready for commercialization

## Contact:

- Head & Principal Investigator (AICRP on FIM), Department of Farm Machinery and Power Engg., Tamil Nadu Agricultural University, Coimbatore – 641003 (Tamil Nadu), Ph. No.: 91-422-2457576, E-mail: info@tnau.ac.in

# Tractor Operated Mat type Nursery Seeder

## Utility

For mechanical transplanting of paddy large numbers of plastic trays are required for raising of mat type nursery, which increases the cost of mechanical transplanting. Further more manual method of raising mat type nursery requires a number of operations. To accomplish all these operations in one go and to reduce the labour requirement, a tractor operated mat type paddy nursery sowing seeder has been developed. Tractor operated seeder for mat type paddy nursery lays one-meter-wide perforated polythene sheet (50-60 gauge) over one-meter-wide soil bed with simultaneous uniform seed placement over the soil bed.

| Specification & Performance results: | | |
|---|---|---|
| Power Source | : | 33.55 to 37.28 kW Tractor |
| Field Capacity, ha/day | | 0.88 |
| Field efficiency, % | : | Seed spread varied from 86.5 to 93.2% |
| Cost of operation, Rs/h | : | 1129/- |

## Benefits over conventional/traditional practices

- Cost saving of 65-68%.
- Labour saving of 94%.

**Design:** PAU, Ludhiana (AICRP on FIM)

**Commercialization Status:** Commercialized

## Contact:

- M/s Rajarh Agricultural Works Near Sran Hospital, Mandi Mullanpur, Adda Dakha Dist. Ludhiana Mob: +(91)-9417199761.
- Principal Investigator (FIM project), Department of Farm Machinery and Power Engineering, Punjab Agricultural Univsersity, Ludhiana – 141004 (Punjab), Ph No. 0161 2401325, Email: hodfmpe@pau.edu

# Tractor Operated Zero-Till Drill

## Utility

Use of zero-till drill for direct sowing of wheat after rice was found to be advantageous in terms of 50-60% saving in time and 40-50% saving in cost of sowing as compared to the conventional practice of seed bed preparation and sowing with seed-cum-fertilizer drill. Therefore, tractor operated zero-till drill is developed to sow wheat directly in rice-harvested fields without preparing the seedbed. The ground drive wheel supplies power through sprockets and chain for metering of seed and fertilizer. The furrow openers are of inverted 'T' type.

| Specification & Performance results: | | |
|---|---|---|
| Number of rows | : | 9 |
| Row to row spacing, mm | : | 200 |
| Field capacity, ha/h | : | 0.3-0.4 |
| Field efficiency, % | : | 75 |
| Cost, Rs | : | 40,000/- |
| Cost of operation, Rs/ha | : | 1000-1200/- |

## Benefits over conventional/traditional practices

- It saves Rs. 1,500-2,000/- per hectare in the cost of wheat production.

**Design:** PAU, Ludhiana (AICRP on FIM)

**Commercialization Status:** Commercialized

## Contact:

- Principal Investigator (FIM project), Department of Farm Machinery and Power Engineering, Punjab Agricultural University, Ludhiana – 141004 (Punjab), Ph No. 0161 2401325, Email: hodfmpe@pau.edu.

# Tractor Operated Bt Cotton Planter (Inclined Plate Type)

## Utility

The tractor operated inclined plate planter for Bt cotton has been developed to reduce labour requirement during peak season of cotton planting and to reduce human drudgery.

| Specification & Performance results: | | |
|---|---|---|
| Seed rate, kg/ha | : | 2.5-91.5 |
| Plant to plant spacing, mm | : | 650-700 |
| Row to row spacing, mm | : | 1,000 |
| Field capacity, ha/h | : | 0.7-0.8 |
| Field efficiency, % | : | 59 |
| Cost, Rs | : | 30,000/- |
| Cost of operation, Rs/ha | : | 425/- |

## Benefits over conventional/traditional practices

- It saves Rs.475/ha against traditional method.

**Design:** HAU, Hissar(AICRP on FIM)

**Commercialization Status:** Commercialized

## Contact:

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# Tractor Operated Sugarcane Budchip Settling Planter

## Utility

The bud chip settlings from the nursery can be dropped by two operators through the indexing tray rotated by metering mechanism. A shoe type furrow opener opens up the soil in which the seedlings with soil are dropped. The furrow closure which follows the soil opener closes the soil thereby giving stability to the settlings. The furrow openers at both sides open up furrows for irrigation.

| Specification & Performance results | | |
|---|---|---|
| Power source, kW | : | 35-40 kW tractor |
| Weight, kg | : | 590 |
| Row spacing, mm | : | 2 rows, 900, 1200, 1500(Adjustable) |
| Plant spacing in rows, mm | : | 300, 450, 600 (Adjustable) |
| Depth of planting, mm | : | 20-100 (Adjustable) |
| Type of metering mechanism | : | Horizontal disc indexing mechanism |
| Field capacity, ha/h | : | 0.15-0.20 |
| Cost, Rs. | : | 75,000/- |

## Benefits over conventional/traditional practices

- Simultaneous planting and formation of irrigation channel.
- It saves 70 per cent in cost when compared to manual planting.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

## Contact:

- M/s Rohit krishi industries private limited, Pune, Chinchwad, Pune. Contact No. 020-27476444 / 09561266444
- M/s Magnificent Engineers, Kurichi, Coimbatore, Contact No.: +(91) 9843033808, E mail: magengg1@gmail.com
- M/s Uttam Sugar Mills limited, Hridwar, Uttarakhand.
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated Strip till drill

## Utility

By adopting the strip tillage planting technology for wheat, the timeliness of operation improved significantly resulting in an increase in the total yield of wheat. The drill is essentially a 9 or 11 row seed-cum-fertilizer drill with a rotary blade attachment for minimum soil manipulation running ahead of the normal furrow openers.

| Specification & Performance results: | | |
|---|---|---|
| Power requirement | : | 26 kW tractor |
| Number of rows | | 9 |
| Field capacity, ha/h | : | 0.3 |
| Field efficiency, % | : | 70 |
| Cost of equipment, Rs | : | 125,000/- |
| Cost of operation, Rs/ha | : | 1,500-2,000/- |

## Benefits over conventional/traditional practices

- The strip-tillage system can save 65 to 70% in time of operation comparison to conventional tillage planting.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- M/s. Dashmesh Mechanical Works, Amargarh, Distt. Sangrur (Punjab), Phone: 078374 94949
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Micro-controller based Sugarcane Planter with Autonomous Fungicide Application System

## Utility

The planting of sugarcane buds is labour intensive and drudgery prone operation. The farmers face problem of labour shortage during peak season of planting. The sugarcane buds (eyes) are exposed at both ends and are prone to pest and disease attacks leading to poor establishment of plants. This requires the seed material and the surrounding soil to be treated with appropriate fungicides to avoid yield loss due to poor germination. Therefore, a sugarcane bud planting machine with an autonomous fungicide application system has been developed, which opens a wide furrow, meter the seed from hopper using a cup type metering mechanism, delivers the seeds into the open furrow through seed delivery tube, covers the seed within the soil upto depth of 50 mm and apply precise amount of fungicide on the planted bud.

| Specification & Performance results | | |
|---|---|---|
| Power source, kW | : | 34 kW tractor |
| Cost of implement, Rs | : | 100,000/- |
| Seed rate, buds/ha | : | 28,354 |
| Row to row spacing, m | : | 1.2 |
| Fuel consumption, l/h | : | 3.8 |
| Plant stand, % | : | 52.2 |
| Effective field capacity for spraying, ha/h | : | 0.34 |
| Field efficiency, % | : | 56 |
| Missing index, % | : | 33.3 |

## Benefits over conventional/traditional practices

- Reduces labour cost and drudgery as compared to traditional practice.
- Saves chemical upto 48% as compared to continuous spraying method.

**Design:** IIT, Kharagpur (AICRP on FIM)

**Commercialization Status:** Ready for commercialization

## Contact:

- Principal Investigator, AICRP on FIM, Department of Agricultural & Food Engineering, Indian Institute of Technology, Kharagpur – 721302 (WB), Ph No.: +91-3222-255221, E-mail: rajendra@agfe.iitkgp.ac.in

# Tractor Operated Planter for sugarcane Bud Chip Settlings Raised in Portrays

## Utility

Sugarcane bud settling planting is a new method of sugarcane planting and is gaining popularity. In this technique, the bud along with a portion of the nodal region is chipped off and planted in raised bed nurseries / portray / polybags filled with FYM or press mud, soil and sand at 1:1:1 proportion. Seed material required under this technique is only 1 to 1.5 t/ha and the remaining cane after taking bud chips can be sent for milling/jaggery purpose. It also facilitates easier handling and transportation.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 26 kW or above, Tractor |
| Weight | : | 590 kg |
| Row spacing | : | 2 rows, 900, 1200, 1500 mm (Adjustable) |
| Plant spacing in rows, mm | : | 300, 450, 600 (Adjustable) |
| Type of metering mechanism | : | Horizontal disc indexing mechanism |
| Furrow opener and closer | : | Shoe type furrow opener, Wheel type furrow closer |
| Working width, mm | : | 1350 - 1800 (Adjustable) |
| Depth of planting, mm | : | 20 - 100 (Adjustable) |
| Field capacity, ha/h | : | 0.10 - 0.20 |

## Benefits over conventional/traditional practices

- Sugarcane bud settling planting is a new method gaining popularity.
- Seed material required under this technique is only 1-1.5 t/ha.
- Remaining cane after taking bud chips can be sent for milling /jaggery.
- Facilitates easier handling and transportation.

**Design:** ICAR-Sugarcane Breeding Institute, Coimbatore

**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-Sugarcane Breeding Institute, Coimbatore - 641 007. Off: 0422 - 2472621 (Ext: 203), 0422-2473971, E-mail: director@sugarcane.res.in; director.sbi@icar.gov.in.

# Tractor Operated Mulch Laying-cum-Seedling Planting Machine

## Utility

Presently, operations like bed forming, drip lateral laying, mulch laying, punching holes in the mulch and transplanting seedlings into soil are done in multiple passes of individual equipment. Therefore, the tractor operated mulch and drip lateral laying-cum-seedling planter has been developed to carry out these operations in a single pass to reduce labour, time and cost as compared to traditional practices.

| Specifications & Performance results | | |
|---|---|---|
| Power required | : | 34 kW Tractor |
| Weight, kg | : | 328 |
| Type of metering mechanism | : | Star wheel |
| Cost, Rs | : | 150,000/- |
| Height of bund, mm | : | 170-180 |
| Bottom width of bund, mm | : | 700 -720 |
| Top width of bund, mm | : | 400 - 414 |
| Fuel consumption, l/h | : | 3.6 - 4.2 |
| Effective field capacity, ha/h | : | 0.08 - 0.12 |
| Mulch film required, $m^2$/ha | : | 7680 |
| Mulch covering, % | : | 44.80 |
| Draft, N | : | 3,610 - 3,983 |
| Cost of operation, Rs/ha | : | 6,500/- |

## Benefits over conventional/traditional practices

- Multiple operations reduced cost of mulch laying than traditional method, which ultimately reduced total cost of cultivation.

**Design:** MPUAT, Udaipur (AICRP on FIM)

**Commercialization Status:** Ready for commercialization

## Contact:

- Principal Investigator (FIM Project), Dept. of Farm Machinery and Power Engg., College of Technology & Engineering, Maharana Pratap University of Agriculture & Technology, Udaipur – 313001 (Rajasthan), Tel: 91-294-2470119, 2980604(R), Email : deempuatudr@gmail.com

# Tractor Operated 6-Row Inclined Plate Planter

## Utility

It is tractor drawn equipment suitable for planting groundnut, gram, soybean, mustard etc. Row to row distance can be controlled and planting of different seeds in different rows is possible.

| Specification & Performance results: | | |
|---|---|---|
| Power Source, kW | : | 26 kW tractor |
| Number of rows, No. | : | 6 (250 to 450mm) |
| Seed Metering | : | Inclined plates with cells |
| Fertilizer metering | : | Cast Iron/ Aluminium fluted rollers |
| Labour requirement, man-days/ha | : | 0.5-1.25 |
| Field capacity, ha/h | : | 0.45 to 0.65 |
| Field efficiency, % | : | 70-75 |
| Cost of equipment, Rs | : | 46,000/- |
| Cost of operation, Rs/ha | : | 800-900/- |

## Benefits over conventional/traditional practices

- Use of planter results in saving of seed (up to 20%) and timely completion of operation.
- Uniform and accurate placement of seed with the use of planter also results in 20% increase in productivity.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- M/s Shri Manak Industries, Bhopal, Email: manakindustriesbhopal@gmail.com, Contact No.: 91-755-2581683, 9993035566, 9425687798 8989821564
- M/s Vasundhara Krishi Yantra, Bhopal, Madhya Pradesh, Ranjit Singh Thakur (Director) Email:vkyu.bpl@gmail.com, Contact No. - 9893018158
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated 6-Row Pneumatic Planter

## Utility

It is suitable for precision planting of single seed of crops like mustard, sorghum, soybean, cotton seed, pigeon pea, maize, groundnut, okra etc. at predetermined spacing.

| Specification & Performance results: | | |
|---|---|---|
| Power Source, kW | : | 26 kW tractor |
| Weight, kg | : | 320 |
| Row spacing, mm | : | 250 and above |
| Type of blower | : | Aspirator |
| Maximum speed of aspirator, rpm | : | 6,000 |
| Seed metering | : | Pneumatic disc suction principle |
| Field capacity, ha/h | : | 0.31 for Okra,<br>0.42 for Cotton and<br>0.40 for Groundnut |
| Field efficiency, % | : | 70-75 |
| Cost of equipment, Rs | : | 75,000 |
| Cost of operation, Rs/ha | : | 1200-1600/- |

## Benefits over conventional/traditional practices

- Saves Rs.1,000/ha in seed cost and cost of operation, each.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- M/s Laxmi Steel Fabs, Sehore, Madhya Pradesh, Mr. Suresh Girdhani, Email: Dhanlaxibhopal@yahoo.in, Contact No.: 9425607880, 9425017929
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated Multi Crop Planter for Seed Spices

## Utility

Tractor operated multi crop planter is developed particularly for seed spices like cumin, fenugreek, coriander, etc. The seed metering mechanism of star wheel (plastic) is made of circular rotor of 90 mm diameter with 10 cells of 20 mm length. The height of seed dropping from hopper is kept 400 mm to get the accurate placement of seeds at depth between 10-15 mm. Inverted T-type furrow opener of small size are fitted. The machine has also fertilizer drilling attachment and variable row to row spacing arrangement.

| Specification & Performance results: | | |
|---|---|---|
| Field capacity, ha/h | : | 0.28-0.3 |
| Depth of seed placement, mm | : | 12-15 |
| Seed rate, kg/ha | | |
| Cumin | : | 6.5-7.5 |
| Fenugreek | : | 12-15 |
| Coriander | : | 9-10 |

## Benefits over conventional/traditional practices

- There is substantial saving in seeds.

**Design:** MPUAT, Udaipur

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Principal Investigator (FIM Project), College of Technology & Engineering, Maharana Pratap University of Agriculture & Technology, Udaipur- 313001 (Rajasthan), Tel: 91-294-2470119, 2980604(R), Email : deempuatudr@gmail.com

# Tractor Operated Multi Crop Seed Drill-cum-Planter

## Utility

Tractor operated multi crop seed drill-cum-planting equipment is suitable for sowing/planting of maize, groundnut, soybean, wheat, etc. The machine has drilling as well as planting mechanism.

| Specification & Performance results: | | |
|---|---|---|
| Minimum row to row spacing, mm | : | 150 |
| Maize | : | 450 |
| Groundnut | : | 300 |
| wheat | : | 220 |
| Seed rate, kg/ha | : | |
| Maize | : | 16-20 |
| Groundnut | : | 70-90 |
| Soybean | : | 70 |
| Wheat | : | 120 |
| Field capacity, ha/h | : | 0.3-0.4 |
| Cost of operation, Rs./h | : | 335 |

## Benefits over conventional/traditional practices

- Saves 20% seed and increases 20% in productivity due to uniform and accurate seed placement.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated 8- Row Paddy Transplanter

## Utility

The self-propelled riding type mat type rice seedlings transplanters are commercially available but their cost of operation is high due to high initial cost and limited use in a year. Therefore, a four wheel drive tractor mounted 8-row paddy transplanter has been developed to reduce cost and to achieve timeliness in operation. The mini tractor provides power for propulsion as well as for working of the paddy transplanting mechanism.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 16.41 kW tractor |
| Weight, kg | : | 750 |
| Cost, Rs. | : | 200,000/- |
| Forward speed, km/h | : | 2.09 |
| Effective field capacity, ha/h | : | 0.24 |
| Field efficiency, % | : | 60 |
| Fuel consumption, l/h | : | 1.0 |
| Missing hills, % | : | 7.04 |
| Cost of operation, Rs./ha | : | 1,925/- |

## Benefits over conventional/traditional practices

- Reduces cost of operation by Rs. 1,830/ha over conventional method.

**Design:** JSTSAU, Rajendranagar, Hyderabad(AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Head, Agricultural Research Institute, FIM Scheme, Prof. Jaya Shankar Telangana State Agricultural University, Rajendranagar, Hyderabad, Email: fimscheme@gmail.com, Phone: +91 - 40 - 24015011

# Tractor Operated 6 - Row Drum Type Pneumatic Planter for Multi-Crops

## Utility

The developed tractor operated equipment is suitable for sowing multi crops such as chickpea, pulses and vegetable seeds, etc. Use of this planter can save seeds and plant single or multi seeds precisely.

| Specifications & Performance results | | |
|---|---|---|
| Metering mechanism for seed | : | Drum type |
| Metering mechanism for fertilizer | : | Vertical plate type |
| Overall weight, kg | : | 265 |
| **Flat field** | | |
| Field capacity, ha/h | : | 0.70 |
| Cost of operation, Rs./ha | : | 1,152/- |
| Cost, Rs. | : | 92,500/- |
| **Raised bed system** | | |
| Field capacity, ha/h | : | 0.50 |
| Cost of operation, Rs./ha | : | 2,216/- |
| Cost, Rs. | : | 112,500/- |
| **Ridge and Furrow system** | | |
| Field capacity, ha/h | : | 0.40 |
| Cost of operation, Rs./ha | : | 3287/- |
| Cost, Rs. | : | 112,500/- |

## Benefits over conventional/traditional practices

- It is light weight and can be easily carried to the field.
- It can be used for multi-crops and multi seed or hill drop planting.
- It can be attached with raised bed and ridge furrow system to facilitate the sowing on different bed systems.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- M/s. Bharti agro engineering, Rajkot, Gujrat. Ph. : 0757-5035616
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated Seed Drill

## Utility

It is a ten row seed drill suitable for seeding in dry field. Seed metering device consists of wooden rollers having grooves on its periphery. Seed rate can be adjusted by raising and lowering the height of seed box. Row to row distance can be adjusted. It saved 70% time and 55% labour cost and weeding cost compared to broadcasting and transplanting method.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 26 kW tractor |
| Cost, Rs | : | 50000/- |
| Number of rows | : | 10 Adjustable according to crop |
| Row to row spacing, mm | : | 200 |
| Working width, mm | : | 1800 |
| Metering Mechanism | : | Fluted roller |
| Transmission mechanism | : | Chain and sprocket mechanism |
| Type of furrow opener | : | Shovel type |
| Effective field capacity, ha/h | : | 0.8 |
| Cost of operation, Rs/ha | : | 300/- |

## Benefits over conventional/traditional practices

- Delivery rate can be adjusted to make it suitable for various crops.
- Line sowing facilitates post sowing mechanical operations.

**Design:** ICAR-NRRI, Cuttack

**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-National Rice Research Institute, Cuttack, Odisha-753006, Phone: +91-671-2367757/67, Email:director.nrri@icar.gov.in, crrictc@nic.in

# Tractor Operated Revolving Magazine Type Vegetable Transplanter

## Utility

Revolving magazine type vegetable transplanter has been developed to facilitate easy and quick transplanting of vegetable seedlings. The developed system consists of shoe type furrow opener, packing wheel, main axle, frame, three point hitch system, ground wheels, seedling trays and power transmission system.

| Specification & Performance results: | | |
|---|---|---|
| Average plant missing, % | : | 3.33 |
| Average plant mortality, % | : | 5 |
| Cost of transplanting, Rs. /ha | | |
| Tomato | : | 3,302/- |
| Brinjal | : | 3,536/- |
| Average transplanting time, h/ha | | |
| Tomato | : | 8.77 |
| Brinjal | : | 8.2 |
| Labour required, man-days/ha | : | 4.5 |
| Field capacity, ha/h | : | 0.12 |

## Benefits over conventional/traditional practices

- It saves 86% in labour requirement and 23% in cost of operation over traditional manual transplanting.
- Time and cost saving technology compared to the traditional method.

**Design:** AICRP on FIM

**Commercialization Status:** Ready for Commercialization

## Contact:

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated Onion Transplanter

## Utility

Farmers usually prefer transplanting of onion seedlings instead seeding to get better productivity. Therefore, a tractor operated onion transplanter has been developed, which has seating arrangement for 4 persons and can place seedlings in the metering unit.

| Specification & Performance results: | | |
|---|---|---|
| No. of rows | : | 8 |
| Field capacity, ha/h | : | 0.091 |
| Field efficiency, % | : | 71.6 |
| Labour required, man-days/ha | : | 14 |
| Net saving, Rs./ha | : | 1,990/- |

## Benefits over conventional/traditional practices

- It saves time, drudgery and cost over traditional method.

**Design:** MPKV, Rahuri (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

## Contact:

- Principal Investigator, AICRP on FIM, Dr. ASCAET, Mahatma Phule Krishi Vidyapeeth, Rahuri – 413722, Dist. Ahmednagar (Maharashtra),Ph. No.: 02426-243219, Email: dormpkv@rediffmail.com

# Tractor Operated 2 - Row Vegetable Transplanter

## Utility

To reduce drudgery of operation, save human labour, cost and achieve timeliness in transplanting vegetables, tractor operated two row vegetable transplanter has been developed. Two persons, one for each row sitting on the machine places the seedlings in the flappers, when these open at the top position.

| Specification & Performance results | | |
|---|---|---|
| Power Source, kW | : | 26 kW tractor |
| Weight, kg | : | 225 |
| Nursery type | : | Bare root |
| Metering mechanism | : | Picker wheel |
| Row to row spacing, mm | : | 600 |
| Number of picking fingers | : | 10 |
| Diameter of ground wheel, mm | : | 520 |
| Lying down seedlings, % | : | 7-13 |
| Missing seedlings, % | : | 3-9 |
| Field capacity, ha/h | : | 0.08 - 0.12 |
| Cost, Rs. | : | 48,000/- |
| Cost of operation, Rs./ha | : | 3,000-3,500/- |

## Benefits over conventional/traditional practices

- Reduced drudgery and saving in human labour.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

**Contact:**

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated Drip Lateral and Plastic Mulch Layer-cum-Planter

## Utility

Manual operations of raised bed forming, drip lateral and plastic mulch laying, and planting seeds in mulch are drudgery prone, time consuming and laborious activities. The tractor operated drip lateral and plastic mulch layer-cum- planter performs all these operations in one go. It can be adopted for varying bed widths (0.6-1 m), plastic mulch (1.2-1.8 m) and crop geometry. It is suitable for planting of melons, corns, okra, green pleas, beans etc.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | ≥ 41 kW tractor |
| Width of operation, m | : | 0.6 - 1.2 |
| Depth of operation, mm | : | 250 |
| Cost, Rs. | : | 3,60,000/- |
| Draft, N | : | 5500 |
| Actual field capacity, ha/h | : | 0.2 |
| Field efficiency, % | : | 74 |
| Labour requirement, man-days/ha | : | 2.0 |
| Cost of operation, Rs./h | : | 1500/- |

## Benefits over conventional/traditional practices

- It saves Rs. 6600/- per hectare (43%) in cost of operation & 26 man days (89%) per hectare compare to existing drip lateral cum plastic mulch laying machine.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

**Contact:**

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated Onion Seeder

## Utility

The seeder has bed former and seeding unit. The seeding unit has drive wheel, seed chamber, main shaft and frame, wheels, seed closures and beam. The seed chamber having diameter of 150 mm and 50 mm width could drop required number of seeds at 2-3 km/h operating speed.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 25 kW Tractor |
| Weight, kg | : | 50 |
| Cost of machine, Rs. | : | 60,000/- |
| Capacity, ha/h | : | 0.2 |

## Benefits over conventional/traditional practices

- Saving of time (50%), labour and cost over traditional practice.

**Design:** ICAR-IIHR, Bangalore

**Commercialization Status:** Commercialized

**Contact:**

- M/s Dharma Technologies, Karnataka Ph: 0816-2292159, +919886737260 Email: info@dharmaagrotech.com
- M/s Varsha Associates, Sadashivanagar, Bangalore - 560 003 Tel (Off): 080 – 41236389; Mob: +9194483 96283; Fax: 08194 – 226648, E-mail:info@varshaagro.com; varshaassociates@gmail.com
- M/s Team Flame Engg& Solutions, Bangalore – 560 091, Mobile: +919844277339; E-mail: teamflame37@gmail.com
- Director, ICAR-IIHR, Hessaraghatta Lake Post, Bengaluru-560 089. E-mail director.iihr@icar.gov.in website: https://www.iihr.res.in

# Tractor Operated Bed Former cum Vegetable Transplanter

## Utility

The seeder has bed former and transplanting unit. The bed former forms beds of 850- 900 mm. The planting unit has wheels for making pits to plant seedlings and soil closure.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 26 kW Tractor |
| Weight, kg | : | 150 |
| Cost of machine, Rs. | : | 1,00,000/- |
| Capacity, ha/h | : | 0.2 |

## Benefits over conventional/traditional practices

- Saving of time (50%), labour and cost over traditional practice

**Design:** ICAR-IIHR, Bangalore

**Commercialization Status:** Commercialized

## Contact:

- M/s Omega Metallic, Bengaluru – 560 058 Mobile: +918123415828, E-mail: omegametalic@gmail.com
- M/s Varsha Associates, Bangalore - 560 003, Tel (Off): 080 – 41236389; Mob: +9194483 96283; Fax: 08194 – 22664, E-mail: info@varshaagro.com; varshaassociates@gmail.com
- M/s Team Flame Engg& Solutions, Bangalore – 560 091, Mobile: +919844277339; E-mail: teamflame37@gmail.com
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# Vertical Cup type Vegetable Transplanter for Cell Feed Nursery

## Utility

The higher missing index, labour requirement and mortality rate of vegetable seedlings are hindrance in promotion of existing semi-automate transplanters in India. To overcome these lacunas, a two row semi-automatic vegetable planter having cup type metering mechanism for cell feed nursery has been developed.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 37.28 or above kW tractor |
| Weight, kg | : | 580 |
| Row spacing, mm | : | 675 (Adjustable) |
| Type of bed maker | : | Ridger type |
| Cost, Rs. | : | 100,000/- |
| Depth of transplanting, mm | : | 46 - 61 |
| Missing percent, % | : | 2 - 28 |
| Quality of feed index, % | : | 64 - 96 |
| Speed of operation, m/s | : | 0.42 |
| Effective field capacity, ha/h | : | 0.15 |
| Cost of operation, Rs/ha | : | 4,200/- |

## Benefits over conventional/traditional practices

- Saves 85, 86 and 86% of labour for transplanting of tomato, brinjal and chilli crops, respectively as compared to manual method.
- Saves 24, 31 and 29% cost of operation of for transplanting tomato, brinjalandchilli crops, respectively over traditional manual method.

**Design:** PAU, Ludhiana (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Principal Investigator (FIM Project), Department of Farm Machinery & Power Engineering, Punjab Agricultural University, Ludhiana – 141 004 (Punjab), Ph No. 0161 2401325, Email: hodfmpe@pau.edu

# Tractor Operated 6 - Row Planter with Fertilizer Drill

## Utility

Tractor drawn six row planter and fertilizer drill is available with inclined plate and vertical plate type seed metering system, suitable for sowing of millets and multi-crop such as sorghum, wheat, maize etc

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | ≥ 26kW Tractor |
| Weight, kg | : | 245 |
| Working width, mm | : | 2340 |
| Cost of equipment, Rs. | : | 38,000/- |
| Operational speed, km/h | : | 4 |
| Working depth, mm | : | 40-50 |
| Field capacity, ha/h | : | 0.42-0.52 |
| Field efficiency, % | : | 80-85 |

## Benefits over conventional/traditional practices

- It can be used for planting various type of crops (seeds) like cotton, groundnut, pigeon pea, soybean, green gram, black gram, maize, etc.
- Multi seeds (hill dropping) can be planted at specific distance.
- Comparatively cheaper to other pneumatic planters.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- M/s Shree Guru Prasad Engineering & Welding Works , Satan, MH, Ph No. 9422770739 Email: hiramanjadhav1@gmail.com
- M/s Dharti agro engineering, Rajkot, Gujarat, "Shri Chiman S Detroja Phone:7575035616, Email : dhartiagro@rediffmail.com
- M/s Swastik Agro Industries, Rajnandgaon, (C.G.), Email: paragb99@gmail.com Contact No.: 07744-281915, 9301899909
- M/s Vasundhara Krishi Yantra, Bhopal, (M.P.), Email: vkyu.bpl@gmail.com, Contact No. – 9893018158
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated Drum Type Pneumatic Planter

## Utility

This equipment is suitable for planting wheat, rice, etc. It can be used for multi-crops by changing the orifice size of metering mechanism.

| Specifications & Performance results | | | |
|---|---|---|---|
| | | 09 Row | 05 Row |
| Power source, kW Tractor | : | ≥ 33.55 | ≥ 18.64 |
| Weight, kg | : | 520 kg | 325 kg |
| Working width, mm | : | 1320 | 1320 |
| Cost of equipment, Rs. | : | 1,75,000 | 1,00,000 |
| Operational speed, km/h | : | 2-3 | 2-3 |
| Working depth, mm | : | 40-50 | 40-50 |
| Field capacity, ha/h | : | 0.3-0.7 | 0.3-0.5 |
| Field efficiency, % | : | 84-86 | 84-86 |

## Benefits over conventional/traditional practices

- It can be used for planting various type of crops (seeds) like cotton, groundnut, pigeon pea, soybean, green gram, black gram, maize, etc.
- Multi seeds (hill dropping) can be planted at specific distance.
- Affordable and comparatively cheaper to other pneumatic planters available in the market.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- M/s Dharti agro engineering, Rajkot, Gujarat, Shri Chiman S Detroja Phone:7575035616 dhartiagro@rediffmail.com
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Drawn Planter - cum - Pre-emergence Herbicide Applicator

## Utility

A tractor-operated 6-row pre-emergence herbicide strip-application system used in conjunction with an inclined-plate planter to manage weeds in widely spaced crops. It is tractor drawn six row planter-cum-fertilizer drill equipped with pre-emergence herbicide applicator. The machine sprays herbicide strip across the planted rows simultaneously.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | ≥ 26kW Tractor |
| Working width, mm | : | 1525 |
| Field capacity, ha/h | : | 0.6 |
| Herbicide tank capacity, Ltr | : | 80 |
| Herbicide Saving, % | : | 40 - 50 |

## Benefits over conventional/traditional practices

- Use of pre-emergence herbicide application, the intra row weeding is eliminated.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- M/s Dharti agro engineering, Rajkot, Gujarat, Shri Chiman S Detroja Phone:7575035616 dhartiagro@rediffmail.com
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated High Speed Planter for Soybean

## Utility

Delayed monsoon onset or consecutive rainfall leads to delayed sowing and leads to low yield. This machine can be used for timely sowing of soybean and like seeds. The higher forward speed of the machine covers more area in less time. The mechanical assisted pneumatic metering mechanism is used for the seed metering. The machine is capable for planting of soybean at 5-7 km/h speed for 100 mm spacing of soybean.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW Tractor | : | 26 or above |
| Weight of machine, kg | : | 325 |
| Number of row | : | 6 (modular units) |
| Row spacing, m | : | 0.2-0.9 |
| Seed to seed spacing, mm | : | 100 |
| Crop | : | Soybean and like seeds |
| Metering mechanism | : | Mechanical assisted pneumatic metering mechanism |
| Filed capacity, ha/h | : | 0.6-0.84 |
| Threshing efficiencies, % | : | 72 |
| Cost of the machine, Rs. | : | 1,20,000/- |
| Cost of operation, Rs/h | : | 790/- |

## Benefits over conventional/traditional practices

- Higher field capacity facilitates timely sowing of soybean even in a shorter window available.
- Saves time and labour.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

**Contact:**

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated Garlic Dibbler for Raised Beds

## Utility

About 65-85 man-days/ha are required for planting of garlic cloves manually. Considering the economic importance of the garlic production, a tractor-drawn eight row garlic dibbler has been developed for sowing garlic cloves at recommended spacing with high accuracy. The machine is capable of planting garlic cloves at uniform depth and maintains equal row to row and plant to plant spacing.

| Specifications & Performance results | | |
|---|---|---|
| Broad beds size, mm | : | Top width: 1200, Furrow width: 300, Height: 150 |
| No of row | : | 8 |
| Spacing, mm | : | 150 (R×R), 100 (P×P) |
| Metering unit | : | Chain-cup type |
| Dibbling unit | : | 16 cups in one row |
| Stationary cup unit | : | 8 cups |
| Power transmission unit | : | Ground wheel cum shaper |
| Depth of operation, mm | : | 40-60 |
| Forward speed, km/h | : | 2.0-2.5 |
| Effective field capacity, ha/h | : | 0.20-0.25 |
| Field efficiency,% | : | 70.0-75.0 |
| Missing percentage,% | : | 2.0-5.0 |
| Multiple percentage,% | : | 5.0-10.0 |
| Cost of machine, Rs | : | 95,000/- |
| Cost of operation, Rs/ha | : | 3,500-3,800/- |

## Benefits over conventional/traditional practices

- Placement of seeds at equal depth and uniform spacing.
- Save 77% cost and 97% labour as compared to manual dibbling.
- 30-35% saving in seeds as compared to commercially available garlic planter.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

**Contact:**

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated Protray Dibbler cum Vacuum Seeder

## Utility

It is suitable for dibbling single seed in the growing media filled protray. The dibbling unit consisted of dibbler drum fitted with pegs for dibbling. The rooting media filled portray was kept on the carrier trolley and pushed below the dibbler drum. The pegs make 5-10 mm deep depressions for seed sowing in all the 98 cavities of protrays. The vacuum seeder consisted of a vacuum chamber fitted with nozzles arranged in such a manner to match the cells of the protray and a seed tray. The vacuum seeder picks single seed by each nozzle and releases to the protray cavities. The vacuum seeder was operated by 0.75 hp vacuum pump. The seeds are picked by creating vacuum and dropped into the dibbled protray by cutting off the vacuum.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 0.372 kW Vacuum pump |
| Weight, kg | : | 120 |
| Cost of machine, Rs. | : | 1,50,000/- |
| Capacity, trays/h | : | 150 |
| No. of trays filled per min | : | 3 |
| Cost of operation/tray, Rs. | : | 1.11 |

## Benefits over conventional/traditional practices

- Saving of time (50%), labour and cost over traditional practice.

**Design:** ICAR-IIHR, Bangalore

**Commercialization Status:** Commercialized

## Contact:

- M/s Dharma Technologies, 1st cross, 60 feet Road Saptagiri extension westTumkur-572102, Karnataka Ph: 0816-2292159, +919886737260 Email: info@dharmaagrotech.com
- M/s Varsha Associates, #35, 1st main Road, Opp. Mahalakshmi Temple Lower Palace Orchards, Sadashivanagar, Bangalore - 560 003 Tel (Off): 080 – 41236389; Mob: +9194483 96283; Fax: 08194 – 226648,Email: info@varshaagro.com; varshaassociates@gmail.com
- Director, ICAR-IIHR, Hessaraghatta Lake Post, Bengaluru-560 089. E-mail director.iihr@icar.gov.in website:https://www.iihr.res.in

# Tractor Operated Automatic Step Seeder

## Utility

It is used to dibble the growing media filled protray and sow single seeds. It has conveyor belt, dibbling unit and vacuum seeding unit and all the units are controlled by PLC. The dibbling unit consists of pegs, used to dibble in the protray filled with cocopeat. Seeds are picked from seed tray by vacuum nozzles and gets released in the protray.

| Specifications & Performance results | | |
|---|---|---|
| Power source. kW | : | 0.746 kW geared motor and 0.746 kW Vacuum pump |
| Weight, kg | : | 300 |
| Specification | : | PLC based conveyer belt, dibbling unit and vacuum seeding unit |
| Cost of machine, Rs. | : | 9,50,000/- |
| Capacity, trays/h | : | 150 |
| No. of trays filled per min | : | 3 |
| Cost of operation/tray, Rs. | : | 1.11 |

## Benefits over conventional/traditional practices

- Saving of time (60%), labour and cost over traditional practice.

**Design:** ICAR-IIHR, Bangalore

**Commercialization Status:** Commercialized

## Contact:

- M/s Concorde Engineering Works, #39, 11th Main, 2nd and 3rd Cross, Milk Muniyappa Road, Kalanagar, Kammagondanahalli, Jalahalli West, Bangalore – 560 015, Mobile: +919886781667E-mail: sivakumar1671@gmail.com
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# WEEDING, FERTILIZER APPLICATION & PLANT PROTECTION EQUIPMENT






# WEEDING EQUIPMENT

# Manual Single Wheel Jute Weeder (Cycle Weeder)

## Utility

CRIJAF single wheel jute weeder is a portable, manually operated weeding device for controlling composite weed flora in line sown up-land crops.

The push and pull type single wheel weeder consists of body frame, ground wheel, blade or tyne attachment frame and handle. The weeder can work with three types of blade i.e. 3-4 tines rake, scraper and share. Weeding operation is push and pull type in standing posture and removes weeds completely from its operational width at 15-30 days after sowing (DAS).

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Manual (One person) |
| Weight, kg | : | 6 |
| Cost, Rs. | : | 2,000/- |
| Working width, mm | : | 180-190 |
| Effective field capacity, ha/h | : | 0.028 |
| Field efficiency, % | : | 85-87 |
| Weeding index, % | : | 88-94 |
| Labour requirement, man-h/ha | : | 38 |
| Cost of operation, Rs./ha | : | 2300/- |

## Benefits over conventional/traditional practices

- Reduction in cost of weeding and drudgery in weeding operation.
- Saving in 60% of weeding time & reduces labour requirement for weeding by 50-60 man-days/ha.
- Saves about Rs.15000-18000/- per ha over manual weeding operation
- Draft requirement is less.
- Improves yield by 10-15%.

**Design:** ICAR-CRIJAF, Barrackpore, Kolkata

**Commercialization Status:** Commercialized

**Contact:**

- M/s Creative Displayer, 55(26) S.N. Banerjee Road, Barrackpore, 700120 W.B.
- Director, ICAR-Central Research Institute for Jute & Allied Fibres, Barrackpore, Kolkata-700121 (WB), Phone: 033-25356121/6122; Fax:033-25350415, Email:crijaf-wb@nic.in; Website: www.crijaf.org.in

# Manual Nail Weeder

## Utility

Nail weeder has been developed to weed out young composite weed flora including germinating ones from line sown and broadcast field crops (jute, mesta, cereals, pulses, vegetables etc.) at 3 - 7 DAS. Provisions have been kept here to attach usual tynes and scrappers for heavy operations.

| Specification & Performance results | | |
|---|---|---|
| Power source | : | Manual (One person) |
| Weight, kg | : | 7 |
| Cost, Rs. | : | 1,950/- |
| Working width, mm | : | 160-190 |
| Effective field capacity, ha/h | : | 0.023 |
| Field efficiency, % | : | 72- 87 |
| Weeding index, % | : | 62 - 76 |
| Labour requirement, man-days/ha | : | 43 |
| Cost of operation, Rs./ha | : | 2600/- |

## Benefits over conventional/traditional practices

- The tool is useful for (a) mechanical weed management (from weed germination stage onwards, 5-6 days) in field and other horticultural crops (b) soil water conservation through soil mulching (c) simultaneous weeding, thinning and line arrangement.
- It is easy to operate and reduces the manpower requirement by 60-70 per cent over manual weeding.
- It reduces the cost of weeding & drudgery.

**Design:** ICAR-CRIJAF, Barrackpore, Kolkata

**Commercialization Status:** Commercialized

**Contact:**

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- Director, ICAR-Central Research Institute for Jute & Allied Fibres, Barrackpore, Kolkata-700 121, (WB). Phone: 033-25356121/6122; E-mail: crijaf-wb@nic.in.

# Manual Cono Weeder

## Utility

The developed manual conoweeder is used for weeding in line-planted wetland paddy. The mild steel material is used to develop this implement. The operation with this implement is easier than the traditional practice with better weeding efficiency.

| Specification & Performance results | | |
|---|---|---|
| Power Source | : | Manual |
| Field capacity, ha/h | : | 0.019 |
| Cost of equipment, Rs. | : | 1800/- |

## Benefits over conventional/traditional practices

- Better weeding efficiency, higher field capacity, less drudgery, higher reliability.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Manual Finger Weeder

## Utility

Wheel finger weeder is suitable for weeding of row crops like upland rice, jute, maize and vegetable crops. It is a manual pull and push type weeder. The weeder consists of a frame, wheel, handle and five number of curved fingers. The wheel is made of M.S. flat with 4 spokes and an axle. The spacing between fingers is adjustable. As the operator moves the handle to and fro, the fingers push into the soil and loosen it and weeds get uprooted.

| Specifications & Performance results | | |
|---|---|---|
| Power requirement | : | 1 person |
| Weight, kg | : | 7.5 |
| Type | : | Manual, pull and push type |
| Field capacity, ha/h | : | 0.025 |
| Working Width, mm | : | 110 |
| Working Depth, mm | : | 50 |
| Output, man-h/ha | : | 40 |

## Benefits over conventional/traditional practices

- Suitable for weeding of row crops like upland rice, jute, maize and vegetable crops.
- The fingers are positioned in staggered manner so that there is no clogging and all the area in between rows is covered.

**Design:** ICAR-NRRI, Cuttack

**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-National Rice Research Institute, Cuttack, Odisha-753006, Phone: +91-671-2367757/67, Email: director.nrri@icar.gov.in, crrictc@nic.in

# Manual Stalk Uprooter

## Utility

It is light weight, gender friendly, simple, handy and easy to fabricate manually operated implement to uproot stalks of harvested crops such as cotton, red gram, lantana camera, etc.

| Specifications & Performance results | | |
|---|---|---|
| Field Capacity (7 Stalks/min) | : | 0.04 ha / h |
| Weight, Kg | : | 4.5 |
| Cost of machine, Rs. | : | 950/- |

## Benefits over conventional/traditional practices

- 40-45% saving in cost of operation.
- 90% saving in time, reduces human drudgery and maintain timeliness in operation.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s New kisan agro services, Ahmednagar, Maharashtra, Mr. Dattatray Vikram Nimbalkar, Email- dnimbalkar7@gmail.com., Phone – 8657595209
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Stem Applicator as an Attachment to Power Weeder

## Utility

In cotton crop, weeding and application of agrochemicals are done in two separate operations, which involve more labour. With an objective to reduce cost of two operations and reduce time of operation, a stem applicator attachment has been developed for power weeder considering the spacing and recommended application dose for cotton crop.

| Specifications & Performance results | | |
|---|---|---|
| Power required, kW | : | 2.6 |
| Weight, kg | : | 66 |
| Cost of implement , Rs | : | 85,000/- |
| Forward speed, m/s | : | 0.33 |
| Effective field capacity, ha/h | : | 0.058 |
| Field efficiency, % | : | 84 |
| Fuel consumption, l/ha | : | 1.2 |
| Cost of operation, Rs/ha | : | 675 |

## Benefits over conventional/traditional practices

- Reduces cost of operation by Rs.2550/ha for application of agrochemical and weeding in cotton crop compared to the conventional method.

**Design:** JTSAU, Rajendranagar, Hyderabad (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

## Contact:

- Head, Agricultural Research Institute,FIM Scheme, Prof. Jaya Shankar Telangana State Agricultural University, Rajendra nagar, Hyderabad - 500030 (Telangana), Email: fimscheme@gmail.com, Phone: +91 - 40 - 24015011

# Self-Propelled Power Weeder

## Utility

It is suitable for weeding operation in line sown upland crops under dry condition. It consists of a main frame, chassis and gear box, handle, hitch, attachment for weeding tines, and wheels. It is powered by 2.25 kW petrol start kerosene run engine. Weeding sweeps are attached to the tool bar through clamps and spacing between the tines can be adjusted. The unit has been provided with steel lugged wheels and their position also can be adjusted to match the crop row spacing.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 2.25 kW petrol start kerosene run engine |
| Weight, kg | : | 100 |
| Cost, Rs | : | 75,000/- |
| Field capacity, ha/h | : | 0.10-0.15 |
| Field efficiency, % | : | 60-70 |
| Weeding efficiency, % | : | 65 |
| Fuel Consumption, l/h | : | 0.70 |
| Cost of operation, Rs/h | : | 125/- |

## Benefits over conventional/traditional practices

- Saves 90% time and 30% in cost of operation compared to manual weeding using khurpi.
- Reduces drudgery in weeding operation.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Fine Fabrication Works, Govindpura, Bhopal ,Tel: 0755 425 1574
- M/s Yashoda Engineering Works, Govindpura, Bhopal; Tel: 99260 03343
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Single Row Self Propelled Power Weeder

## Utility

It is suitable for intercultural operation in line sown rice crop in upland under dry condition. The machine consists of a petrol start kerosene run 1.03 kW engine, an engine mounting frame, the main frame, transmission system, jaw type clutch assembly, clutch control lever, handle, two transport wheels, rotary tine assembly, a support wheel and a rubber flap engine speed of 3600 rpm is reduced to 470 rpm at rotary blade.

| Specifications & Performance results | | |
|---|---|---|
| Power Source, kW | : | 1.03 kW petrol start, kerosene driven engine. |
| Weight, kg | : | 38.5 |
| Cost, Rs | : | 25,000/- |
| Number of rows | : | 1 |
| Weeding mechanism | : | Rotary blade |
| Blade width, mm | : | 120 |
| Wheel base, mm | : | 400 (adjustable) |
| Width of cut, mm | : | 120 |
| Working capacity, ha/h | : | 0.025 |
| Weeding efficiency, % | : | 65 |
| Labour requirement, man-h/ha | : | 40 |

## Benefits over conventional/traditional practices

- Facilitate adoption of DSR technique.
- Easy to operate as compare to manual weeder.
- Reduces drudgery in weeding operation.

**Design:** ICAR-NRRI, Cuttack

**Commercialization Status:** Commercialized

## Contact:

- Director, ICAR-National Rice Research Institute, Cuttack, Odisha-753006, Phone: +91-671-2367757/67, Email: director.nrri@icar.gov.in, crrictc@nic.in

# Single Row Self-Propelled Wet Land Weeder

## Utility

It is suitable for carrying out weeding in transplanted paddy field. The weeder is powered by 1.03 kW petrol start kerosene run engine. Power to lugged wheel is given to propel the machine in forward direction through belt and pulley and chain and sprocket in two step reduction. The forward speed of machine is 2.0 km/h. Flap of metal sheet is provided at the back of rotary unit of blades to stop the throwing of soil in the back. Two side clutches with control lever at the handle are provided for easy turning of machine.

| Specifications & Performance results | | |
|---|---|---|
| Power Source, kW | : | 1.03 kW petrol start, kerosene driven engine |
| Weight, kg | : | 50 |
| Cost, Rs | : | 28,000 |
| Number of rows | : | 1 row |
| Weeding mechanism | : | Rotary blade |
| Blade width, mm | : | 140 |
| Number of blades | : | 6 |
| Width of cut, mm | : | 140 |
| Working capacity, ha/h | : | 0.026 |
| Weeding efficiency, % | : | 70 |
| Crop damage, % | : | Nil |
| Labour requirement, man-h/ha | : | 40 |

## Benefits over conventional/traditional practices

- Suitable for weeding in standing water conditions.
- Saves labour, time and drudgery in weeding operation.
- Saves on account of cost of operation compared to manual weeding.

**Design:** ICAR-NRRI, Cuttack

**Commercialization Status:** Ready to commercialization.

## Contact:

- Director, ICAR- National Rice Research Institute, Cuttack, Odisha-753006, Phone: +91-671-2367757/67, Email: director.nrri@icar.gov.in, crrictc@nic.in

# Self-propelled Onion Weeder

## Utility

Manual weeding in closely spaced crops like onion and garlic is a very tedious, costly and time consuming operation. Self-propelled onion weeder is very useful for weeding in crops like onion and garlic. A petrol engine (1.5 hp) operated weeder consists of weeding mechanism, which works on a vertical rotary weeding principle.

| Specifications & Performance results | | |
|---|---|---|
| Power source , kW | : | 1.12 kW engine |
| Weight of machine, kg | : | 90 |
| Number of rows | : | 4 |
| Row spacing adjustment, mm | : | 150 and 200 mm |
| Actual field capacity (ha/h) | : | 0.06 |
| Forward speed, km/h | : | 1.2 |
| Field efficiency, % | : | 85 |
| Weeding efficiency, % | : | 91-93 |
| Cost of the machine, Rs. | : | 80,000/- |
| Cost of operation, Rs/h | : | 264 |

## Benefits over conventional/traditional practices

- Time saving is 96% and cost saving is 62% as compared to manual weeding.
- Reduces drudgery by avoiding continuous bending and squatting posture to be maintained during manual weeding.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

## Contact:

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Small Tractor Operated Weeder for Narrow Row Crops

## Utility

Intercultural operation is carried out using hand tool known as khurpi, which is operated in squatting posture and has very low work output. The use of large capacity tractor operated weeder may damage the crop due to its track width. Hence, a small tractor drawn weeder has been developed to reduce drudgery involved in the operation and can be cost effective in removing weeds in between rows.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW Tractor | : | 15.7 |
| Weight, kg | : | 60 |
| Type of blade | : | Straight blade |
| Cost of implement, Rs. | : | 16,000 |
| Forward speed, m/s | : | 0.56-0.83 |
| Effective field capacity, ha/h | : | 0.28 |
| Field efficiency, % | : | 72.50 |
| Weeding efficiency, % | : | 68.50 |
| Cost of operation, Rs/ha | : | 1,375 |

## Benefits over conventional/traditional practices

- Saves 60% in labour as compared to manual weeding.
- Saves 37% in cost of operation as compared to traditional practice.

**Design:** CAE, UAS, Raichur (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

## Contact:

- Principal Investigator (FIM Project), College of Agril. Engg., University of Agril. Sciences, P.B. No 329, Lingasugur Road, Raichur- 584101 (Karnataka), Ph. No.: 08532-220154, Email: dr@uasraichur.edu.in

# Tractor Operated Sensor based Inter-cum-Intra Row Weeder for Wide Row Crops

## Utility

Manual weeding in wide spaced crops is arduous and requires high labour especially in cotton, sugarcane and vegetable crops. It also results in fatigue and health hazards to farm workers. Inefficient management of weeds can reduce the production by 15-20%. Therefore, a tractor operated sensor based inter-cum-intra row weeder has been developed, which discriminate main crop and weeds. This information is utilized by the automatic embedded control system to control the rotary hoe movement within the intra-row region for weeding.

| Specifications & Performance results | | |
|---|---|---|
| Number of rows | : | 3 |
| Cost of machine, Rs. | : | 200,000 |
| Forward speed m/s | : | 0.63 |
| Working width of the machine, m | : | 1.95 |
| Effective field capacity, ha/h | : | 0.43 |
| Field efficiency, % | : | 75 |
| Weeding efficiency, % | : | 90 |
| Fuel consumption, l/h | : | 3.7 |
| Draft, N | : | 325 |

## Benefits over conventional/traditional practices

- Reduces total cost of cultivation by 10-15% due to reduction in labour cost.
- Increases yield of chilli crop and also saves soil nutrients consumed by unwanted weeds due to precise weeding in rows and between plants.

**Design:** IIT, Kharagpur (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

## Contact:

- Principal Investigator, AICRP on FIM, Department of Agricultural & Food Engineering, Indian Institute of Technology, Kharagpur – 721302 (West Bengal), Tel: 91-3222-283160 (O), E-mail: rajendra@agfe.iitkgp.ac.in

# Tractor Operated Inter-cum-Intra Row Weeder for Orchards

## Utility

The tractor operated intra row-cum-inter row weeder are being imported in India and are being utilized by few grape and pomegranate growers. They are costly and have hydraulically controlled sensor based rotary unit for weed removal. The adoption of imported weeder in India is low due to high cost and complex design. Threfore, a low horse power tractor operated intra row-cum-inter row weeder has been developed for orchards.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW Tractor | : | 18.63 |
| Weight, kg | : | 270 |
| Type of rotary unit | : | One side shift rotary unit |
| Rotary width, mm | : | 600 |
| Side shift, mm | : | 500 |
| Max. depth of tilling, mm | : | 200 |
| Effective field capacity, ha/h | : | 0.17 (pomegranate), 0.15 (grape) |
| Field efficiency, % | : | 89 (pomegranate), 81 (grape) |
| Weeding efficiency, % | : | 95 |

## Benefits over conventional/traditional practices

- Net saving of Rs. 1,775/ha in pomegranate orchard and Rs. 1,480/ha in grape vineyard over traditional method.

**Design:** MPKV, Rahuri (AICRP on FIM)

**Commercialization Status:** Commercialized

## Contact:

- M/s Shree Ganesh Engineering Works, Nashik. Distt. Nashik (Maharashtra), E mail : shreeganeshengg57@gmail.com , Contact no: 9422228357, 9049061757
- Principal Investigator, AICRP on FIM, Dr. ASCAET, Mahatma Phule Krishi Vidyapeeth, Rahuri – 413722, Dist. Ahmednagar (Maharashtra), Ph. No.: 02426-243219

# Tractor Operated Rotary Weeder

## Utility

This weeder consists of three sets of rotary blade assemblies, which are adjustable on the main frame. Power to these assemblies is provided from main shaft with the help of chain and sprockets.

| Specification & Performance results: | | |
|---|---|---|
| Field capacity, ha/h | : | 0.3-0.8 |
| Field efficiency, % | : | 70-80 |
| Weeding efficiency, % | : | 61-82 |
| Cost of equipment, Rs | : | 60,000/- |
| Cost of operation, Rs/h | : | 1,217 |

## Benefits over conventional/traditional practices

- The machine saves 54% labour and 74% cost of operation as compared to traditional method.

**Design:** PAU, Ludhiana (AICRP on FIM)

**Commercialization Status:** Commercialized

## Contact:

- M/s Gurunanak Industries Sales Corp. Near Tinkoni, Opp. BDO Office, Mansa -151 505 (Punjab), Tel: 9815544242
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# FERTILIZER APPLICATION EQUIPMENT

# Women Friendly Fertilizer Broadcaster

## Utility

Women friendly fertilizer broadcaster is developed to reduce drudgery of women in agriculture and helps to avoid hand skin contact with fertilizer thereby reducing health hazards. The unit is hung in front portion of body with shoulder belt provision. The operator has to rotate the handle and walk in the field to carry out the broadcasting operation. When the fertilizer falls from the hopper on to the rotor plate, it is scattered by the guide vanes.

| Specification & Performance results: | | |
|---|---|---|
| Power Source | : | Manual |
| Weight, kg | : | 3.5 |
| Swath width, m | : | 5 |
| Speed of operation, m/s | : | 1.1 |
| Field capacity, ha/h | : | 1 |
| Labour requirement, man-days/ha | : | 0.13 |
| Cost, Rs | : | 2,000/- |
| Cost of operation, Rs/h | : | 27/- |

## Benefits over conventional/traditional practices

- Productivity of worker increased thrice than the traditional method.
- Uniform application of fertilizer.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Satish Agro Industries, Khed-Digar – 452 409 (MS), Phone: 72074 39822, 86888 29992
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Bullock Operated Farmyard Manure Spreader

## Utility

The animal operated farmyard manure spreader has been developed for spreading the manure uniformly. Adjusting the opening of a MS plate fitted above the auger opening can vary the manure application rate. A dog clutch is provided to engage/ disengage the rotating axle of the cart with manure spreader spiral auger shaft.

| Specification & Performance results | | |
|---|---|---|
| Power Source | : | A pair of bullocks |
| Weight, kg | : | 480 |
| Field capacity, ha/h | : | 0.19 |
| Application rate, t/ha | : | 5-10 |
| Draught, N | : | 676 |
| Coefficient of variation, % | : | 18-20 |
| Cost, Rs. | : | 25,000/- |
| Cost of operation, Rs./ha | : | 350/- |

## Benefits over conventional/traditional practices

- The manure spreader has the advantage of uniform application rate, which is not possible manually
- The equipment can save 85% in cost of operation against manual manure spreading
- This implement is beneficial in farms, where organic farming is practiced

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

## Contact:

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Bio-fungicide and Micro-nutrient Applicator Attachment to Rice Transplanter

## Utility

To control diseases, an application of bio-fungicide (Pseudomonas Fluorescens) is recommended by dipping the roots of paddy seedlings plucked from the nursery. In mechanized transplanting, this is not possible and farmers are not often following this practice. Hence, an attachment to four wheel riding type rice transplanter has been developed for applying bio-fungicides and micro-nutrients in mat type nursery. It helps in prevention of diseases and enhances growth of rice plants leading to higher yields.

| Specifications & Performance results | | |
|---|---|---|
| Weight of attachment, kg | : | 55 (with spray liquid in tank) |
| Number of nozzles and type | : | 5, Solid cone |
| Nozzle spacing, mm | : | 350 |
| Type of pump | : | 12V DC electrical diaphragm type |
| Cost of attachment, Rs. | : | 5,000/- |
| Micro-nutrient application rate, kg/ha | : | 2.5 |
| Cost of transplanting, Rs./ha | : | 3,000/- (Excluding cost of mat nursery, bio-fungicide/ micro-nutrient mixture) |

## Benefits over conventional/traditional practices

- The attachment helps in reducing the cost for plant protection in transplanted rice.
- The attachment helps in uniform application of micro-nutrient without loss of nutrients at no extra labour cost.

**Design:** KCAET, KAU, Tavanur, Kerala (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

## Contact:

- Principal Investigator, AICRP on Farm Implements and Machinery, Kelappaji College of Agril. Engg. & Tech., Tavanur (Kerala), Ph. No. :+91-494-2686214, Email: kcaet@kau.in

# Tractor Operated Fertilizer Band Placement-cum-Earthing-up Machine

## Utility

The band placement of fertilizer and earthing up operations in wide spaced sugarcane and maize crops are time consuming and drudgery prone. Therefore, the tractor operated fertilizer band placement-cum-earthing up machine has been developed for loosening the soil, cutting weeds, placing chemical fertilizer and earthing up the plant simultaneously in crops such as maize, sugarcane, potato, etc.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 26 kW tractor |
| Seed/fertilizer metering device | : | Cell type positive feed roller |
| Number of cells | : | 10 |
| Power transmission | : | From ground drive wheel through chain and sprockets |
| Cost of equipment, Rs | : | 60,000/- |
| Fertilizer rate, kg/ha | : | 60-250 |
| Effective working width, mm | : | 100 |
| Effective field capacity, ha/h | : | 0.56 |
| Operating speed, m/s | : | 1.25 |
| Draft, N | : | 1056 - 5018 |
| Field efficiency, % | : | 82 |
| Cost of operation, Rs/ha | : | 1,550/- |

## Benefits over conventional/traditional practices

- Helps in achieving timeliness in earthing up, weeding, and fertilizer applications.
- Reduces cost of production by 10-20% as compared to traditional method.

**Design:** GBPUAT, Pantnagar (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

## Contact:

- Head, Department of Farm Power and Machinery, College of Technology, GBPUAT Pantnagar (Uttarakhand)
  Email: regreg@gbpuat.ac.in

# Tractor Operated Fertilizer Dibbler for Ratoon Sugarcane

## Utility

Fertilizer dibbling for ratoon sugarcane is time consuming and cumbersome process involving huge labour cost and drudgery in performing the task under traditional practice. To address the need tractor operated fertilizer dibbler for ratoon sugarcane has been developed for placement of fertilizer in ratoon sugarcane grown at a spacing of 1.5 m without much soil disturbance.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 11 kW tractor |
| Fertilizer metering device | : | Fluted roller |
| Cost of equipment, Rs | : | 75,000 |
| Number of punch/10 m | : | 27 |
| Effective field capacity, ha/h | : | 0.14 |
| Field efficiency, % | : | 86.33 |
| Distance between the punched holes, m | : | 0.36 |
| Average quantity of fertilizer/punch, g | : | 46.22 |
| Application rate, kg/ha | : | 850/- |
| Deviation from recommendation, % | : | 0.95-5.52 |
| Depth of placement, mm | : | 110-120 |
| Cost of operation, Rs/ha | : | 1,550/- |

## Benefits over conventional/traditional practices

- Saves time, labour cost and cost of operation by 60% as compared to traditional practice.

**Design:** TNAU, Coimbatore (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

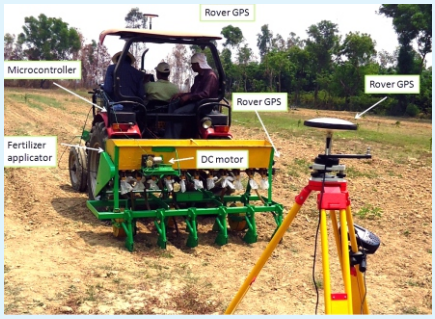
## Contact:

- Head & Principal Investigator (AICRP on FIM), Department of Farm Machinery and Power Engg., Tamil Nadu Agricultural University, Coimbatore – 641003 (Tamil Nadu), Ph. No.: 91-422-2457576, E-mail: info@tnau.ac.in

# Tractor Operated GPS Based Variable Rate Granular Fertilizer Applicator

## Utility

GPS based variable rate granular fertilizer applicator (VRFA) has been developed to apply variable rate of fertilizers as basal dose based on nutrient availability map of the field. The fertilizer application rate is changed according to the prescribed application rate at the identified grid with coefficient of variation (CV) of 11.7-15.0%.




| Specifications & Performance results | | |
|---|---|---|
| Power source, kW tractor | : | 26.11 |
| Fertilizer metering device | : | Fluted roller |
| Power transmission | : | From ground drive wheel through chain and sprockets |
| Cost of equipment, Rs | : | 60,000 (without GPS) |
| Fertilizer application rate, kg/ha | : | 5-300 |
| Fertilizer application accuracy, % | : | 98 |
| Cost of operation, Rs/ha | : | 3,600/- |

## Benefits over conventional/traditional practices

- Ensure precise application of fertilizers as basal dose.

**Design:** ICAR-CIAE, Bhopal and IIT, Kharagpur (AICRP on FIM)

**Commercialization Status:** Commercialization

## Contact:

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com
- Principal Investigator, AICRP on FIM, Department of Agricultural & Food Engineering, Indian Institute of Technology, Kharagpur – 721302 (West Bengal), Tel: 91-3222-283160 (O),E-mail: rajendra@agfe.iitkgp.ac.in

# Tractor Operated Side Trencher-cum-FYM Applicator for Grapes Orchard

## Utility

The FYM application in vineyard is one of the most drudgery prone operations in grapes cultivation, which is done manually by digging a continuous trench near the plant and placing FYM. A side trencher-cum-FYM applicator having one tonne capacity can do trenching and place FYM on either side of plant rows, simultaneously.


| Specifications & Performance results | | |
|---|---|---|
| Power source, kW tractor | : | ≥ 34 |
| Mode of operation | : | Hydraulic motor |
| Width of operation, m | : | 2.4-2.6 |
| Depth of operation, mm | : | 300 |
| Application rate of FYM, tonn/ha | : | 25 |
| Cost of machine, Rs. | : | 2,00,000/- |
| Draft, N | : | 5563 |
| Actual field capacity, ha/h | : | 0.2 |
| Field efficiency, % | : | 80 |
| Labour requirement, man-days/ha | : | 2.0 |
| Cost of operation with machine, Rs./ha | : | 3,440/- |

## Benefits over conventional/traditional practices

- 88% saving in cost of operation.
- 99% saving in labour and 80% saving in time of operation.
- Uniform distribution of FYM.
- Reduces human drudgery and maintain timeliness in operation.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Email: directorciae@gmail.com
- M/s Varadvishwa Green Energy, Baramati, MH

# Plant Protection Equipment

# Manual Banana Pseudostem Injector

## Utility

Banana pseudo stem injector has been developed for injecting chemicals in banana pseudo stem. At present, pseudostem injection is done manually and it requires more labour and is tedious operation. It consists of chemical tank, peristaltic pump, control unit with non-return valve and injector. The peristaltic pump is attached to pump the liquid from chemical tank to injection system. The control unit is attached with electronic embedded system to control chemical quantity and depth of injection by 8 mm I/P & O/P Screw variable valve. The non-return valve (Thread, one way valve) is attached with control unit to restrict the chemical back flow to the injector after injection. Quantity of liquid injected is 2-4 ml per tree.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Battery operated sprayer |
| Battery | : | 12 V, DC |
| Tank capacity, lit | : | 15 |
| Pump type | : | Diaphragm pump |
| Field capacity, Trees/h | : | 140 – 150 |
| Spillage,% | : | 2 |
| Injector efficiency, % | : | 95 |

## Benefits over conventional/traditional practices

- Battery operated back pack model.
- Very easy to carry one tree to another tree.
- Injecting liquid quantity can adjusted precisely.

**Design:** ICAR-CIAE, RC, Coimbatore and NRCB, Tiruchirapalli

**Commercialization Status:** Commercialized

## Contact:

- M/s. Magnificent Engineers,T.S. 36, SIDCO Industrial Estate, Kurichi, Coimbatore – 641 021.
- Head, ICAR-Central Institute of Agricultural Engineering, Regional Centre, Coimbatore-641007 ciaerccbe@gmail.com
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Manual Herbicide Applicator

## Utility

Herbicide applicator is a handy tool to apply non selective herbicides in between row crops to control composite weed flora. Herein, non-selective herbicides loaded on applicators back (filled in container) flows through a conduit (guided by a handle) and reaches to a jute cushion (hanging from two wheeled cushion holder) by gravity flow and the same is wiped on the top of the target weeds. In broadcast jute, synchronous weed control thinning and line development can be done using this tool. This process controls 80 to 85 per cent of the total weed flora and one hand weeding is required to control rest of the weeds from within the rows. This process completely eliminates the usual drift hazard of herbicide.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Manual (One person) |
| Weight, kg | : | 11.5 |
| Cost, Rs. | : | 3,800/- |
| Working width, mm | : | 160 |
| Effective field capacity, ha/h | : | 0.26 |
| Field efficiency, % | : | 90 |
| Labour requirement, man-h/ha | : | 4 |
| Cost of operation, Rs./ha | : | 240/- |

## Benefits over conventional/traditional practices

- Eliminates the risk of crop damage by directed herbicide application and effective for other crops as it has no drift hazard.
- Weeding through this machine is cheaper by Rs.10000/- in comparison to twice manual weeding .

**Design:** ICAR-CRIJAF, Barrackpore, Kolkata

**Commercialization Status:** Commercialized

## Contact:

- M/s Creative Displayer, 55(26) S.N. Banerjee Road, Barrackpore, W.B.Pin-700120
- M/s Krishi Udyog, Samabaya Pally, Bally, Howrah, W.B. Pin-711205, Phone: 9432580161
- Director, ICAR-Central Research Institute for Jute & Allied Fibres, Barrackpore, Kolkata-700 121, West Bengal. Phone: 033-25356121/6122; E-mail: crijaf-wb@nic.in; Website: www.crijaf.org.in

# Bullock Operated sprayer

## Utility

Bullock operated sprayer is especially designed for chemical spraying in crops requiring high clearance such as cotton. It can be used in other crops too. This technology is suitable for adoption by farmers to increase the annual use of draught animals and to achieve benefits of timeliness of farm operations.

| Specification & Performance results: | | |
|---|---|---|
| Power Source | : | A pair of bullocks |
| Pressure vessel size | : | I- 9498 |
| Type of nozzles | : | Hollow cone |
| No of nozzles | : | 6 |
| Boom length, m | : | 2.1 |
| Tank capacity, l | : | 200 |
| Field capacity, ha/h | : | 0.56 |
| Cost of equipment, Rs | : | 5,000/- |
| Cost of operation, Rs/ha | : | 175/- |

## Benefits over conventional/traditional practices

- The cost of operation per ha is 50-100% lower than tractor or engine operated sprayers.
- The cost of operation was Rs. 83/ha less as compared to knapsack sprayer whereas the field capacity was 9 times more.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- M/s Pudsons Industries Pvt Ltd, Mangaldas Market, Akola, Phone: 09689897117, Email: padsonmarketing@gmail.com
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Bullock Operated Traction Sprayer

## Utility

The sprayer is operated by two ground wheels having stub axles. Drive is taken to a double piston horizontal triple action pump, which is mounted on the frame of the sprayer above the traction wheels. Pump is powered by the ground wheel through belt and pulleys. The pressurized liquid is conveyed to 14 no hollow cone nozzles through a flexible pipe. The liquid is stored in 200 ltr tank. Nozzle height is adjustable.

| Specification & Performance results | | |
|---|---|---|
| Power Source | : | A pair of bullocks |
| Discharge, $m^3/s$ | : | $1.2 \times 10^{-5}$ |
| Field capacity, ha/h | : | 1.33 |
| Field efficiency, % | : | 84 |
| Draught, N | : | 655-710 |
| Boom length, m | : | 6 |
| Mean pressure, kPa | : | 2745 |
| Forward speed, m/s | : | 0.71 |
| Cost, Rs. | : | 70,000/- |
| Cost of operation, Rs./ha | : | 60/- |

## Benefits over conventional/traditional practices

- This is a versatile spraying implement for bullock operated farms which can attend wide range of chemical application such as weedicide and insecticide and also suitable for wide variety of crops such as vegetables, soybean, pigeon pea, cotton, etc.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

## Contact:

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Bullock Operated Engine Powered Sprayer for Cotton and Pigeon Pea Crop

## Utility

A 2.2 kW Honda sprayer was mounted on a frame modified from a commercial bullock operated sprayer so as to make it suitable for high clearance crops such as cotton and pigeon pea.

| Specification & Performance results | | |
|---|---|---|
| Power Source | : | A pair of bullocks |
| Weight, kg | : | 305 |
| Discharge, $m^3/s$ | : | $1.6 \times 10^{-5}$ |
| Field capacity, ha/h | : | 1.2 |
| Draught, N | : | 735-840 |
| Boom length, m | : | 5.2 |
| Mean pressure, kPa | : | 2060 |
| Forward speed, m/s | : | 0.8 |
| Cost, Rs. | : | 70,000/- |
| Cost of operation, Rs./ha | : | 65/- |

## Benefits over conventional/traditional practices

- As compared to traditional practice of mounting of engine-operated sprayer on bullock cart, this sprayer gives a higher field capacity as compared to traditional practice (0.66 ha/h) resulting in 50% decrease in cost of spraying.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

## Contact:

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Self-propelled High Clearance Multi-purpose Vehicle

## Utility

Most of farm operations in cultivation of vegetable crops are done by manual labour.
Considering the need of single prime mover which can be utilized for multiple operations, a self-propelled hydraulically actuated specialty vehicle is developed. It is suitable for crops like tomato, brinjal, chilli, pigeon pea, sugarcane, maize, okra, etc. of height up to 2.0 m to carry out different farm operations like spraying, weeding, harvesting, etc. The vehicle has provision of adjustable ground clearance and variable track width to suit different spacing and height of horticultural crops. Equipped with hydrostatic transmission and steering.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW engine | : | 29 |
| Weight, kg | : | 1500 |
| Adjustable track width, m | : | 2 - 2.6 |
| Adjustable height, m | : | 1.5 - 2.0 |
| Spraying tank capacity, l | : | 400 |
| Spray boom length, m | : | 9.4 |
| Cost, Rs. | : | 2,50,000/- |
| Maximum torque per wheel, Nm | : | 2500 |
| Maximum speed, km/h | : | 20 |
| Effective field capacity for spraying, ha/h | : | 1.4 |
| Effective field capacity forweeding, ha/h | : | 0.16 |
| Weeding efficiency,% | : | 92.5 |
| Cost of operation for spraying, Rs./ha | : | 400 |
| Cost of operationforweeding, Rs./ha | : | 1500 |

## Benefits over conventional/traditional practices

- Multiple operations such as spraying, weeding, harvesting, etc. by single prime mover. Saving in time and cost of operation.
- Reduces drudgery and labour requirement.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Small Tractor Operated EPN Applicator for Sugarcane White Grub Management

## Utility

Majority of the farmers do the spot application of entomapathogenic nematodes (EPN) to control white grub, manually. Manual application method of EPN application involve more drudgery and results in non-uniform application of EPN solution in sugarcane root zone. The developed small tractor operated EPN applicator consists of main frame, tank holding assembly, agitator, water pump, furrow opener and standard three-point hitch. A 150-liter tank is placed to carry the EPN solution. The tank consists of agitator and two EPN solution outlet flexible tubes. The agitator shaft is operated by 12 V high torque DC motor. The speed of the agitator shaft and discharge rate can be adjusted by using control units. The agitator provides continuous agitation of EPN solution and avoid suspension of particles so that it results in uniform delivery of the EPN. Pumping of EPN solution is done by two numbers of 4.0 LPM / 12v DC water sprayer motor diaphragm pump and it is powered by 12 V Battery.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW Small tractor | : | 13.42 – 17.89 |
| No. of row | : | 2 |
| Row to row spacing adjustment, m | : | 1.07 – 1.37 |
| Pump type | : | Diaphragm pump |
| Furrow opener | : | 2 no |
| Water tank capacity, lit | : | 150 |
| Field capacity, ha/h | : | 0.18 |
| Cost of operation, Rs/ha | : | 2,550/- |

## Benefits over conventional/traditional practices

- Eliminates drudgery in EPN spot application operation
- Higher capacity compared to manual method

**Design:** ICAR-CIAE, RC and ICAR-SBI, Coimbatore

**Commercialization Status:** Ready for commercialization

## Contact:


- Head, ICAR-Central Institute of Agricultural Engineering, Regional Centre, Coimbatore-641007, Email:ciaerccbe@gmail.com
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Small Tractor Operated Boom Sprayer suitable for Field and Orchard Crops

## Utility

This equipment is suitable for field crops and orchards crops. The developed equipment is small tractor operated and consists of a tank of 300 l capacity, three cylinder axial piston pump and boom fitted with hollow cone nozzles. The tank is fitted on the ROPS of the tractor. The total length of the boom is 7 m and fabricated to fivefold system. The fold system arranged in such a way that, the spray boom can be fixed in horizontal as well as vertical position according to the need of orchard crop canopy geometry.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW tractor | : | Small Tractor |
| Cost of equipment, Rs. | : | 30,000/- |
| Operating speed, | : | 2.8 |
| Effective field capacity, ha/h | : | 1.45 |
| Field efficiency, % | : | 73 |
| Pump capacity, LPM | : | 36 |
| Cost of operation, Rs/ha | : | 500/- |

## Benefits over conventional/traditional practices

- It has compact size, can easily attached with any small tractor for field operation.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Dharti agro engineering, Rajkot, Gujarat, Shri Chiman S Detroja Phone:7575035616, Email: dhartiagro@rediffmail.com
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Small Tractor Operated Variable Rate Vertical Boom type Air-assisted Sprayer with Sensor Attachment

## Utility

The vertical boom type air assisted sprayer with sensor attachment has been developed to deliver the precise amount of chemicals to match the tree configurations and to reduce pesticide use and environmental pollution.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW tractor | : | 13.8 |
| Weight, kg | : | 150 |
| Cost, Rs | : | 150,000/- |
| Forward speed, m/s | : | 0.56-0.83 |
| Effective field capacity, ha/h | : | 0.26 |
| Saving of liquid, % | : | 33 |

## Benefits over conventional/traditional practices

- Saving of pesticide upto 33% and less pollution to environment as compared to blanket application of pesticide.

**Design:** MPUAT, Udaipur (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

## Contact:

- Principal Investigator (FIM Project), Dept. of Farm Machinery and Power Engg., College of Technology & Engineering, MaharanaPratap University of Agriculture & Technology, Udaipur- 313001 (Rajasthan), Tel: 91-294-2470119, Email: deempuatudr@gmail.com

# Solar Powered Knapsack Sprayer with Tilting Arrangement

## Utility

Solar powered knapsack sprayer has been indigenously developed to spray pesticide, micro-nutrients and growth regulators on agricultural crops. Elimination of manual operation of the lever in a Lever operated knapsack (LOK) sprayer reduces the drudgery of operation common with LOK spraying. It maintains constant pressure over a longer period of time due to simultaneous charging with the solar power, thus generating uniform spray droplets resulting in effective sprays, reduction in Insecticide resistance and losses due to drift. It ensures conservation of energy by utilizing non-conventional solar energy, and ensuring safety to environment.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 12 v DC Motor, 18 W |
| Weight, kg | : | 9 (without spay liquid) |
| Cost, Rs | : | 8,000/- |
| Tank Capacity, liters | : | 16 |
| Pressure, kg/cm$^{-2}$ | : | 3 |
| PV Solar panel, W | : | 18 |
| Field capacity, ha/h | : | 0.25 |

## Benefits over conventional/traditional practices

- Reduces drudgery of manual operation in lever operated knapsack sprayer.
- Sustained pressure thereby, ensuring uniform sized droplets over a longer period of time.

**Design:** ICAR-CICR, Nagpur

**Commercialization Status:** Commercialized

**Contact:**

- M/s Padgilwar Corporation, Agriculture Farm Equipment, Machinery & Sprayer Solutions,76, Central Avenue Road, Gandhi Baug, Nagpur 440028, Maharashtra. Website: www.padgilwar.com. Ph: +91-9822935851
- The Head, Crop Production Division, ICAR-Central Institute for Cotton Research, Nagpur. Tel: (07103) 275536, Email: cicrnagpur@gmail.com, www.cicr.org.in

# Tractor Operated Hydraulic Boom Sprayer with Drift Control Shield

## Utility

In India, tractor operated hydraulic boom sprayer are commonly used for application of chemical pesticides in agricultural crops. It has advantages of higher coverage and speedy operation. But the use of these boom sprayers leads to common problem known as "spray drift". Therefore, a drift control shield for hydraulic boom sprayers has been developed, which is circular in shape and has radius of curvature of 0.3 m and the angle of inclusion of 90 degree. The shielding of spray boom reduces spray drift in hydraulic boom sprayers by 35-42% with single foil shield and by 68-73% with the use of double foil shield.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW tractor | : | 26.11 |
| Shields thickness, mm | : | 3 and 4 |
| Cost of equipment, Rs. | : | 30,000/- (only attachment) |
| Nozzles operating pressure, kPa | : | 680 |
| Operating speed, m/s | : | 0.7 |
| Effective field capacity, ha/h | : | 1.5 |
| Field efficiency, % | : | 81 |
| Fuel consumption, l/h | : | 5.8 |
| Cost of operation, Rs/ha | : | 580/- |

## Benefits over conventional/traditional practices

- Reduces spray drift by 35-42% and 68-73% with the use of single and double foil shields, respectively.

**Design:** MPUAT, Udaipur (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

**Contact:**

- M/s ASPEE, Marve Road, Malad West, Mumbai – 400064 (Maharashtra), Phone: +91 22 67745700, 91-22-28822336, Email: aspee@aspee.net
- Principal Investigator (FIM Project), Dept. of Farm Machinery and Power Engg., College of Technology & Engineering, MPUAT, Udaipur-313001 (Rajasthan) Tel: 91-294-2470119, Email: deempuatudr@gmail.com

# Tractor Operated Ultrasonic Sensor based Pomegranate Spraying System

## Utility

A sensor based tractor operated spraying system is developed for detection of plant canopy and spraying of agrochemical over the detected plant canopy.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW tractor | : | 26.11 |
| Pump speed, rpm | : | 920 |
| Pump pressure, kPa | : | 700 |
| Cost of equipment, Rs | : | 300,000/- |
| Effective field capacity, ha/h | : | 0.88 |
| Operating speed, m/s | : | 0.57 |
| Number of plants covered, plants/h | : | 1,370 |
| Chemical application rate with sensor, l/ha | | |
| Turbo nozzles | : | 371 |
| Hollow cone nozzle | : | 200 |
| Cost of operation, Rs/ha | : | 780/- |

## Benefits over conventional/traditional practices

- Saving of liquid with the sprayer is 25-30% and 45-50% with turbo nozzles and hollow cone nozzles, respectively.

**Design:** IIT Kharagpur (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

## Contact:

- Principal Investigator, AICRP on FIM, Department of Agricultural & Food Engineering, Indian Institute of Technology, Kharagpur – 721302 (West Bengal), Tel: 91-3222-283160 (O),E-mail: rajendra@agfe.iitkgp.ac.in

# Tractor Operated Air Sleeve Boom Sprayer

## Utility

To reduce labour requirement during peak season and human drudgery, the sprayer has been developed, which found more efficient for application of pesticides for control of insects and pest.

| Specification & Performance results: | | |
|---|---|---|
| Field capacity, ha/h | : | 1.5-2 |
| Field efficiency, % | : | 75-82 |
| Nozzle pressure, kPa | : | 280-420 |
| Weeding efficiency, % | : | 51 |
| Cost of equipment, Rs | : | 280,000/- |

## Benefits over conventional/traditional practices

- 37 and 12% and higher cotton yield were reported using this sprayer against knapsack sprayer and boom sprayer, respectively.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- Gursukh Agro Works, Vill. Jhakroudi, P.O. Samrala, Ludhiana – 141 114, Phone: 096460-00555
- ASPEE Group of Companies, Aspee House, BJ Patel Road, Malad (W), Mumbai – 400 064
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# HARVESTING EQUIPMENT

# Manual Naveen Sickle

## Utility

A serrated blade sickle is suitable for harvesting wheat, rice and grasses etc. Material used for blade is C-50 grade high carbon steel which is wear resistant and gives longer life. Serrations are made in such a way that the blade can be sharpened and serrations can be reused when the blade get blunt.

| Specifications & Performance results | | |
|---|---|---|
| Labour requirement, man-h/ ha | : | 80 |
| Field capacity, ha/ h | : | 0.018 |

## Benefits over conventional/traditional practices

- It saves 26% labour and operating time as well as saves 27% cost of operation compared to harvesting by local sickle.
- Longer life of blade and serrations.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- Dev Agro Tools Private Limited, 300,Sankaran Complex, 560025, Langford Rd, Akkithimana Halli, Shanti Nagar, Bengaluru, Karnataka 560027, M- 099454 62813
- M/s Hira Krishi Udyog, Fatehbad, Haryana
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Manual Knapsack Type Pneumatic Cotton Picker

## Utility

Manual cotton picking is cumbersome and time consuming practice requiring 1,560 man-h/ha. Knapsack type pneumatic cotton picker performs best at 5,200 rpm blower speed with maximum picking efficiency, output capacity and minimum trash content. It resulted in three time increase in output capacity as compared to manual picking. The trash content is less in first picking as compared to second picking due to maturity of crop.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW engine | : | 1.18 |
| Weight, kg | : | 9 |
| Output capacity, kg/h | : | 8.83 |
| Picking efficiency, % | : | 94-96 |
| Trash content, % | : | 5.5 - 6.2 |
| Fuel consumption, l/ha | : | 0.58 - 0.63 |
| Cost , Rs. | : | 3,000/- |
| Cost of operation, Rs./kg | : | 10.00/- |

## Benefits over conventional/traditional practices

- Saving in cost of operation and time of 35.6% and 57.6%, respectively as compared to conventional method.

**Design:** MPUAT, Udaipur (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Principal Investigator (AICRP on FIM), Dept. of Farm Machinery and Power Engg., College of Technology & Engineering, Maharana Pratap University of Agriculture & Technology, Udaipur- 313 001 (Rajasthan), Tel: 91-294-2470119, 2980604, Email: deempuatudr@gmail.com

# Manual Sugarcane Detrasher

## Utility

It consists of two curved knives welded at two ends of the U shaped stem. The stem is attached to a hollow metal pipe. An adjustable oval shaped loop is provided to increase or decrease the gap between two knives depending on the diameter of sugarcane stalk. One person can operate the tool comfortably.

| Specifications & performance results | | |
|---|---|---|
| Power Source | : | Manual |
| Weight, kg | : | 0.40 |
| Labour requirement, | : | one person |
| Stripping capacity, kg of cane /day | : | 1125 |
| Cost, Rs | : | 650/- |
| Cost of operation, Rs/h | : | 11/- |

## Benefits over conventional/traditional practices

- 13% and 14.5% saving in cost and time, respectively, compared to conventional hand detrashing.
- Improved operator's ergonomics through significant reduction in physiological stress and discomfort.
- Protects user's health by eliminating dermatological injury or other types of injuries and illnesses.

**Design:** TNAU, Coimbatore (AICRP on FIM)

**Commercialization Status:** Commercialized

**Contact:**

- M/s KSNM Marketing, SF No. 29/1B, Ona Palayam, Green Home Via, Dheenam Palayam Post, Coimbatore-641109, Contact No.: +91 94890 61175, Email:info@ksnm.in, ms@ksnm.in

# Manual Arecanut Tree Climber and Harvesting Knife

## Utility

The climbing device is raised by the user to attain a desired elevation in Arecanut tree. The harvesting tool is a curved knife fitted at the tip of long telescopic light weight aluminum hollow pipe. The climbing device offers the user the side support in all direction, thus eliminating the danger of falling down when the user ascends or descends the tree. Increased feeling of stability, comfort and safety to the user.Unskilled worker can climb the tree with ease.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | Manual |
| Weight, kg | : | 12.3 |
| Labour requirement, person | : | 01 |
| Field capacity, kg/h | : | 86 (against 69 kg/h in traditional) |
| Cost, Rs | : | 5,000/- |
| Cost operation, Rs/kg of Arecanut harvested | : | 0.50/- |

## Benefits over conventional/traditional practices

- The cardiac cost per unit output is minimum (29 beats/kg) when compared with conventional method (58 beats/kg.
- 34 percent saving in time and 20 per cent saving in cost.
- It also reduces the drudgery and is safer and easier.
- Economic benefit: Rs. 5000 /unit/ year.
- Protects the worker from occupational Dermatosis.

**Design:** TNAU, Coimbatore (AICRP on FIM)

**Commercialization Status:** Ready for commercialization

**Contact:**

- Head & Principal Investigator (AICRP on FIM), Department of Farm Machinery and Power Engg., TNAU, Coimbatore – 641003 (Tamil Nadu), Ph. No.: 91-422-2457576, E-mail: info@tnau.ac.in

# Manual Scissor type Tea Plucker

## Utility

It is useful for tea leaf plucking. It consists of a light weight collection tray, nylon net lid, a pair of mild steel blade and nylon handle grip.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Manual |
| Weight, kg | : | 1.0 |
| Labour requirement, person | : | 01 |
| Capacity, kg/h | : | 8.6 as against 5.2 in traditional method |
| Cost, Rs | : | 450/- |
| Operating cost, Rs/kg of tea leaves harvested | : | 2.70/- |

## Benefits over conventional/traditional practices

- Economic benefit: Rs. 1,000/unit/year
- The output is 40% higher when compared with conventional method of hand picking
- Cardiac cost for tea plucking is less (295 beats/kgof tea leaves) as compared to traditional plucking (580 beats/ kg of tea leaves).
- Results in 32% saving in cost and 40% saving in time when compared with conventional hand-picking method.
- Protects the hands of the worker from allergic dermatitis

**Design:** TNAU, Coimbatore (AICRP on ESA)

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Head & Principal Investigator (AICRP on ESA), Department of Farm Machinery and Power Engg., Tamil Nadu Agricultural University, Coimbatore – 641003 (Tamil Nadu), Ph. No.: +91-422-2457576, E-mail: info@tnau.ac.in

# Manual Guava Fruit Harvesting Kit

## Utility

The harvesting kit includes a harvesting tool, a collecting bag and an adjustable platform with height adjustment of 1.5 to 2.5 m. One person can handle the unit comfortably and carry out the fruit plucking.

| Specifications & Performance results | | |
|---|---|---|
| **Adjustable platform** | | |
| Weight , kg | : | 25 |
| **Collection bag** | | |
| Weight , kg | : | 0.75 |
| **Harvesting tool** | | |
| Capacity, kg/h | : | 50 |
| Cost, Rs. | : | 1,600/- |
| Operating cost, Rs/h | : | 24/- |

## Benefits over conventional/traditional practices

- The developed kit (harvesting tool, adjustable platform and collection bag) has lower fruit damage and less fatigue during operation.
- It can also be used for all horticulture crops with the fruit bearing height up to 4.5 m such as goose berry, citrus, mango, etc.

**Design:** MPUAT, Udaipur (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

## Contact:

- Principal Investigator (FIM Project), Dept. of Farm Machinery and Power Engg., College of Technology & Engineering, Maharana Pratap University of Agriculture & Technology, Udaipur- 313001 (Rajasthan), Tel: 91-294-2470119, 2980604(R), Email: deempuatudr@gmail.com

# Manual Improved Sugarcane De-trashing Tool

## Utility

De-trashing of sugarcane is a recommended practice on fifth and seventh month after planting which involves removal of dried and yellowish green leaves. It is a labour intensive process in which hands are often injured due to the spines and serrated margins of the sugarcane leaf blade.

An ergonomically improved sugarcane detrashing tool is suitable for stripping green and dry leaves in standing sugarcane crops. This tool has two stainless steel (SS) knives fitted in a 'U' shaped stainless steel flat with tension.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | One person |
| Weight, kg | : | 0.28 |
| Cost, Rs | : | 500/- |
| Field capacity, ha/day | : | 0.12 |

## Benefits over conventional/traditional practices

- Ensure safe operation without any hand injury to labour.
- Higher output.

**Design:** ICAR-SBI, Coimbatore

**Commercialization Status:** Commercialized

## Contact:

- M/s KSNM Marketting, SF No. 29/ 1B, Onapalayam,, Green Home Via, Vadavalli to Thondamuthur Road, Coimbatore - 641 109. Tamil Nadu, Contact No.: +91 94890 61175, Email:info@ksnm.in, ms@ksnm.in
- M/s Celebrating Farmers Edge International Pvt.Ltd, Plot No.79, Yeshwant Bugalow, Opp. Grudut Society, Sarrnath Nagar, Nashik-422005, Maharashtra
- The Director, ICAR -Sugarcane Breeding Institute, Coimbatore 641 007, Tamil Nadu, Tel: 0422-247-2621, Email: director.sbi@icar.gov.in

# Manual Coconut Tree Climber

## Utility

The ergo refined coconut tree climbing device is suitable to climb the coconut tree with minimum risk. The unskilled plantation worker can also work with this unit. It protects the worker from occupational dermatitis. The user can sit comfortably facing the tree and receive support from the concave rear rail and the side rails. The seat is adjustable along the bottom rest towards and away from the back rest and pivotable relative to the upper frame so that the user can choose convenient position.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Manual |
| Weight, kg | : | 13.7 |
| Cost, Rs | : | 4,000/- |
| Cost of operation, Rs/nut | : | 0.75/- |

## Benefits over conventional/traditional practices

- A person can climb 5 to 13 coconut trees and harvest 56 coconuts per hour as against 28 coconuts per hour in traditional system.
- It saves 38% in time and 48% in cost of harvesting as compared to conventional method.
- It also reduces the drudgery by 68% (calculated from cardiac cost) and is safer and easier than the conventional method of climbing and harvesting coconuts.

**Design:** TNAU, Coimbatore (AICRP on FIM)

**Commercialization Status:** Commercialized

## Contact:

- M/s ACN Industries, 231, Sanganur Road, Opp. Roots Industries, Ganapathy, Coimbatore – 641006.
- Head & Principal Investigator (AICRP on FIM), Department of Farm Machinery and Power Engg., Tamil Nadu Agricultural University, Coimbatore – 641003 (Tamil Nadu), Ph. No.: 91-422-2457576, E-mail: info@tnau.ac.in

# Manual Harvesting Tools for Mango, Sapota, Pomegranate and Lemon

## Utility

### Mango harvester

IIHR mango harvester is an improvement on conventional harvester and harvests the fruit with pedicel. While pulling the harvester, the fruit is held between the cushioned frame and the pole and the blade cuts the pedicel of 10-20 mm length to harvest the fruit.

### Sapota and Guava harvester

The harvesting frame is fitted with cushioned pegs to hold the fruit and harvest these while pulling the harvester.

### Lime harvester

The lime harvester is easy to push in the canopy. The fruit is held in the hook, harvested and collected in the box while pulling the harvester.

## Benefits over conventional/traditional practices

- Saving of time (40%), labour and cost over traditional practice

**Design:** ICAR-IIHR, Bangalore

**Commercialization Status:** Commercialized

## Contact:

- M/s Concorde Engineering Works, Kalanagar, Kammagondanahalli, Jalahalli West, Bangalore – 560 015, Mobile: +919886781667 E-mail: sivakumar1671@gmail.com
- M/s Dharma Technologies, west Tumkur-572102, Karnataka Ph: 0816-2292159, +919886737260 Email: info@dharmaagrotech.com
- M/s Renuka Yelladevi Engg Works, Hurulichikkanahalli, Hesaraghatta, Bengaluru North – 560 089 Mobile: 8317441351
- Director, ICAR-IIHR, Hessaraghatta Lake Post, Bengaluru-560 089, E-mail director.iihr@icar.gov.in, website:https://www.iihr.res.in

# Manual Pineapple Harvesting Tools for Hill Farmers

## Utility

Pineapple harvesting task is one of the most important operations among the farm operations in pineapple cultivation. It is usually done manually which is not only time consuming and labour intensive but also, involve excessive drudgery due to awkward posture and repetitive task. A manual harvesting tools is suitable to harvest pineapple for small and marginal farmers in hilly areas in northeast India. The tools comprise of a holding unit and a cutting unit.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Manual |
| Weight, kg | : | 2 |
| Capacity, Fruits/h | : | 40-48 |

## Benefits over conventional/traditional practices

- The improved tool enables harvesting in proper work posture instead of stooping posture in prevalent harvesting practice followed by the farmers using traditional hand tools.

**Design:** ICAR RC for NEH, Umiam, Meghalaya

**Commercialization Status:** Ready for Commercialization

## Contact:

- PI, AICRP on FIM, Division of System Research and Engineering, ICAR RC for NEH, Umiam, Meghalaya, Tel: 91-364-2570276, E-mail : dayamangang@gmail.com

# Manual Engine Powered Pineapple Harvester

## Utility

Manual harvesting of pineapple is a tedious and labour intensive activity. The sharp thorny leaves make harvesting extremely cumbersome as hand access to the fruit is difficult. Traditionally, pineapple is harvested manually using a special knife. The improved unit for harvesting of pineapple developed at KAU, Tavanur can harvest a pineapple fruit upto maximum diameter of 140 mm.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW, (backpack type engine) | : | 0.8 |
| Weight of back pack engine, kg | : | 9.4 |
| Weight of brush cutter with fruit holder, kg | : | 11.5 |
| Length of brush cutter shaft (flexible), mm | : | 1,400 |
| Diameter of blade, mm | : | 150 |
| Speed of blade, rpm | : | 6,000 |
| Cost of attachment, Rs. | : | 900/- |
| Fuel consumption, l/h | : | 0.50 |
| Output capacity, fruits/h | : | 130 |
| Cost of operation, Rs./h | : | 350/- |

## Benefits over conventional/traditional practices

- Reduces human drudgery, time and cost of operation for harvesting pineapple as compared to traditional practice.

**Design:** KAU, Tavanur (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

## Contact:

- Principal Investigator, AICRP on Farm Implements and Machinery, Kelappaji College of Agril. Engineering and Technology, Kerala Agrl. University,Tavanur- 679 573 (Kerala), Ph. No.: +91-494-2686214, Email: kcaet@kau.in

# Animal Operated Garlic Digger

## Utility

Animal drawn garlic digger is useful for digging garlic, groundnut and potato. Transport wheels also acts as depth control during field operation. Beam and tyne angle is adjustable to suit different crops.

| Specifications & Performance results: | | |
|---|---|---|
| Power source | : | A pair of bullocks |
| Blade length, mm | : | 550 |
| Average draft, N | : | 684 |
| Cost, Rs | : | 4,000/- |
| Field capacity, ha/h | : | 0.1 |
| Average garlic damage, % | : | 3-5 |
| Digging efficiency, % | : | 86 |
| Operational cost, Rs/ha. | : | 1,225/- |

## Benefits over conventional/traditional practices

- Saves 75% cost and 45% energy as compared to traditional method.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

## Contact:

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Self-Propelled Vertical Conveyor Reaper (Walk Behind Type)

## Utility

Self-propelled vertical conveyor reaper is suitable for harvesting and windrowing cereals and oilseed crops such as rice, wheat, soybean etc. During forward motion of the reaper, crop row dividers divide the crop, which comes in contact with cutter bar, where shearing of crop stems takes place. The cut crop is conveyed to one side of the machine by the conveyor belt fitted with lugs and is windrowed in the field. The crop is bundled manually and transported to threshing yard.

| Specifications & Performance results: | | |
|---|---|---|
| Power source, kW | : | 4.47 kW diesel engine |
| Weight, kg | : | 245 |
| Cost, Rs | : | 1,00,000/- |
| Field capacity, ha/h | : | 0.2-0.25 |
| Field efficiency, % | : | 65-70 |
| Fuel consumption, l/h | : | 0.75-0.8 |
| Total losses, % | : | 1.0-1.5 (Paddy),<br>3.0-4.0 (Soybean) |
| Cost of operation, Rs/ha | : | 1,000/- |

## Benefits over conventional/traditional practices

- Self-propelled reaper offers labour saving of 131 man-h/ha i.e., almost 75% labour saving compared to conventional.
- The saving in labour results in almost 40% saving in cost of operation

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- M/s Field Worthy Equipments, Ahmadabad, Phone: +91-79-25716031, +91-9826392070
- M/s Swathi Industries, Coimbatore, Phone: +91-79-47130345
- M/s Fine Fabrication Works, Bhopal, Tel: 0755-4251574
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Self-propelled Multi-purpose Platform for Fruits

## Utility

The harvesting, pruning, spraying and other canopy management practices in fruit trees such as mango, citrus and sapota are difficult and labour intensive. A self-propelled hydraulic multi-purpose platform for medium height fruit trees helps to increase harvesting/pruning efficiency in orchards. This machine can be used as a platform to reach fruits on trees for easy picking. Lifting and lowering of the platform, forward and backward movement, and steering of the machine are controlled by an operator from the platform. The machine is easy to operate and requires low maintenance. It can be operated safely on flat field as well as on hilly terrain having lateral as well longitudinal slope up to 5°.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW petrol engine | : | 8.7 |
| Load carrying capacity, kg | : | 200 |
| Cost of the machine, Rs. | : | 7,50,000 |
| Maximum vertical reach, m | : | 6 |
| Maximum ground speed, km/h | : | 3.00 |
| Fuel consumptions, l/h | : | 2.00 |
| Output capacity, fruits/h | : | 700 -1,100 |

## Benefits over conventional/traditional practices

- Reduces labour requirement and cost of operations for pruning, spraying and harvesting of fruits, reduces drudgery and enhances operator comfort.
- Effective pruning and spraying operation because of better reach to the canopy.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Tractors and Farm Equipment Limited, 77Nungambakkam, Chennai – 600034 (Tamil Nadu), Email: corporate@tafe.com, Phone: +91 44 6691 9000
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Self-Propelled Lucerne Harvester

## Utility

It consists of a gearbox and bi-directional reciprocating type cutter bar with effective width of 860 mm and 25 mm length of stroke. The ground wheel drives the reel of the harvester.

| Specifications & Performance results | | |
|---|---|---|
| Effective field capacity, ha/h | : | 0.113 |
| Field efficiency, % | : | 70-75 |
| Cost of operation, Rs/ha | : | 850/- |

## Benefits over conventional/traditional practices

- Net cost saving of Rs. 920/ha i.e. 52% and net time saving is 135 man-h/ha against conventional method i.e. 90%.

**Design:** MPKV, Rahuri(AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

## Contact:

- Principal Investigator, AICRP on FIM, Dr. ASCAET, Mahatma Phule Krishi Vidyapeeth, Rahuri – 413722, Dist. Ahmednagar (Maharashtra), Ph. No.: 02426-243219, Email: dormpkv@rediffmail.com

# Tractor Operated Straw Reaper-cum-Trailer

## Utility


It harvests straw of combine harvested wheat field, gathers shattered ear heads as uncut plants from the field, threshes straw into fine quality bhusa and separates collected grains. Simultaneously, it blows bhusa (fine straw) in the in-built overhead trailer. Thus, the work of harvesting, threshing, loading and unloading is done with only one tractor, while in the existing system additional tractor and trailer is required to collect the straw.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 26 kW tractor or above |
| Length of cutter bar, mm | : | 1,830 |
| Height of cut, mm | : | 60 |
| Number of blowers | : | 1-2 |
| Fuel consumption, l/h | : | 5.6 |
| Machine capacity, ha/h | : | 0.40 |
| Straw output, kg | : | 730 |
| Cost, Rs | : | 3,00,000/- |
| Operating cost, Rs/ha | : | 1,500-1,600/- |

## Benefits over conventional/traditional practices

- Reduces turning radius by 4m as compared to straw combine, thereby facilitates easy operation even in smaller fields.
- Less fatigue to the machine operator, easy in loading and unloading of the straw.
- More straw output of 130 kg/h against conventional system.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- M/s Rattan Agro Industries, Moga, Punjab, Phone: 9888369908, 01636-228511
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated Cassava Harvester cum Lifter

## Utility

The harvester is suitable for digging and lifting cassava. The equipment digs a single ridge and lift the tubers from the ground and convey to surface for manual collection. It consists of digging unit, conveying unit, transmission system and cluster breaking system. The conveying system consists of two endless gripper belt (counter rotating) of 3700 mm length. The power is transmitted from tractor PTO to transmission gear box through universal shaft. The power is then transmitted from gear box to conveying mechanism and cluster breaking blade through suitable belt drives.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW Tractor | : | 37.5 |
| Weight, kg | : | 350 |
| Digger blades | : | 2 |
| Number of rows | : | One |
| Conveying mechanism | : | Gripper belt endless two number (counter rotating) |
| Belt length, mm | : | 3700 |
| Field capacity, ha/h | : | 0.22 |

## Benefits over conventional/traditional practices

- Saves 82% in cost when compared to manual harvesting.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Bhansali Agro Tech, Dhantara, Ahmednagar,Contact No: 9822439621, 02423223391, E mail: bhansaliagrotech@gmail.com
- Head, ICAR-Central Institute of Agricultural Engineering, Regional Centre, Coimbatore-641007;Email: ciaerccbe@gmail.com
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated Potato Combine

## Utility

A tractor operated single-row potato combine is suitable for 600-650 mm bed size. The equipment consists of digging unit, soil separation unit, haulm separation unit, clod separation unit, potato collection unit and bagging unit. Soil-potato mass after digging by a V-scoop type blade passes over the soil separation unit where loose soil gets separated. Haulm gets separated from the potatoes at the topmost section of soil separation unit where potatoes with clods fall over counter rotating cylinders. The counter rotating cylinder passes the potato clod mixture over a conveyor belt, where the clods are separated from the potatoes by manual picking and the clean potatoes are delivered into a temporary storage tank. The clean potatoes are then transferred to gunny bags, which are passed on to ground after stitching.

| Specifications & Performance results | | |
|---|---|---|
| Prime mover, kW tractor | : | 38 |
| Total weight, kg | : | 3,000 |
| Field capacity, ha/h | : | 0.16 |
| Field efficiency, % | : | 94 |
| Harvesting efficiency, % | : | 90-97 |
| Cost, Rs | : | 7,50,000/- |
| Operational cost Rs/h | : | 1,270/- |

## Benefits over conventional/traditional practices

- Saving in labour is about 90% compared to traditional method of harvesting.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for Commercialization

## Contact:

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated Groundnut Digger

## Utility

Timely harvesting of groundnut is an important factor for getting higher yields and reducing the losses. Digging of groundnut is a labour intensive and costly operation. This machine digs whole crop from the soil without detaching or damaging the pods by loosening the soil with a tool.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW tractor | : | 26 or above |
| Weight, kg | : | 194 |
| Cost, Rs. | : | 10,000/- |
| Operating speed, km/h | : | 2.5-3.0 |
| Labour requirement, man-h/ha | : | 2 |
| Depth of digging, mm | : | 120 |
| Field capacity, ha/h | : | 0.32-0.38 |
| Digging efficiency, % | : | 92.75 |
| Operating cost, Rs/ha | : | 1,200/- |

## Benefits over conventional/traditional practices

- Gives an additional income of Rs.1,000/ha as a result of saving of reduced pod loss.
- Machine saves the human labour and reduces drudgery and fatigue.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated Flail Type Fodder Harvester cum Chaffer

## Utility

The fodder crops are generally harvested by sickle and subsequently chaffed by manual or power operated chaff cutter before feeding to animals. Manual harvesting of tall fodder crops such as bajra, maize and sorghum is a very arduous job which require about 160 man-h/ha to harvest by sickle. The tractor operated flail type forage harvester cum chopper harvests the crop by means of flail blades, conveys the cut crop using auger, chops the fodder using cutters and finally convey the chopped fodder through outlet into the trailer.

| Specifications & performance results | | |
|---|---|---|
| Power source, kW tractor | : | 41 |
| Weight, kg | : | 670 |
| Length of cutter bar, mm | : | 1,210 |
| Cost of equipment, Rs. | : | 2,50,000/- |
| Size of cut of chopped fodder, mm | : | 31 |
| Effective working width, m | : | 1.2 |
| Effective field capacity, ha/h | : | 0.12 |
| Average time to fill one trailer, min | : | 22 |
| Fuel consumption, l/h | : | 6.0 |
| Labour requirement, man-h/ha | : | 16.7 |
| Field efficiency, % | : | 82 |
| Cost of operation, Rs./ha | : | 5,025/- |

## Benefits over conventional/traditional practices

- Saving of 77% in labour as well as time and 12% in cost of operation as compared to conventional method.
- Reduces drudgery of agricultural workers.

**Design:** PAU, Ludhiana (AICRP on FIM)

**Commercialization Status:** Commercialized

## Contact:

- M/s Guru Nanak Industries Sales Corp., Near Tinkoni, Opp. BDO Office, Link Road, Mansa – 151505 (Punjab), Phone: 098155 44242, Email. gurureaper@gmail.com
- Principal Investigator (FIM Project), Department of Farm Machinery & Power Engineering, Punjab Agricultural University, Ludhiana – 141004 (Punjab), Ph No. 0161 2401325, Email: hodfmpe@pau.edu

# Tractor Operated Garlic Harvester cum Windrower

## Utility

The traditional method of garlic harvesting is arduous, time consuming and requires 240 man-h/ha labour. Tractor operated garlic harvester cum windrower can dig the mature garlic crop using a blade with triangular point knives, separate the soil from garlic using chain type separating mechanism and windrow the harvested garlic by means of windrower unit mounted at 90° to conveyor direction in two unequal halves.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 26 kW tractor |
| Weight, kg | : | 210 |
| Digging depth, mm | : | 80-100 |
| Effective working width, m | : | 1.35 |
| Operating speed, km/h | : | 2.4 |
| Effective field capacity, ha/h | : | 0.26 |
| Digging losses, % | : | 1-2 |
| Field efficiency, % | : | 78 |
| Fuel consumption, l/h | : | 2.6 |
| Cost of equipment, Rs. | : | 70,000/- |
| Cost of operation, Rs./ha | : | 2,180/- |

## Benefits over conventional/traditional practices

- Saving of 65% in labour and time and 73% in cost of operation as compared to conventional method.

**Design:** MPUAT, Udaipur (AICRP on FIM)

**Commercialization Status:** Commercialized

**Contact:**

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- Principal Investigator (FIM Project), Dept. of Farm Machinery and Power Engg., College of Technology & Engineering, Maharana Pratap University of Agriculture &Technology, Udaipur- 313001 (Rajasthan), Tel: 91-294-2470119, Email: deempuatudr@gmail.com

# Tractor Operated Cassava Harvester

## Utility

The cost of digging is very high due to higher labour wages. A tractor operated cassava harvester can dig cassava by means of digging blade mounted on main frame. The spacing between the bottoms can be adjusted as per the requirement of crop and soil conditions. The depth wheels are provided behind the digger blade to adjust the depth of operation.

| Specifications & Performance results | | | |
|---|---|---|---|
| | | Single row | Double row |
| Power source, kW tractor | : | 26 | 26 |
| Effective width, mm | : | 570 | 1200 |
| Depth of operation, mm | : | 370 | 360 |
| Operational speed, km/h | : | 1.36 | 1.00 |
| Digging efficiency, % | : | 97.46 | 97.40 |
| Fuel consumption, l/h | : | 4.44 | 5.10 |
| Effective field capacity, ha/h | : | 0.08 | 0.12 |
| Cost, Rs. | : | 30,000/- | 35,000/- |
| Cost of operation, Rs./ha | : | 6,400/- | 4,500/- |

## Benefits over conventional/traditional practices

- Saves 36% & 55% in cost of operation and 88% & 90% in labour cost for single row and double row units, respectively as compared to conventional method.

**Design:** TNAU, Coimbatore (AICRP on FIM)

**Commercialization Status:** Commercialized

**Contact:**

- M/s. Greenfield Equipments India Private Limited, SIDCO Industrial Estate, Coimbatore (Tamil Nadu), Email: info@greenfield.in
- Head & Principal Investigator (AICRP on FIM), Department of Farm Machinery and Power Engg., TNAU Coimbatore – 641003 (Tamil Nadu), Ph. No.: 91-422-2457576, E-mail: info@tnau.ac.in

# Tractor Operated Turmeric Digger

## Utility

Turmeric harvesting consumes high labour and shortage of labour sometime delays harvesting operation. It is also time consuming and drudgery prone operation leading to higher cost of digging turmeric. Tractor operated turmeric digger can dig turmeric by means of four digging blades fixed on the frame. The sharp end of the blades are fixed on the lower end of the shanks in such a way that blades cut the ridges from both the sides.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW tractor | : | 33 or more |
| Number of rows | : | 4 |
| Working width, m | : | 1.45 |
| Working depth, mm | : | 300-350 |
| Speed of operation, km/h | : | 2.5 |
| Wheel slip, % | : | 12.5 – 15.0 |
| Effective field capacity, ha/h | : | 0.36 |
| Field efficiency, % | : | 78 |
| Cost, Rs. | : | 30,000/- |
| Cost of operation, Rs./ha | : | 4,200/- |

## Benefits over conventional/traditional practices

- Higher digging efficiency of 90% and less damage to turmeric rhizomes as compared to traditional method.

**Design:** PJTSAU, Rajendranagar, Hyderabad (AICRP on FIM)

**Commercialization Status:** Ready for commercialization

## Contact:

- Head, Agricultural Research Institute, FIM Scheme,Prof. Jaya Shankar Telangana State Agricultural University, Rajendranagar, Hyderabad – 500030 (Telangana), Email: regrpjtsau@gmail.com, Phone: +91 - 40 – 24015011

# Tractor Operated Ginger Harvester cum Elevator

## Utility

The conventional method of harvesting ginger rhizome is labour intensive (240 man-h/ha), which increases total harvest cost due to higher wages during peak season. A tractor operated ginger harvester cum elevator has been developed keeping in view the physiology of ginger varieties and soil conditions. It consists of digging blade, ground wheel and elevator. The conveying system is provided with arrangement for removal of soil clods in between mild steel rods.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW Tractor | : | 37.5 or more |
| Weight, kg | : | 490 |
| Type of blades | : | Straight, inverted V, crescent |
| Length of digging blade, m | : | 1.00 |
| Forward speed, km/h | : | 2-3 |
| Effective field capacity, ha/h | : | 0.18 |
| Field efficiency, % | : | 82 |
| Conveying efficiency, % | : | 99 |
| Cost, Rs. | | 80,000/- |
| Cost of operation, Rs./h | : | 610/- |

## Benefits over conventional/traditional practices

- Saves 86% in time of ginger digging as compared to manual digging.
- Saves 31% in cost of digging as compared to traditional practice of manual digging including cleaning and collection.

**Design:** UAS, Raichur (AICRP on FIM)

**Commercialization Status:** Ready for commercialization

## Contact:

- Principal Investigator (FIM Project), College of Agril.Engg., University of Agril. Sciences, P.B. No 329, Lingasugur Road, Raichur- 584101 (Karnataka), Tel: 91-8532-221480, E-mail: aicrpfim@uasraichur.edu.in

# Tractor Operated Sorghum and Pearl Millet Ear-head Separator

## Utility

The ear-head separation of sorghum and pearl millet crops needs labour requirement of 80 man-h/ha and delays preparation of seedbed for next crop. Presently, it is performed by cutting the stem at the neck of ear-head using sickle. Tractor operated sorghum and pearl millet ear-head separator is suitable for separating ear-heads of sorghum and pearl millet crops of height ranging from 1,750 to 2,100 mm.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW Tractor | : | 37.5 or more |
| Rotational speed of main pulley, rpm | : | 504 |
| Peripheral speed of circular saw cutter, m/s | : | 12 |
| Output capacity, ha/h | : | 1.0 |
| Earhead cutting efficiency, % | : | 95 |
| Linear speed of conveyor belt, m/s | : | 0.48 |
| Labour required with the machine, man-h/ha | : | 3 |
| Cost, Rs. | : | 80,000/- |
| Cost of operation, Rs./ha | : | 1,560/- |

## Benefits over conventional/traditional practices

- Saving in cost of operation of Rs. 1,454/ha as compared to traditional method.
- Saving in labour requirement of 77 man-h/ha with the use of machine over traditional method.

**Design:** MPKV, Rahuri (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Principal Investigator, AICRP on FIM, Dr. ASCAET, Mahatma Phule Krishi Vidyapeeth, Rahuri–413722, Dist. Ahmednagar (Maharashtra), Ph. No.: 02426-243219, Email: dormpkv@rediffmail.com

# Tractor Operated Front Mounted Three Row Sorghum Harvester

## Utility

The harvesting of sorghum consumes huge labour (240 man-h/ha) in traditional method. The drudgery is also observed due to bending posture during harvesting. A tractor front mounted hydraulic operated three row sorghum harvester facilitates cutting and conveying of sorghum stalks and ear-heads, storage of the ear-heads and windrowing of the cut stalks simultaneously.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW Tractor | : | 34 |
| Weight, kg | : | 300 |
| Forward speed, km/h | : | 1.5-2.0 |
| Effective field capacity, ha/h | : | 0.23-0.27 |
| Cutting efficiency for stalk, % | : | 92-95 |
| Conveying efficiency for stalk, % | : | 86-93 |
| Cutting efficiency for ear-head, % | : | 83-86 |
| Collection efficiency for ear-head, % | : | 77-81 |
| Field efficiency, % | : | 80-83 |
| Cost, Rs. | : | 400,000/- |
| Cost of operation, Rs./ha | : | 2,500/- |

## Benefits over conventional/traditional practices

- Reduces labour requirement and drudgery of workers involved in manual harvesting of sorghum crop.
- Results in net saving of Rs. 5,000/ha and timeliness in harvesting of sorghum as compared to manual harvesting.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

**Contact:**

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated Harvester cum Collector for Cluster Onion

## Utility

Manual harvesting and collection of cluster onion needs huge labour and time. The drudgery is also faced in handling harvested produce and results into delayed subsequent operations of next crop. A tractor operated harvester cum collector can harvest onion cultivated on raised bed. The harvester cum collector consists of digger blade, riddle conveyor, collector chamber cum cross conveyer and bucket elevator.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW Tractor | : | 34 |
| Weight, kg | : | 420 |
| Cost of implement, Rs. | : | 75,000/- |
| Row to row spacing, mm | : | 150 - 200 |
| Operational speed, km/h | : | 2.00 |
| Effective digging width, m | : | 1.05 |
| Effective field capacity, ha/h | : | 0.16 |
| Field efficiency, % | : | 80 |
| Dug cluster onion, % | : | 98 |
| Cost of operation, Rs./h | : | 750/- |

## Benefits over conventional/traditional practices

- Reduces drudgery of agricultural workers and results in saving in cost of operation by 66% over conventional method.

**Design:** TNAU, Coimbatore(AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

## Contact:

- Head & Principal Investigator (AICRP on FIM), Department of Farm Machinery and Power Engg.,Tamil Nadu Agricultural University, Coimbatore – 641003 (Tamil Nadu), Ph. No.: 91-422-2457576, E-mail: info@tnau.ac.in

# Tractor Operated Tapioca Detopper

## Utility

There is huge labour cost involved in detopping of tapioca and paucity of labourers is also faced. The slow work rate in manual practice results in delaying of subsequent operations. A tractor front mounted tapioca de-topper cancut and convey tapioca stems ahead of the digger.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW Tractor | : | 26 or above |
| Weight, kg | : | 350 |
| Cost of implement, Rs. | : | 80,000/- |
| Height of cut, mm | : | 300 |
| Effective field capacity, ha/h | : | 0.06 |
| Cutting efficiency, % | : | 92 |
| Conveying efficiency, % | : | 85 |
| Cost of operation, Rs./h | : | 950/- |

## Benefits over conventional/traditional practices

- Reduction in drudgery and labour cost in detopping of tapioca.

**Design:** TNAU, Coimbatore (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

## Contact:

- Head & Principal Investigator (AICRP on FIM), Department of Farm Machinery and Power Engg.,Tamil Nadu Agricultural University, Coimbatore – 641003 (Tamil Nadu), Ph. No.: 91-422-2457576, E-mail: info@tnau.ac.in

# Tractor Operated Root Crop Harvester-cum-Elevator

## Utility

It consists of a digger blade with width and thickness of 1,144 mm and 16 mm, respectively. The blade is mounted on the machine at an angle of 20° with the horizontal. Two coulter discs are provided in front of the blade at the outer ends which helps in easy slicing and lifting of soil by the blade.

| Specifications & Performance results | | |
|---|---|---|
| Power Source, kW Tractor | : | 37 |
| Capacity, ha/h | : | 0.25 |
| Cost, Rs. | : | 60,000/- |
| Cost of operation, Rs./ha | : | 12,000-15,000/- |

## Benefits over conventional/traditional practices

- Provides 50-60% saving in cost of operation and 60-70% in labour.

**Design:** PAU, Ludhiana (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

## Contact:

- Principal Investigator (FIM Project), Department of Farm Machinery & Power Engineering, Punjab Agricultural University, Ludhiana – 141004 (Punjab)Ph No. 0161 2401325, Email: hodfmpe@pau.edu

# Tractor Operated Groundnut Digger Elevator

## Utility

It comprises of a blade, elevator-cum-pickup reel, fenders, gauge wheel, coulters and power transmission system. The front end of the pickup rod is so adjusted that the spikes comb about 30 mm of the top soil to lift vines gently from the loosened soil.

| Specifications & Performance results | | |
|---|---|---|
| Power Source, kW Tractor | : | 37 |
| Cost, Rs | : | 80,000/- |
| Field capacity, ha/h | : | 0.16-0.21 |

## Benefits over conventional/traditional practices

- The machine saves 65% labour and 32% cost of operation.

**Design:** PAU, Ludhiana (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

## Contact:

- Principal Investigator (FIM Project), Department of Farm Machinery & Power Engineering, Punjab Agricultural University, Ludhiana – 141004 (Punjab) Ph No. 0161 2401325, Email: hodfmpe@pau.edu

# Tractor Operated Turmeric Harvester

## Utility

The tractor mounted turmeric harvester consists of gear box, digging blade, conveyor, and collection box. The machine digs the turmeric rhizomes, lifts up the rhizomes along with the soil over the conveyor and the rhizomes are collected in the oscillating box at the rear.

| Specifications & Performance results | | |
|---|---|---|
| Power, kW | : | 7.46 |
| Manpower, persons | : | 05 |
| Capacity, ha/h | : | 0.16 |
| Efficiency, % | : | 98.5 |
| Cost, Rs | : | 65,000/- |

## Benefits over conventional/traditional practices

- Higher digging efficacy and less damage to the turmeric rhizomes compared to traditional method.

**Design:** ANGRAU, Hyderabad (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

## Contact:

- Principal Investigator, AICRP on FIM, College of Agricultural Engineering (CAE), Bapatla – 522101Guntur (D.T.) Tel: 91-8643-222851Fax: 91-8643-224068Mob: 91-9848186842 E-mail: veeraprasad18@gmail.com; fimbapatla2015@gmail.com

# Tractor Operated Front Mounted Two Row Harvester for Pigeon Pea

## Utility

The traditional method of pigeon pea harvesting involves huge amount of labor, drudgery and cost. A tractor hydraulic operated front mounted two row harvester cut the pigeon pea stems and lay down in the field for sun drying. The machine has two cutting blades mounted over front hydraulic platform and a row divider fitted between these two blades for dividing crop rows during harvesting. It can be used by small and marginal farmers.

| Specifications & Performance results | | | | |
|---|---|---|---|---|
| Power, kW | : | 15-41 | | |
| Cutting mechanism for seed | : | circular saw | | |
| Conveying mechanism | : | row divider | | |
| Overall weight, kg | : | 150 | | |
| Harvesting loss, % | : | 2 | | |
| Cost of machine, Rs. | | 60,000/- | | |
| | | **Plain field** | **Raised bed system** | **Ridge and Furrow system** |
| Cutting Efficiency, % | : | 98 | 89 | 87 |
| Field capacity, ha/h | : | 0.55 | 0.3 | 0.4 |
| Field efficiency, % | : | 80 | 70 | 78 |
| Cost of operation, Rs./ha | : | 930/- | 2,130/- | 1,530/- |

## Benefits over conventional/traditional practices

- Harvesting loss is less than 2%.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

## Contact:

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated Collector for Left over Wheat Straw for Puddling of Fields

## Utility

A tractor operated wheat straw collector collect and bruise the wheat straw and stubbles left behind after wheat harvesting by grain combines. It consists of a harvesting unit for left over wheat straw and a collection unit. The straw collection unit is fitted with hydraulic cylinder lift arms for easy unloading of the collected straw.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW tractor | : | 33 or above |
| Width of straw harvesting unit, m | : | 1.88 |
| Shape of blades | : | Inverted T type flail |
| Effective field capacity, ha/h | : | 0.26 |
| Straw collection efficiency, % | : | 58 |
| Total left over straw collection, t/ha | : | 0.35 |
| Straw collection capacity, t/h | : | 0.09 |
| Dust concentration in left over straw, % | : | 15 - 22 |
| Cost, Rs. | : | 60,000/- |
| Cost of operation, Rs./ha | : | 3,800/- |

## Benefits over conventional/traditional practices

- Reduces burning of wheat straw.
- Avoids discomfort to hands and feet of workers employed for manual transplanting of rice.

**Design:** PAU, Ludhiana (AICRP on FIM)

**Commercialization Status:** Ready for Commercialization

## Contact:

- Principal Investigator (FIM Project), Department of Farm Machinery & Power Engineering, Punjab Agricultural University, Ludhiana – 141004 (Punjab), Ph No. 0161 2401325, Email: hodfmpe@pau.edu

# Tractor Operated Cotton Stalk Shredder cum Mixer

## Utility

Tractor operated cotton stalk shredder cum mixer cut, shred and mix the cotton stalk into the soil. Traditionally, two seperate operations are required for shredding and mixing of cotton stalks into soil. The cotton stalk shredder cum mixer consists of plant conveying unit, cutting unit, shredding unit, uprooting unit and mixing unit. The mixing unit consists of two mould boards to cover shredded material.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW Tractor | : | 37.5 or more |
| Type of shredding unit | : | Disc - flywheel type cutter head |
| Average length of cut, mm | : | 54 |
| Forward speed, km/h | : | 4 |
| Effective field capacity, ha/h | : | 0.40 |
| Mixing efficiency, % | : | 92 |
| Uprooting efficiency, % | : | 96 |
| Cost, Rs. | : | 1,50,000/- |
| Cost of operation, Rs./ha | : | 2,280/- |

## Benefits over conventional/traditional practices

- Reduces drudgery of workers and saves labour requirement for cotton stalk shredding and mixing into soil as compared to traditional practice.

**Design:** MPUAT, Udaipur (AICRP on FIM)

**Commercialization Status:** Commercialized

## Contact:

- M/s Angel Enterprises, Rajkot, Phone: 099094 76690
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# Tractor Operated Dust Separation System for Wheat Straw Combine

## Utility

Wheat straw harvested by commercial straw combines contain soil and other foreign materials which may lower feed intake, disrupt digestion and may have adverse effect on animal health. Farmers usually go for an extra cleaning operation to separate dirt from the bruised straw obtained from commercial wheat straw combine.

A dust separation system for wheat straw combine helps to reduce the soil entrainment into the bruising unit and in the bruised straw. This improves the bhusa quality for livestock consumption.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW Tractor | : | 34-37 |
| Weight, kg | : | 1845 |
| Cutting width, m | : | 2.28 |
| Effective cutter bar width, m | : | 2.03 |
| Operating speed, km/h | : | 2.00 |
| Effective field capacity, ha/h | : | 0.30 |
| Cost, Rs. | : | 2.70 lakh |
| Cost of operation, Rs./h | : | 890/- |

## Benefits over conventional/traditional practices

- The system improves the quality of bruised wheat straw by reducing the dust concentration and eliminating the extra operation for dust separation.

**Design:** PAU, Ludhiana (AICRP on FIM)

**Commercialization Status:** Commercialized

## Contact:

- Principal Investigator (FIM Project), Department of Farm Machinery & Power Engineering, Punjab Agricultural University, Ludhiana – 141004 (Punjab), Ph No. 0161 2401325, Email: hodfmpe@pau.edu

# Tractor Operated Banana Bunch Harvester

## Utility

Banana bunch harvesting is typically carried out by only one person, partly by cutting the pseudostem with a machete, and lowering the bunches down slowly. To eliminate the human drudgery, a tractor PTO operated banana bunch harvester has been developed. It consists of main frame, harvesting boom, bunch holding and bunch cutting system, hydraulic system and power transmission system. The developed Bunch harvester is used for harvesting banana bunches.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW Small tractor | : | 13-18 |
| Power transmission | : | Hydraulic system |
| Height adjustment | : | 2450 - 3650, mm |
| Field capacity, 0Trees/ h | : | 20 -25 |

## Benefits over conventional/traditional practices

- Suitable for Mini tractor.
- Height of reach and weight of bunch handled is 1.1 to 2.7 m and 18-25 kg, respectively.
- Cost saving: 25% when comparing with manual harvesting.

**Design:** ICAR-CIAE, RC, Coimbatore and ICAR-NRCB, Tiruchirapalli

**Commercialization Status:** Ready for commercialization

## Contact:


- Head, ICAR-Central Institute of Agricultural Engineering, Regional Centre, Coimbatore-641007 ciaerccbe@gmail.com
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated Aerial Access Hoist for Coconut and Tall Tree Crop Management

## Utility

Aerial access hoist for coconut and tall tree crop management equipment is tractor mounted developed by considering the limitations of the PTO drive. The entire weight of the hoist and moments are transmitted through the chassis to the stabilizers without transferring to the tractor chassis. The time required for locating unit and operating stabilizers is 60s. The time required for positioning against a tree of 10 m height is 120s.

## Benefits over conventional/traditional practices

- Easy in harvesting and spraying on tall trees.

**Design:** TNAU, Coimbatore (AICRP on FIM)

**Commercialization Status:** Ready for commercialization

## Contact:

- Head & Principal Investigator (AICRP on FIM), Department of Farm Machinery and Power Engg., Tamil Nadu Agricultural University, Coimbatore – 641003 (Tamil Nadu), Ph. No.: 91-422-2457576, E-mail: info@tnau.ac.in

# Tractor Operated Platform for Harvesting, Pruning and Spraying in Orchards

## Utility

Hydraulic operated platform is suitable for harvesting fruits, prunning the branches and spraying in the orchards.The hydraulic power from the tractor is distributed and controlled by the hydraulic controls to operate the platform. The harvesting tool, pruning tool and sprayer can be operated upto a height of 6 m from the platform.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW Tractor | : | 26 |
| Weight, kg | : | 400 |
| Cost of machine, Rs. | : | 1,50,000/- |
| Capacity, ha/h | : | Harvesting capacity : 100-150 kg/h/person.<br>Spraying capacity : 1 ha/h. |

## Benefits over conventional/traditional practices

- Saving of time (60%), labour and cost over traditional practice.

**Design:** ICAR-IIHR, Bangalore

**Commercialization Status:** Commercialized

## Contact:

- M/s Varsha Associates, #35, 1st main Road, Opp. Mahalakshmi Temple, Lower Palace Orchards, Sadashivanagar, Bangalore - 560 003, Tel (Off): 080 – 41236389;Mob: +9194483 96283; Fax: 08194 – 226648, E-mail: info@varshaagro.com; varshaassociates@gmail.com
- Director, ICAR-IIHR, Hessaraghatta Lake Post, Bengaluru-560 089. E-mail director.iihr@icar.gov.in website:https://www.iihr.res.in

# Tractor Operated Onion Digger

## Utility

Tractor operated onion digger is suitable for digging onion grown on raised bed. It consists of digging blade, oscillating conveyor chain, supporting ground wheel. The digging blades dig and scrap the onion crop along with leaves. The harvested onions are conveyed back by the oscillating chain and the soil is removed during conveying. The harvested onions are windrowed in the field at the back of the digger.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW Tractor | : | 26 |
| Weight, kg | : | 250 |
| Cost of machine, Rs. | : | 1,50,000/- |
| Capacity, ha/h | : | 0.25 |

## Benefits over conventional/traditional practices

- Saving of time (60%), labour and cost over traditional practice.

**Design:** ICAR-IIHR, Bangalore

**Commercialization Status:** Commercialized

## Contact:

- M/s Omega Metallic, #15, 7th Cross, Karihobanahalli, Thigarapalya Main Road, Bengaluru – 560 058, Mobile: +918123415828, E-mail: omegametalic@gmail.com
- M/s Concorde Engineering Works,#39, 11th Main, 2nd and 3rd Cross, Milk Muniyappa Road, Kalanagar, Kammagondanahalli, Jalahalli West, Bangalore – 560 015Mobile: +919886781667; E-mail: sivakumar1671@gmail.com
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# Tractor Operated Bunch Field Crop Harvester

## Utility

In bunch field crops i.e. soybean, black gram, green gram, etc. pods formation take place near the ground surface and distributed in the plant branches which leads to higher shattering losses, during mechanical harvesting with the available harvesters. This tractor front mounted harvester (integrated harvesting-cum-conveying machine) can do timely harvesting of the bunch field crops with lesser harvesting losses by harvesting and conveying the bunches of crop to the rear mounted storage box.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 35 kW or above tractor |
| Cutterbar width, m | : | 2.1 |
| Weight of machine, kg | : | 450 |
| Storage box volume, $m^3$ | : | 2.8 |
| Forward speed, km/h | : | 1.5 |
| Output capacity, ha/h | : | 0.24-0.25 |
| Threshing efficiency, % | : | 77 |
| Harvesting losses, % | : | 1.5-2.9 |
| Cost of the machine, Rs. | : | 1,20,000/- |
| Cost of operation, Rs/h | : | 952/- |

## Benefits over conventional/traditional practices

- The economic benefit and time saving is up to 49 and 60% respectively, in comparison to manual harvesting.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

## Contact:

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated Garlic Harvester for Raised Beds

## Utility

Garlic harvesting is one of the most laborious and time-consuming operation. The garlic bulbs are difficult to harvest manually under black cotton soil conditions. A tractor operated garlic harvester is suitable for harvesting of onion and garlic crop sown on raised beds.

| Specifications & Performance results | | |
|---|---|---|
| Working width, mm | : | 1200 |
| Power source, kW | : | Tractor (30 or higher) |
| Blade type | : | Triangular point blades |
| Cutting disc type and size | : | Two plain cutting discs of 400 mm diameter |
| Depth of operation, mm | : | 60-80 |
| Forward speed, km/h | : | 2.0-2.5 |
| Effective field capacity, ha/h | : | 0.18-0.22 |
| Field efficiency, % | : | 70-72 |
| Digging efficiency, % | : | 94-98 |
| Cost of machine, Rs. | : | 60000 /- |
| Cost of operation, Rs./ha | : | 3500-3800 |

## Benefits over conventional/traditional practices

- 60-70% saving in harvesting cost and 90-95% saving in labour as compared to traditional harvesting.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

## Contact:

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Tractor Operated Cotton Stalk Puller

## Utility

Tractor operated cotton stalk puller can be used for uprooting of deep rooted crop stalks like cotton and pigeon pea. It has a pair of long counter rotating tapered drums covered with thick rubber sheets. Clearance between two counter-rotating drums in running condition is adjustable to take care of variation in diameter of stalks.Chain conveyor conveys the uprooted stalks to rear of the machine.

| Specifications & Performance results | | |
|---|---|---|
| Power source,kW tractor | : | 26 and above |
| Type of stalk pulling mechanism | : | Counter rotating tapered drums |
| Row spacing adjustment, mm | : | >450 |
| Actual field capacity (ha/h) | : | 0.18 |
| Forward speed, km/h | : | 1.2 |
| Field efficiency, % | : | 80 |
| Uprooting efficiency, % | : | 86-94 |
| Number of plants uprooted per min | : | 70-90 (single row in HDPS)<br>36 (single row in conventional planting) |
| Cost of the machine, Rs. | : | 80,000/- (Single row) |
| Cost of operation, Rs/h | : | 700/- |

## Benefits over conventional/traditional practices

- Savings in terms of time is 86% and cost is 60%.
- Labor requirement with machine reduced to 8-12.5 man-h/ha compared to 77 man-h/ha using manual stalk puller.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com
- M/s Halcyon Agrimech Pvt. Ltd. Ahmedabad, Gujrat. Email : pragnesh@halcyonengineers.com Mob. : 9909014220

# THRESHING EQUIPMENT

# Manual Rotary Arecanut Dehusker

## Utility

Arecanuts are harvested at physiological maturity and sundried to reduce moisture content upto 6 to 7%. After drying, the dehusking is done by women workers using a country kitchen tool having a wooden plank and curved MS blade. This conventional method is highly labour intensive, time consuming, uneconomical and above all very unsafe for fingers and palms. The hand-operated arecanut dehusker consists of a hopper, a conveying screw, cutting tips and a handle. The graded nuts are fed to conveying screw through hopper. The nuts get compressed between the conveying screw and cutting tips. The husk is peeled off and the kernel is ejected by the leads on the conveying screw.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | Manual |
| Weight, kg | : | 20 |
| Hand cranking speed, rpm | : | 60 |
| Labour requirement | : | One person |
| Capacity, kg/h | : | 5.0 |
| Working heart rate, beats/min | : | 108 |
| Cost, Rs | : | 3000/- |
| operating cost, Rs /h | : | 63/- |

## Benefits over conventional/traditional practices

- Machine helps to reduce the drudgery as well as injuries to workers during this operation.
- Possibility of injuries to fingers and palm is eliminated.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Krupa Fuel Engg. Works, Gimone, Dapoli-415712, dist. Ratnagiri (M.S.).
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Dynapod

## Utility


It is a portable pedal operated power device that consists of a stand, saddle, handlebar, chain, sprocket wheels, cranks, pedals and a flywheel. The device may be used to power any manually operated equipment with appropriate combination of sprocket wheels/pullies to obtain the desired speed/power. A 60 teeth sprocket is used on the crankshaft and 18 teeth sprocket on the flywheel shaft to get a speed of 3.33 times the pedalling speed. The complete power transmission system and flywheel has been covered to avoid any injury to worker during its operation.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | Manual |
| Weight, kg | : | 68 |
| Saddle height, mm | : | 750 to 900 |
| Crank length, mm | : | 178.5 |
| Labour requirement | : | One person |
| Cost of operation, Rs/h | : | 56 ( for maize shelling) |

## Benefits over conventional/traditional practices

- Efficient utilization of human power.
- More output with machines at less human energy cost.
- Reduced drudgery during operations.
- Economic benefit: Rs. 6500 /unit/ year.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Yashoda Engineering, LUN Shed, 12, I Sector, Industrial Area, Govindpura, Bhopal, Ph No.: 99260 03343
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Manual Arecanut Dehusker

## Utility

It consists of a rasp type blade, seat for arecanut, a handle with grip, a spring loaded holding device with a handle and a frame to hold all the important movable parts. It is suitable for dehusking dry as well as green arecanuts. The worker can perform the dehusking operation in convenient posture. It eliminates the finger cut and bruise in the palm of women workers. The spring loaded device ensures safe handling of arecanut.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | Manual |
| Weight, kg | : | 1.6 |
| Labour requirement | : | One person (Dehusking of 76 kg of green arecanuts or 24 kg of dry arecanuts /day with one person) |
| Cost, Rs | : | 850/- |
| Operating cost, Rs. /kg of arecanuts | : | 1.70/- |

## Benefits over conventional/traditional practices

- The cardiac cost for dehusking one kg of green and dry arecanut is less (69 and 201 beats) with this arecanut dehusker as compared with conventional system (236 and 771 beats) resulting in about 70% drudgery reduction.
- Use of this dehusker unit reduces drudgery, accidental injuries and skin problems which are common in traditional dehusking method.

**Design:** TNAU, Coimbatore (AICRP on FIM)

**Commercialization Status:** Ready for commercialization

## Contact:

- Principal Investigator (AICRP on FIM), Department of Farm Machinery and Power Engg., Tamil Nadu Agricultural University, Coimbatore – 641003 (Tamil Nadu), Ph. No.:91-422-2457576, E-mail: info@tnau.ac.in

# Manual Rice Winnower

## Utility

It is a simple women friendly winnowing machine to clean threshed paddy crop, suitable for small farmers. The machine consists of a blower, hopper, vibratory feeding tray, discharge chute and supporting frame.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | One person |
| Weight, kg | : | 35 |
| Cost, Rs | : | 6000/- |
| Capacity, kg/h | : | 90 |
| Cleaning efficiency | : | 96% |
| Labour required | : | one |
| Cost of operation, Rs/t | : | 100/- |

## Benefits over conventional/traditional practices

- Easy to operate and clean paddy crop timely.
- Farmers get better market price from clean paddy.

**Design:** ICAR-NRRI,Cuttack, Odisha

**Commercialization Status:** Commercialized

**Contact:**

- The Director, ICAR-National Rice Research Institute, Cuttack, Odisha-753006, Phone: +91-671-2367757/67, Email: director.nrri@icar.gov.in, crrictc@nic.in

# Manual Groundnut Stripper

## Utility


Groundnut stripper consists of a horizontal strip of expanded metal fixed on each side of the frame in the form of comb reinforced by wooden reapers. The square frame is provided with telescopic support pipes. The working height of the square frame can be adjusted from 400 to 620 mm by lowering or lifting the telescopic pipes. An adjustable stool is provided for the operator to sit and perform the stripping operation. The height of the stool can be adjusted from 280 to 400 mm to suit the sitting. The stripping of the pods is accomplished by drawing a handful of vines across the comb with a slight force.

| Specifications & Performance results | | |
|---|---|---|
| Weight, kg | : | 13.5 |
| Labour requirement, person | : | 01 |
| Maximum stripping efficiency, % | : | 97 |
| Damage, % | : | < 1 |
| Cost, Rs. | : | 5,000/- |
| Operating cost, Rs./kg of pods | : | 1.05/- |

## Benefits over conventional/traditional practices

- Telescopic legs and adjustable stool offer convenient working height which eliminates postural discomfort, numbness of lower leg and foot.
- Results in 35 and 75 per cent saving in cost and time respectively when compared to manual hand stripping.
- Women friendly technology and reduces drudgery of workers involved in groundnut stripping.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

**Contact:**

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Manual Groundnut Decorticator for Women

## Utility

It is a manually operated equipment to separate kernels from groundnut pods specifically designed for rural women who prefer sitting posture while working. The unit consists of frame, handle, oscillating arm and sieve with oblong hole. The pods are fed in batch of 2 kg and decorticated between concave and shoes on the oscillating arm to achieve shelling.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | Manual |
| Weight, kg | : | 5.7 |
| Labour requirement, man-h/q | : | 2.5 |
| Man power | : | One person |
| Output capacity, kg/h | : | 35-40 |
| Cost , Rs. | : | 2400/- |
| Operating Cost, Rs./tonne | : | 240/- |

## Benefits over conventional/traditional practices

- Capacity enhancement over operation without machine.
- Reduces drudgery.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s fine fabrication works, Govindpura, Bhopal, Phone: 0755 425 1574
- M/s Manak Industries, Govindpura, Bhopal, Mr. M.L. Vishwakarma, Email: manakindustriesbhopal@gmail.com, Contact: No.: 91-755-2581683, 9993035566, 9425687798 8989821564
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Manual Groundnut / Sunflower Decorticator with Feeder and Separator

## Utility

It is a manually operated equipment with auto controlled feeding to break the groundnut pods and later separate the kernels from crushed mixture. It can also be used for sunflower seed decortication by changing sieve and shoe.It consists of frame, hopper, controlled feeder, handle, concave, page, oscillating arm and separating unit.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | Manual |
| Weight, kg | : | 15 |
| Labour requirement, man-h/q | : | 1.6 |
| Man power | : | One person |
| Output capacity, kg/h | : | 60-65 |
| Shelling efficiency, % | : | 93-98 |
| Cost, Rs | : | 2500/- |
| Operating Cost, Rs./tonne | : | 210/- |

## Benefits over conventional/traditional practices

- Capacity enhancement over operation without machine.
- Reduces drudgery.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s VainketeshLaxmiKrishi, Bhopal, Madhya Pradesh, Email : venkateshlaxmibhopal@gmail.com, Contact: No: 9425017929, 9425607880
- M/s Manak Industries, Govindpura, Bhopal, Mr. M.L. Vishwakarma, Email: manakindustriesbhopal@gmail.com, Contact: No.: 91-755-2581683, 9993035566, 9425687798 8989821564
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Manual Groundnut cum Castor Decorticator

## Utility

It is a manually operated equipment to separate kernels from groundnut and castor pods. The pods are fed in batches of 5 kg and decorticated between concave and oscillating arm having cast iron/nylon shoes to achieve shelling.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | Manual |
| Weight , kg | : | 15 |
| Labour requirement , man-h/q | : | 6 |
| Output capacity, kg/h | : | 60-70 |

## Benefits over conventional/traditional practices

- Capacity enhancement of a works compared to work without machine

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Vainketesh Laxmi Krishi , Bhopal, Madhya Pradesh, Email : venkateshlaxmibhopal@gmail.com, Contact: No: 9425017929, 9425607880
- M/s Manak Industries, Govindpura, Bhopal, Mr. M.L. Vishwakarma, Email: manakindustriesbhopal@gmail.com, Contact: No.: 91-755-2581683, 9993035566, 9425687798 8989821564
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Manual Rotary Groundnut Decorticator-cum-Sunflower Thresher and Maize Sheller (3-in-1)

## Utility

It is a small hand-operated device with a mild steel body. The ribbed threshing cylinder consists of rubber cushions to facilitate smooth shelling of the pods inside the shelling chamber. The pods are fed through the hopper. When the handle is rotated, the pods get shelled inside the shelling chamber and both the shell and kernel fall through the sieve at the bottom of the shelling chamber to be separated manually. The equipment is provided with two separate inter-changeable attachments for maize shelling and sunflower threshing which can be fitted to the shaft at the far end of the shaft.

| Specifications & Performance results | | |
|---|---|---|
| Prime mover | : | Manual |
| Weight , kg | : | 8 |
| Man power | : | 01 |
| Suitability for crop | : | Groundnut, sunflower, maize |
| Cost, Rs | : | 2,000/- |
| Output capacity, kg/h | : | 15 (Groundnut) 12-15 (Maize/Sunflower) |
| Efficiency, % | : | 97% |
| Cost of operation, Rs/kg | : | 2.25/- |

**Design:** AICRP on PHET

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Research Engineer, AICRP on PHET Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora – 263 601 (Uttaranchal), Ph. No. : +91-5962-241022, 18001802311, Email: director.vpkas@gov.in, vpkas.nic.in.

# Manual Arecanut Dehusker

## Utility

It is a manually operated unit where four persons can dehusk arecanuts simultaneously. The dehusking assembly consists of two sharp edged blades, one being stationary and the other movable, operated by a pedal through a linkage mechanism. The unit has a hopper to hold 20 kg raw nuts and the raw nut freely flows to the dehusking tray by gravity. The outer shell of freshly harvested nut is pierced by pressing the nut against the sharp edge of the blade and the leg pedal is operated to split the husk. About 2-3 strokes are required to completely dehusk a nut.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | Manual |
| Weight, kg | : | 40 |
| Man power | : | 02 |
| Cost, Rs | : | 4500/- |
| Output capacity,kg raw nut per day / person | : | 160 |
| Suitability for crops/commodity | : | Arecanut |

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

**Contact:**

- M/s Dollar Engineering Industries Pvt. Ltd. #3, Adjacent to BIS, Tumkur Road, 1st Stage, Peenya, Bangalore - 560 058, India.
- Research Engineer, AICRP on PHET, University of Agricultural Sciences, J- Block, GKVK Campus, Bangalore - 560 065 (Karnataka), Ph. No, :+91-80-2333 0153 / 2333 0984

# Pedal Operated Paddy Thresher

## Utility

Pedal operated paddy thresher can be operated by one person. The threshing cylinder is provided with wire loops and it separates the grains from the panicles.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | Manual |
| Weight, kg | : | 42 |
| Drum width, mm | : | 460 |
| Treadling speed, strokes/min | : | 75 |
| Drum speed, rpm | : | 260 |
| Labour requirement | : | one person |
| Capacity, kg /h | : | 45 |
| Cost, Rs | : | 5500/- |
| Operating cost, Rs/h | : | 22/- |
| Operating cost, Rs./tonne | : | 500/- |

## Benefits over conventional/traditional practices

- Improved operator's posture reducing significant physiological stress and discomfort.
- Protects the operator from hitting of grains and thus eliminating injury to face/eyes.
- 50 percent saving in labour.
- Avoids bending posture and thus reduces drudgery of workers during operation.

**Design:** ICAR-NRRI, Cuttack

**Commercialization Status:** Commercialized

## Contact:

- M/s Unicus Engineering Pvt Ltd. 23, Madhusudan Nagar, Bhubaneswar – 751001, Odissa, Email: unicus06@yahoo.com
- M/s Sidheswar Engineering works, Bidhyadharpur , Cuttack-753004
- The Director, ICAR-National Rice Research Institute, Cuttack, Odisha-753006, Phone: +91-671-2367757/67, Email: director.nrri@icar.gov.in, crrictc@nic.in

# Pedal Operated Maize Dehusker cum Sheller

## Utility

A pedal operated maize dehusker cum sheller performs both dehusking and shelling operations simultaneously and removes the husk and grain from the cob in single operation. This machine requires two persons for operation, one to perform the pedalling operation and another to feed the cobs in the hopper. A person can continuously operate it for about half an hour. It is suitable for small and marginal farmers including tribal farmers.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | Manual |
| Weight, kg | : | 170 |
| Labour requirement | : | Two persons |
| Capacity, kg/h | : | 130 |
| Grain damage, % | : | 1 |
| Dehusking efficiency, % | : | 94.5 |
| Shelling efficiency, % | : | 96.2 |
| Cost, Rs | : | 25000/- |
| Operating cost, Rs/h | : | 65/- |
| Operating cost, Rs/tonne | : | 500/- |

## Benefits over conventional/traditional practices

- Significant increase in the Output of workers.
- Drudgery is reduced with less cost of operation.

**Design:** MPUAT, Udaipur (AICRP on ESA)

**Commercialization Status:** Commercialized

## Contact:

- M/s M M Engineering Works, Plot No. G1- 469B, Road No 12, Near UCCI office, M I A. Udaipur 313003
- M/s Bharat Engineering Works, Opposite Candhari and Kandhari, Udaipur 313004, Ph. No: 9115569710
- Principal Investigator (ESA Project), College of Technology & Engineering, Maharana Pratap University of Agriculture & Technology, Udaipur- 313001 (Rajasthan), Tel: 91-294-2470119, Email : deempuatudr@gmail.com

# Animal Operated Rotary Transmission System for Agro-processing Operations

## Utility

It consists of a set of bevel gears that converts horizontal rotary motion of draught animal to vertical rotary motion with stepping up speed in the ratio of 1:5. The output from the bevel gear has been further stepped up by gear box making the combined speed ratio of 1:120. Chaff cutter, Paddy thresher, Winnower, Caster decorticator and few other gadgets have been evaluated at different Centres.

| Specifications & Performance results | | |
|---|---|---|
| Capacities with different gadgets, kg/h | | |
| Cleaner cum grader | : | 300 |
| Maize Sheller | : | 120 |
| Chaff cutter | : | 40 |
| Flour mill | : | 20-25 |
| Paddy thresher | : | 120-140 |
| Winnower | : | 1150 |
| Unit cost with attachments, Rs | : | 100000/- |
| Cost of operation, Rs/h | : | 65/- |

## Benefits over conventional/traditional practices

- It is useful for increasing annual use of draught animals in areas where grid electricity is limited and draught animals remain the main source of power. Suitable for community use in a village.
- Saves consumption of petroleum products.

**Design:** SHIATS Allahabad (AICRP on UAE)

**Commercialization Status:** Ready for Commercialization

## Contact:


- Principal Investigator, AICRP on UAE, College of Agricultural Engineering, UAS Raichur, Tel. 08532-220541, Fax no. 08532-220079, E-mail: anantachar@gmail.com
- Principal Investigator, AICRP on UAE, College of Agricultural Engineering, SHIATS Allahabad; Tel. 0532-2684281 (O), E-mail: registrar@shiats.edu.in

# Conveyor Belt type Mechanical Feeding System of Axial Flow Paddy Thresher

## Utility

A conveyor belt type mechanical feeding system is an attachment for commercially available tangential axial flow spike tooth type thresher. It consists of wide flat belt type endless conveyor and a pressing roller. The cleaning system of thresher consists of two aspirators of the same diameter but of different width and a combination of sieve and screen. The flat belt conveyor consists of two cylindrical rollers on which the endless conveyor is rotated. One of these two rollers, nearer to threshing cylinder is powered from central shaft of thresher through a gear box.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW Tractor | : | 30 |
| Weight, kg | : | 1378 |
| Cost, Rs. | : | 1.50 lakh |
| Feed rate , kg/h | : | 9496 |
| Cylinder speed , m/s | : | 20.73 |
| Threshing efficiency, % | : | 98.95 |
| Non-collectable loss, % | : | 0.57 |
| Broken grains, % | : | 3.08 |
| Cleaning efficiency, % | : | 96.68 |
| Sieve overflow, % | : | 0.38 |
| Cost of operation, Rs./h | : | 1021/- |

## Benefits over conventional/traditional practices

- The automatic feeding system reduces labour requirement and enhances capacity of thresher.

**Design:** PAU, Ludhiana (AICRP on FIM)

**Commercialization Status:** Ready for commercialization

## Contact:

- Principal Investigator (FIM Project), Department of Farm Machinery & Power Engineering, Punjab Agricultural University, Ludhiana – 141004 (Punjab), Ph No. 0161 2401325, Email: hodfmpe@pau.edu

# Engine Operated Arecanut Stripper

## Utility

A hold-on type arecanut stripper consisting of a feeding chute, a peg tooth cylinder, a stripping mechanism and an oscillating sieve. The arecanuts are separated from bunches due to the impact force of pegs of rotating cylinder and the stripped arecanuts fall on the oscillating sieve. The oscillating motion of the sieve separates arecanut from the chaff and other impurities. The safety features here include a hand warning device, a shield provided at the top of the feeding chute giving protection to the operator from arecanuts flying towards him from the stripping cylinder, a stable platform for the user. The unit is suitable for stripping both green and ripen arecanut bunches.

| Specifications & Performance results | | |
|---|---|---|
| Power Source, kW engine | : | 2.2 |
| Weight, kg | : | 320 |
| Stripping drum width, mm | : | 820 |
| Peripheral velocity of stripping drum, m/s | : | 5.8 |
| Labour requirement, person | : | 05 |
| Capacity, kg/h (With five persons) | : | 700 |
| Striping efficiency, % | : | 99.5 |
| Cost, Rs | : | 25,000/- (without prime mover) |
| Cost of operation, Rs/kg of arecanut | : | 0.15/- |

## Benefits over conventional/traditional practices

- Economic benefit: Rs. 20,000 /unit/ year.
- Eliminates the high work stress and back pain disorders caused due to lifting and forceful striking the arecanut bunch.

**Design:** TNAU, Coimbatore (AICRP on FIM)

**Commercialization Status:** Ready for commercialization

## Contact:

- Principal Investigator (AICRP on FIM), Department of Farm Machinery and Power Engg., TNAU Coimbatore – 641003 (Tamil Nadu), Ph. No.:91-422-2457576, E-mail: info@tnau.ac.in

# PTO Operated Whole Crop Maize Thresher

## Utility

A whole crop maize thresher has been developed for shelling of maize cob and simultaneously converting stalk to chaff. It has spike tooth cylinder having 6-7 bolts per row on periphery.

| Specifications & Performance results | | |
|---|---|---|
| Power requirement, kW Tractor | : | 5.5 |
| Threshing speed, rpm | : | 620 |
| Output, kg/h. | : | 210 |
| Threshing efficiency, % | : | 100 |
| Cleaning efficiency, % | : | 98.6 |
| Blown out grain, % | : | Nil |
| Cost, Rs | : | 55,000 /- |
| Cost of threshing maize grain, Rs. /q | : | 25-35/- |

## Benefits over conventional/traditional practices

- Significant saving in labour upto 2000-2100 Rs/ha for detachment of cobs and transportation of crop from field to home.
- Reduces labour requirement during peak season and human drudgery.

**Design:** PAU, Ludhiana (AICRP on FIM)

**Commercialization Status:** Commercialized

## Contact:

- M/s Kanhaiyalal Ramratan Krishi Yantra Lghu Udyog, Bus Stand, Rampura Dabadi, Sikar road, Jaipur
- Principal Investigator (FIM Project), Department of Farm Machinery & Power Engineering, Punjab Agricultural University, Ludhiana – 141004 (Punjab), Ph No. 0161 2401325, Email: hodfmpe@pau.edu

# PTO Operated High Capacity Multicrop Thresher

## Utility

High capacity multicrop thresher is suitable for threshing wheat, maize, sorghum, pigeon pea, soybean and sunflower crops. It consists of a spike-tooth cylinder (700 mm diameter), three aspirator blowers, cleaning sieves and automatic feeding and bagging systems.

| Specifications & Performance results | | | |
|---|---|---|---|
| Power source, kW | | : | 15 (electric motor) or 27 (tractor pto) |
| Weight, kg | | : | 1200 |
| Output, (kg/h) | Wheat | : | 1450 |
| | Soybean | : | 800 |
| | Maize | : | 2900 |
| | Pigeonpea | : | 950 |
| | Sorghum | : | 1150 |
| | Gram | : | 1350 |
| | Sunflower | : | 550 |
| | Mustard | : | 425 |
| Threshing efficiency, % | | : | 99.3 -99.8 |
| Cleaning efficiency, % | | : | 96.5 -99.9 |
| Broken grain, % | | : | 0.5 -1.4 |
| Total loss, % | | : | 0.85 -3.00 |
| Cost of machine, Rs. | | : | 2,50,000/- |

## Benefits over conventional/traditional practices

- It facilitates timely threshing of the crop to achieve better quality.
- Reduces drudgery and threshing accidents because of safe design.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Arjun Industries, Bhopal, Phone: 079426 84441
- M/s Fine Fabrication Works, Bhopal, Phone: 0755 425 1574
- M/s Manak Industries, Bhopal, Contact No.: 91-755-2581683, 9993035566 Email: manakindustriesbhopal@gmail.com,
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# PTO and Electric Motor Operated Multi Crop Thresher for Seed Spices

## Utility

A tractor/electric motor operated thresher can be used for threshing of cumin and coriander crops.

| Specifications & Performance results | | |
|---|---|---|
| Power required, kW | : | 5.6 |
| Output, kg/h | : | 240 -260 |
| Threshing efficiency, % | : | 100 |
| Cleaning efficiency, % | : | 99 |
| Blown out grain | : | Nil |
| Cost, Rs | : | 70,000/- |
| Cost of operation , Rs/kg | : | 100/- |

## Benefits over conventional/traditional practices

- Mechanization of the threshing of seed spices against the traditional practice of threshing either by beating on drums or on wooden logs or treading under tractor wheels which requires lots of labour and lot of dust with stone enters in during the threshing process.
- Improves the quality of seed spices.

**Design:** MPUAT, Udaipur (AICRP on FIM)

**Commercialization Status:** Commercialized

## Contact:

- M/s Makewell Industries, Unjha (Gujarat), Phone: 02767 282 047, E-mail : makwelindustries@yahoo.co.in
- Principal Investigator (FIM Project), Dept. of Farm Machinery and Power Engg., College of Technology & Engineering, MPUAT, Udaipur-313001 (Rajasthan), Tel: 91-294-2470119, Email : deempuatudr@gmail.com

# Power Operated Multi-Crop Thresher for Hilly Region

## Utility

Hill farming needs versatile agricultural machineries which should be light in weight for transportation in hilly areas as well as portable, so that it can easily assemble and dismantle. The developed light weight multi-crop power thresher is suitable for threshing of wheat, paddy, amaranth and millets in order to suit requirements of hilly regions.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 1.5 single phase electric motor |
| Weight of machine, kg | : | 95 |
| Threshing capacity, kg/h | : | |
| Wheat - | | 34 |
| Paddy - | | 75 |
| Barnyard millet - | | 58 |
| Finger millet - | | 54 |
| Amaranth - | | 30 |
| Threshing efficiencies, % | : | 98 |
| Cost of the machine, Rs. | : | 25,000/- |
| Cost of operation, Rs/kg | : | 0.5-1.5/- |

## Benefits over conventional/traditional practices

- Benefits hill farmers by not only saving of time and labour but also reducing the drudgery involved in the manual threshing operations.
- Light weight and easy to transport in hilly region.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

## Contact:

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Power Operated Light Weight Power Thresher cum Cleaner

## Utility

A large number of labourers are engaged for threshing and cleaning of rice crop in hilly region which increases the cost of cultivation. A light weight paddy thresher cum cleaner is useful for threshing as well as winnowing of rice crop. It consists of main frame, wire loops type threshing unit, blower, sieving unit and power transmission unit. The separation of paddy grain from the straw is achieved due to combing action of the wire loops fitted on the threshing cylinder. A blower is used to blow off the chaff, dust and other light foreign materials from the grain. The reciprocating screen separates sand, weed seeds and other heavy weight small size impurities while leaving paddy on the screen.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 0.75 electric motor |
| Type of threshing cylinder | : | Wire loop |
| Cost of equipment, Rs. | : | 60,000/- |
| Grain output capacity, kg/h | : | 143 |
| Threshing efficiency, % | : | 99 |
| Threshing losses due to shattering, % | : | 2 |
| Cost of operation, Rs./t | : | 750/- |

## Benefits over conventional/traditional practices

- Saves 40% in operating time and 20% in labour as compared to conventional method of hand beating on a wooden platform.

**Design:** ICAR Research Complex for NEH Region, Umiam, Barapani (AICRP on FIM)

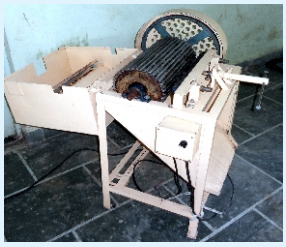
**Commercialization Status:** Ready for commercialization

## Contact:

- Principal Investigator (FIM Project), ICAR Research Complex for NEH Region, Umiam (Barapani) – 793103 (Meghalaya), Tel: 91-364-2570276, E-mail : dayamangang@ gmail.com

# Power Operated Dehusker and Seed Extractor for Tamarind

## Utility



Tamarind dehusking and seed extraction are very labour intensive and drudgery prone operations. Two separate units of dehusker and seed extractor have been developed to increase work rate and reduce labour requirement due to complexity in carrying out both operations simultaneously.

In tamarind dehusker, dry tamarind pods are fed manually into the feed hopper. The counter rotating rollers detach the outer covering of dry tamarind pods which are eventually discharged from outlet chute and are collected in the plastic tray placed beneath the discharge end of outlet chute. The centrifugal blower is provided to blow away trash material.

In seed extractor, dry tamarind pods are fed manually into the feed hopper. The rotating roller with rasp bar mechanism detach the seeds from dry dehusked tamarind pods which are eventually discharged from outlet chute and collected in the plastic tray placed beneath the discharge end of outlet chute.

| Specifications & Performance results | | |
|---|---|---|
| Power Source, kW | : | 0.37 (2 nos) electric motor |
| Extractor roller speed, rpm | : | 180-200 |
| Dehusker output capacity, kg/h | : | 32 |
| Dehusking efficiency, % | : | 91 |
| Output capacity of seed extractor, kg/h | : | 64 |
| Deseeding efficiency, % | : | 90 |

## Benefits over conventional/traditional practices

- Net savings of Rs. 6150/t and Rs. 4250/t over traditional method of dehusking and seed extraction, respectively.

**Design:** MPKV, Rahuri (AICRP on FIM)

**Commercialization Status:** Ready for commercialization

## Contact:

- Principal Investigator, AICRP on FIM, Dr. ASCAET, Mahatma Phule Krishi Vidyapeeth, Rahuri–413722, Dist. Ahmednagar (Maharashtra), Ph. No.: 02426-243219, Email: dormpkv@rediffmail.com

# Power Operated Finger Millet Thresher

## Utility

Threshing of finger millet is one of the critical operations. Traditionally, the threshing of finger millet is performed by three different methods, manually beating with sticks, bullock drown stone roller and tractor drown stone roller. These methods are labour intensive with low output and uneconomical resulting low quality products. A finger millet thresher has been developed based upon requirement of threshing and pearling action.

| Specifications & Performance results | | |
|---|---|---|
| Optimum feed rate, kg/h | : | 36 |
| Optimum cylinder peripheral speed, m/s | : | 12 |
| Optimum frequency, strokes/min | : | 400 |
| Threshing efficiency, % | : | 99.5 |
| Pearling efficiency, % | : | 99 |
| Grain damage, % | : | 0.7 |
| Cleaning efficiency, % | : | 97.5 |
| Total grain loss, % | : | 1.6 |
| Energy consumption, kWh | : | 0.7 |

## Benefits over conventional/traditional practices

- Reduce labour requirement and increase output.

**Design:** BSKKV, Dapoli (AICRP on FIM)

**Commercialization Status:** Ready for commercialization

## Contact:

- Principal Investigator, AICRP on FIM, BSKKV, Dapoli, (Maharashtra), Tel: 02358-284393, Email: dor.dbskkv@gov.in

# Power Operated Multi Millet Thresher

## Utility

Multi-millet thresher can be used for threshing and dehulling of different types of millets.

| Specifications & Performance results | | |
|---|---|---|
| Power requirement, kW | : | 1.5 (single phase electric motor) |
| Weight, kg | : | 150 |
| Threshing capacity, kg/h | : | 100 |
| Dehulling capacity, kg/h | : | 50 |
| Cost, Rs | : | 45,000/- |

## Benefits over conventional/traditional practices

- Reduced labour requirement and Increase in output.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

## Contact:

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# PTO Operated High Capacity Multi-crop Thresher

## Utility

The threshing cylinder has thirty-six spikes placed six in each row. For threshing pulses six spikes are retained on cylinder in 6 rows i.e. 1 in each row.

| Specifications & Performance results | | |
|---|---|---|
| Diameter of threshing cylinder, mm | : | 580 |
| Length, mm | : | 326 |
| Capacity, q/h | : | |
| Wheat | | 16-20 |
| Gram | | 6-8 |
| Green Gram | | 4-5 |
| Efficiency, % | : | 98-99 |
| Cost, Rs | : | 1,00,000 to 3,25,000/- |
| Cost of operation, Rs/h | : | 250-300/- |

## Benefits over conventional/traditional practices

- Net saving per year is estimated to be Rs. 86,000/-.
- Reduces labour requirement during peak season and human drudgery.

**Design:** PAU, Ludhiana (AICRP on FIM)

**Commercialization Status:** Commercialized

## Contact:

- Principal Investigator (FIM Project), Department of Farm Machinery & Power Engineering, Punjab Agricultural University, Ludhiana – 141004 (Punjab), Ph No. 0161 2401325, Email: hodfmpe@pau.edu

# Power Operated Curry Leaf Stripper

## Utility

It is useful for stripping of curry leaflets from the branch which can be used in culinary and pickle industries. The machine consists of four main components viz., power source (1 hp single phase motor), pulling mechanism, stripping mechanism, and collecting tray. The stripping mechanism is designed to carry out the function of gripping and holding the leaflets, while the branch with petioles is pulled through the gripping mechanism as the leaflets are stripped by reciprocating motion of the gripper. By the simultaneous action of gripping of leaflets while pulling of the branch and stripping, the leaflets are stripped from petioles of the branch.

| Specifications & Performance results | | |
|---|---|---|
| Power | : | 0.746 kW single phase motor |
| Manpower, person | : | 02 |
| Capacity, kg/h | : | 40-50 |
| Cost, Rs | : | 20,000/- |

## Benefits over conventional/traditional practices

- Hygienic method of stripping of curryleaf compared to traditional hand stripping method.
- Saving in labour and saving in cost is to the tune of 80% and 60%, respectively.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

**Contact:**

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Power Operated Ramie and Sisal Fibre Extractor

## Utility

Portable ramie and sisal fibre extractor is suitable to extract fibre from harvested ramie stem and sisal leaf.
The machine needs two workers for its operation; one for material feeding and manipulation into the machine and the other for collection and disposal of machine waste and extracted fibre etc. Ramie plant (6-7 nos.) or sisal leaf is fed manually from the tip end first into the machine up to 3/4th of length. When the operator pulls out, the beater scrap out all the non-fibrous tissue and then other end is fed for complete extraction.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | 2.23 kW motor or 3.72kW engine |
| Weight, kg | : | 185 |
| Cost, Rs. | : | 43,500/- |
| Machine capacity | : | 10-12 kg fibre/h (ramie)<br>12-14 kg fibre/h (sisal) |
| Extraction efficiency, % | | 90 |
| Labour requirement | : | 2 |
| Cost of operation, Rs./ha | : | 8160/- |

## Benefits over conventional / traditional practices

- Designed ergonomically for user comfort and less maintenance.
- Produces 55-60% more fibre than existing 'raspador' decorticator.

**Design:** ICAR-CRIJAF, Barrackpore, Kolkata

**Commercialization Status:** Commercialized

## Contact:

- M/s Akriti (Lath), Bamra, Dist: Sambalpur, Odisha, Phone-06642-229336, 09437059095, Email :-lathakriti@gmail.com
- Director, ICAR-Central Research Institute for Jute & Allied Fibres, Barrackpore, Kolkata-700 121, West Bengal. Phone: 033-25356121/6122; E-mail: crijaf-wb@nic.in.
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Power Operated Flax Fibre Extractor

## Utility

The flax fibre extractor was developed to extract flax or linseed fibre from retted and dried straw. The machine consists three sets of fluted nylon rollers with five scutching points through which manually fed retted and dried stalks are passes in vertical direction for scutching action. It needs two persons for operation, one for feeding straw and collection of scotched fibre and other for assisting the operator in keeping straw near to him, collection of waste and handling/hackling of scotched fibre.


| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | 0.746 kW motor |
| Weight, kg | : | 158 |
| Cost, Rs. | : | 41,000/- |
| Machine capacity | : | 5-6 kg fibre/h (23-25 kg straw/h) |
| Extraction efficiency, % | : | 90 |
| Labour requirement | : | 2 |
| Cost of operation, Rs./ha | : | 23,400/- |

## Benefits over conventional/traditional practices

- Reduces cost of fibre extraction compared to manual extraction.
- The machine gives higher fibre recovery.
- It has been designed ergonomically for user comfort.
- Reduces labour requirement from 665 man-days/ha to 109 man-day/ha for fibre extraction using the technology.

**Design:** ICAR-CRIJAF, Barrackpore, Kolkata

**Commercialization Status:** Commercialized

**Contact:**

- M/s Santra & Co., 18/3, Brindabon Mullick Lane, Howrah, Phone-033-26531687, Mobile-9433079264, Email :santraco@yahoo.in
- Director, ICAR-Central Research Institute for Jute & Allied Fibres, Barrackpore, Kolkata-700 121, WB, Phone: 033-25356121/6122; E-mail: crijaf-wb@nic.in.

# Power Operated Paddy Stripper

## Utility

This is a hold on type thresher having wire loop type threshing drum, for threshing paddy. Rotational power to threshing drum is given by 0.75 kW single phase electric motor through belt and pulley. The machine consists of a basic frame, threshing cylinder, prime mover, and power transmission unit. Two persons are required to undertake the threshing operation. It is economical and suitable for threshing of paddy to small and marginal farmer.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 0.7 electric motor |
| Cost, Rs | : | 22,000/- |
| Working width, mm | : | 800 |
| Diameter of drum, mm | : | 250 |
| Capacity, kg/h | : | 300-400 |
| Threshing efficiency, % | : | 98.5 |

## Benefits over conventional/traditional practices

- Suitable for small and marginal farmers.
- About 60% saving in labour requirement and 54% saving in cost of threshing.

**Design:** ICAR-NRRI,Cuttack, Odisha

**Commercialization Status:** Commercialized

## Contact:

- The Director, ICAR-National Rice Research Institute, Cuttack, Odisha-753006, Phone: +91-671-2367757/67, Email: director.nrri@icar.gov.in, crrictc@nic.in

# Power Operated Rice Winnower cum Cleaner

## Utility

It is a power operated machine to clean threshed paddy crop. The machine consists of a blower, an electric motor (0.75 kW), hopper, vibratory feeding tray, discharge chute with two screens (top scalping and bottom grading screen) and supporting frame with trolley wheels. The blower is of centrifugal type with long axis and straight blades. The whole unit is mounted on trolley wheels along with a handle to make it movable.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 0.75 electric motor |
| Weight, kg | : | 100 |
| Cost, Rs | : | 16,000/- |
| Blower type | : | Centrifugal |
| Capacity clean grain, kg/h | : | 500 |
| Labour requirement | : | One |
| Cleaning efficiency, % | : | 98 |
| Cost of operation, Rs/t | : | 60/- |

## Benefits over conventional/traditional practices

- It can be used by different categories of farmers for producing clean grain from the threshed crop at farm level.
- Properly cleaned rice grains add value to the product; help it for longer and safer storage and smooth milling operation.
- Lower cost of operation.

**Design:** ICAR-NRRI,Cuttack, Odisha

**Commercialization Status:** Commercialized

## Contact:

- TheDirector, ICAR-NRRI, Cuttack, Odisha-753006, Phone: +91-671-2367757/67, Email: director.nrri@icar.gov.in, crrictc@nic.in

# Power Operated Jute Ribbonner

## Utility

The power operated jute ribbonner is useful for removal of ribbon (jute fibre) from green jute stick i.e., freshly harvested jute crop, without retting of jute sticks. It consists of twin-roller assembly, stalk removal roller assembly, jute stick guides with provision for operation of the machine by multiple persons. With the help of this invention, ribbon can be removed from jute plant without retting i.e., without soaking it in water for long time. It removes the fibre from green jute plants before retting.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW electric motor | : | 2.24 |
| Weight, kg | : | 280 |
| Capacity, kg/h of ribbon | : | 100 |
| Ribbonning efficiency, % | : | 90 |
| Cost, Rs. | : | 40,000/- |
| Cost of operation, Rs/h | : | 100/- |

## Benefits over conventional/traditional practices

- Biomass handling is reduced by about 60%, reducing the cost of labour in retting operation as only ribbons are retted instead of whole plants.
- The water requirement is reduced by 20-25 times as compared to traditional retting practice.
- Retting period is 7 to 8 days compared to 15 to 20 days in conventional retting.
- Yield of fibre is also high due to minimum loss of fibre during ribboning and washing of retted ribbons.
- The traditional methods pollute water bodies and also have an adverse effect on the health of farmers who stand in water for long hours.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

**Contact:**

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# PROCESSING AND VALUE ADDITION EQUIPMENT

# CLEANING, GRADING, SORTING AND WASHING EQUIPMENT

# Manual Sack Holder

## Utility

It holds the sack in vertical open position for easy loading of cleaned grains and granular materials. Its height can be adjusted to the size of the sack and suitable for all types of granular materials.


| Specifications & Performance results | | |
|---|---|---|
| Power source | : | No Power |
| Weight, kg | : | 11 kg |
| Cost, Rs. | : | 1000/- |
| Labour requirement | : | 10 man-h/t |
| Holding capacity, kg | : | 100 |

## Benefits over conventional/traditional practices

- Capacity enhancement over operation without machine.
- Reduces drudgery.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- M/s. Fine fabrication works, Govindpura, Bhopal, Phone: 0755 425 1574
- M/s. Manak Industries, Govindpura, Bhopal, Email: manakindustriesbhopal@gmail.com,
- Director, ICAR-CIAE, NabiBagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Manual Fruit Grader

## Utility

The main component of multi fruit grader includes; feed trough, intermediate hopper, separating trough collecting platform and mainframe. Multi-fruit grader is designed on the principle of grading based on difference in size of the fruits. The multi-fruit grader is also an adjustable and can be adjusted for a variety of spherical and oval shaped fruits. Multi-fruit grader can separate as small as 50 mm size and as large as 130 mm fruits.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | Manual |
| Weight, kg | : | 63 |
| Suitability for crop/ commodity | : | Spherical Fruits & Vegetables like Citrus fruits, Potatoes, Onion etc. |
| Cost, Rs | : | 10,000/- |
| Output capacity, kg/h | : | 1200 |
| Efficiency, % | : | 90 – 95 |
| Cost of operation, Rs/h | : | 40/- |

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

**Contact:**

- Research Engineer, AICRP on PHET College of Agricultural Engineering, Jawaharlal Nehru Krishi Viswa Vidyalaya, Jabalpur - 482 004 (Madhya Pradesh), Ph: (0761) 2681074(O), E-mail : drsjnkvv@gmail.com

# Manual Apricot Stone Grader

## Utility

Machine is pedal operated and used to grade the apricot pits based on their size. Pits are graded in four grades using three sieves of different sizes of rectangular holes and one pan at bottom.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | Manual, pedal operated |
| Weight, kg | : | 42 |
| Man power | : | 2 persons/day for 8 hours |
| Suitability for crop/ commodity | : | Apricot pit, almond etc. |
| Cost, Rs | : | 4000/- |
| Output capacity, kg/h | : | 150 |
| Efficiency, % | : | 86 |
| Cost of operation, Rs/kg | : | 1.0/- |

**Design:** AICRP on PHET

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Head, Department of Post-Harvest Process and Food Engg, College of Tech., G. B. Pant University of Agriculture & Tech., Pantnagar - 263 145 (Uttaranchal), Email: regreg@gbpuat.ac.in.

# Manual Dried Apricot Grader

## Utility

The dried apricot fruits can be graded into four grades based on theirsize.Size grading of dried apricots ensures better returns to the people involved in the trade.
The lot is mainly classifies in four grades. The dimensions of the specified grades (i.e., length and breadth) are given as:
Grade 'A' = 29.73x28.60 mm
Grade 'B' = 26.34x22.66 mm
Grade 'C' = 23.30x20.44 mm
Grade 'D'= 18.33x15.26 mm


| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | Manual, Hand operated |
| Weight, kg | : | 45 |
| Man power | : | 2 persons/day for 8 hours |
| Suitability for crop/ commodity | : | For dried apricot fruits. |
| Cost, Rs | : | 3500-4000/- |
| Output capacity, kg/h | : | 200-250 |
| Efficiency, % | : | 81-92 |
| Cost of operation, Rs/t | : | 400/- |

**Design:** AICRP on PHET

**Commercialization Status:** Ready for Commercialization

**Contact:**

- PI, AICRP on PHET Sher-e-Kashmir University of Agri. Sciences and Technology, Shalimar Campus, Srinagar – 191 121 (J&K), Ph. No.: + 0194-2461258, Email: provc@skuastkashmir.ac.in

# Manual Double Screen Cleaner

## Utility

It is a batch type hand operated equipment to replace existing traditional practice i.e. manual horizontal / vertical sieving to clean the grains. It separates impurities like stubbles, chaff, dirt and brokens from wheat, chickpea, soybean and other cereals and pulses. It consists of main frame, scalper/grading screen, draper rod, handle, shutter etc. and operated by hanging it on any elevated point with ropes. A batch of 5-10 kg is fed into the cleaner which swung to and fro till the batch is sieved.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Manual |
| Weight, kg | : | 17.6 |
| Cost, Rs. | : | 4,500/- (approx.) |
| Labour requirement, man-h/t | : | 5.0 |
| Output capacity, kg/h | : | 125-225 |
| Cleaning Efficiency, % | : | 99.0 |

## Benefits over conventional/traditional practices

- Capacity enhancement over operation without machine.
- Reduces drudgery.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s. Fine fabrication works, Govindpura, Bhopal, Phone: 0755 425 1574
- M/s. Manak Industries, Govindpura, Bhopal, Email: manakindustriesbhopal@gmail.com
- Director, ICAR-CIAE, NabiBagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Pedal Operated Winnower-Cleaner-Grader for Millets

## Utility

A winnower-cleaner-grader suitable for winnowing, cleaning and grading of millet, cereal and pulse crops in single pass. The major components of the machine are fabricated using fiber reinforced plastic material. It consists of a winnower, cleaning sieve and grading assembly as major components.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | Manual |
| Weight, kg | : | 60 |
| Man power | : | 01 person / day for 8 hours |
| Suitability for crop | : | Millets, wheat, paddy, lentil and soybean |
| Cost, Rs | : | 8,000/- |
| Output capacity, kg/h | : | 250 - 350 |
| Efficiency, % | : | 96 |
| Cost of operation, Rs/kg | : | 0.04/- |

**Design:** AICRP on PHET

**Commercialization Status:** Ready forCommercialization

**Contact:**

- Research Engineer, AICRP on PHET Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora – 263 601 (Uttaranchal), Ph. No.: +91-5962-241022, 18001802311, Email: director.vpkas@gov.in, vpkas.nic.in.

# Pedal-cum-Power Operated Double Screen Cleaner-Grader

## Utility

It is pedal or electric motor operated equipment to separate dust, dirt, stones, straw, chaff etc. and grade the cereals and pulses. The cleaning of the grains is taking play through air blowing of light impurities while the grading through sieving of different sizes. It consists of main frame, hopper, feeding mechanism, sieve box, scalping and grading sieves, ecentric unit centrifugal blower, bicycle drive unit etc. The sieves provided in sieve box may be replaces as per the type of grains.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.375 kW single phase electric motor |
| Weight, kg | : | 100-110 |
| Cost, Rs. | : | 20000/- |
| Labour requirement, man-h/t | : | 4 |
| Output capacity, kg/h | : | Power operated: 900<br>Pedal operated: 600 |
| Screen effectiveness,% | : | Power operated: 80<br>Pedal operated: 78 |
| Cost of operation, Rs/t | : | 75/- |

## Benefits over conventional/traditional practices

- Capacity enhancement over manual operation.
- Reduces drudgery.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s. Fine fabrication works, Govindpura, Bhopal, Phone: 0755 425 1574
- M/s. Manak Industries, Govindpura, Bhopal, Email: manakindustriesbhopal@ gmail.com, Contact: No.: 91-755-2581683, 9993035566, 9425687798 8989821564
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Engine Operated Continuous Carrot Washer

## Utility

Carrots when harvested from soil adhere with the soil particles and hence not suitable for direct consumption. The inclined perforated screen based rotary cylinder type of washer is used for the washing of carrots using pressurized get of water. The machine operated in continuous manner using appropriate power source.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | 0.375 kW Diesel Engine |
| Weight, kg | : | 500 |
| Man power | : | 04 |
| Suitability for crops/commodity | : | Carrots |
| Cost, Rs | : | 80,000/- |
| Output capacity, kg/h | : | 1,000 |
| Efficiency, % | : | 95 |
| Cost of operation, Rs/kg | : | 0.30/- |

**Design:** AICRP on PHET

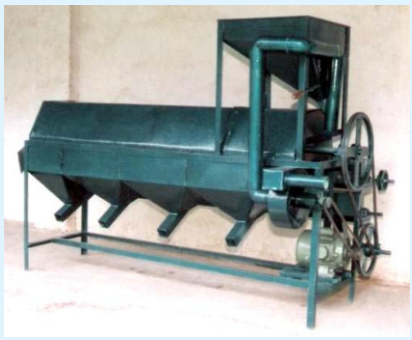
**Commercialization Status:** Commercialized

**Contact:**

- Sr. Research Engineer, AICRP on PHET Deptt of Agril. Processing and Energy College of Agricultural Engineering & Technology CCS Haryana Agricultural University Hisar -125004, Email: dr@hau.ac.in, Phone No.: 01662-284340.
- M/s Sanjeev Jangra Engg. Works (C/o Mistry Krishan Kumar Jangra) Village Badopatti, Bus standBahbalpur (Hisar), Haryana.

# Grain Cleaner-Grader-Polisher

## Utility



It consists of aspirator, rotary sieves and polisher. Hopper with feeding mechanism is provided for proper feeding of grain to rotary sieve. Before the grain reaches to sieve it is cleaned by aspirator and the grains are graded based on their size through different sizes of sieves arranged in series. The stone and lumps are separated at the end. The machine can grade pigeon pea, green gram and black gram grains. Grading of pulse grains lead to better milling and higher dal recovery. Other pulses can also be graded by using proper sized sieve.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 0.75 kW single phase electric motor |
| Weight, kg | : | 120 |
| Man power | : | 1 skilled and 1 unskilled |
| Cost , Rs. | : | 24,500/- (including electric motor) |
| Suitability for crop/ commodity | : | Pulses and other food grains |
| Output capacity, kg/h | : | 400-500 |
| Efficiency, % | : | Cleaner : 98%; Grader : 92%; Polisher : 91% |
| Cost of operation, Rs/t | : | 400/- |

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

**Contact:**

- M/s YMB Agri Machineries, W/37-38, Phase 3, MIDC Akola (MS) (M) 09850303202 (O) 0724-2258184
- Research Engineer, AICRP on PHT College of Agricultural Engineering, Dr. Punjabrao Deshmukh Krishi Vidyapeeth, KrishiNagar, AKOLA - 444 104 (Maharashtra), Email: info@pdkvu.in

# Cleaner/Grader for Small Seeds

## Utility

It has been specifically developed for cleaning and grading of light small seeds such as cumin, coriander etc. It consists of four vertical cylinders of diameter varying from 80 to 240 mm mounted on a horizontal pipe through which air is blown at a speed of 2.30 to 2.70 m/min. The lightest material, i.e. dust etc. is collected in a cyclone separator attached to the blower end of aspirator. It easily separates impurities.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.37 kW, Single phase, electrical motor |
| Weight, kg | : | 200 |
| Cost, Rs. | : | 25,000/- |
| Labour requirement, man-h/t | : | 10 |
| Output capacity, kg/h | : | 140, 185 and 285 kg/h for cumin, coriander and berseem, respectively. |

## Benefits over conventional/traditional practices

- Useful for separation/grading of light seeds, also facilitates cleaning otherwise it is very difficult and tedious in traditional manual practice.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for Commercialization

## Contact:

- Director, ICAR-CIAE, NabiBagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Onion Bulb Descaler

## Utility

Removal of dry peel/scale of onion is the common practice during storage and marketing of onions. Onion bulb descaler reduces drudgery in manual operation and clean the onions effectively. The machine consists of four brush rollers rotating in one direction. The bristles of roller are flexible enough to remove the dry peel from onion bulbs without any damage to bulbs. The configuration of rotating rollers is kept in such a way that the onion bulbs turns randomly around their major and minor axis and get travelled along the rollers to discharge chute. The dry peel gets pulled down through the gap between brush rollers and gets collected in collection spout. The machine has facility to sort out infected/rotten onion bulbs during its de-scaling operation.

| Specifications & Performance results | | |
|---|---|---|
| Power source, Electrical Power, | : | 0.75 kW single phase motor |
| Cost of equipment, Rs. | : | 35,000/- |
| Labour requirement, man-h/t | : | 1.23 |
| Output capacity, kg/h | : | 1000 |
| Descaling efficiency, % | : | 88.3 |
| Cost of operation, Rs/tonne | : | 41/- |

## Benefits over conventional/traditional practices

- Replacement of laborious and tedious manual task.
- Minimum damage to bulb.
- The machine is movable and compatible with existing mechanical system.
- Proper collection of dry peel.
- Cost effective operation.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

## Contact:

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Fruit Grader

## Utility

The roller type fruit grader having four pairs of rollers (PVC pipes) of 100 mm diameter and 1500 mm length rotating (opposite and outward) at 80 rpm with adjustable diverging gap between each pairs of roller.The fruits are graded based on their size. The grader is useful for grading Nagpur mandarin, Sweet lime and Sapota (spherical varieties) into 3 to 4 grades.

| Specifications & Performance results | | |
|---|---|---|
| Power Source, kW | : | 0.75 kW, single phase electric motor |
| Weight, kg | : | 365 |
| Man power | : | 2 (unskilled) |
| Suitability for crop/ commodity | : | Grading of spherical fruits (Mandarin, sweet lime and Sapota) |
| Cost, Rs | : | 57,500/- (including electric motor) |
| Output capacity, t/day | : | 10 - 12 |
| Efficiency, % | : | 70-80 |
| Cost of operation, Rs/t | : | 400/- |

**Design:** AICRP on PHET

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Research Engineer, AICRP on PHET College of Agricultural Engineering Dr. Punjabrao Deshmukh Krishi Vidyapeeth, Krishi Nagar, Akola - 444 104 (Maharashtra), Email: info@pdkvu.in

# Walnut Bleacher-cum-Washer

## Utility

The post-harvest losses due to manual washing are in the range of 1.5-3.0% in walnuts. Presently, the manually dehulled walnuts are washed under running water from streams, and tap water, which causes the shell break and hence results in moisture increase, microbial growth, darkening of kernel and causes rancidity. A mechanized walnut bleacher-cum-washer not only eliminates all such problems but also saves labour and time required.


| Specifications & Performance results | | |
|---|---|---|
| Power Source, kW | : | 0.75 kW, electric motor |
| Weight, kg | : | 73 |
| Man power | : | 01 |
| Suitability for crop/ commodity | : | For dehulled walnuts |
| Cost, Rs | : | 48,000/- |
| Output capacity, kg/h | : | 130 |
| Efficiency, % | : | 94.5 |
| Cost of operation, Rs/t | : | 186/- |

**Design:** AICRP on PHET

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Principal Investigator, AICRP on FIM, Department of Agricultural & Food Engineering, Indian Institute of Technology, Kharagpur – 721302 (West Bengal), Tel: 91-3222-283160 (O), E-mail: rajendra@agfe.iitkgp.ac.in

# Garlic Grader

## Utility

Garlic grading machine is suitable to grade garlic bulb/cloves on overall size basis. The machine consists of a rotary frame for mounting two sieves, an aspirator, a hopper and bottom discharge toughs for collection of graded material. The screen for machine has been developed to separate the garlic bulbs in grades specified under AGMARK, viz. less than 30 mm, between 30-40 mm (Class I & II) and more than 45 mm diameter size (Extra class).


| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | 0.75 kW,single phase Electric motor |
| Weight, kg | : | 150 |
| Man power | : | 01 |
| Suitability for crop/ commodity | : | Garlic |
| Cost, Rs | : | 35000/- (without motor) |
| Output capacity, kg/h | : | 100 |
| Efficiency, % | : | 82 |

## Benefits over conventional/traditional practices

- The machine results in saving of almost 200% cost over conventional practice.

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

## Contact:

- M/s Kalpana Entreprises N. B. Complex, Pratap nagar,Udaipur-1
- Research Engineer, AICRP on PHET, College of Technology & Argil. Engineering, Maharana Pratap University of Agricultural & Technology, Udaipur, Rajasthan, Tel: 91-294-2470119, 2980604(R).

# Fruit Grader (Light Weight)

## Utility

The grading of the commodities is carried out based on their size. The commodity to be graded is fed to the feed hopper, commodity is passing over the moving diverging belts (small to large), and drops midway based on their size. The dropped fruits were collected from four outlets into crates. The opening between belts can be adjusted by moving the pulleys on either or both ends.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.375 kW, Single Phase |
| Weight, kg | : | 138 |
| Cost, Rs. | : | 25,000/- |
| Labour requirement, man-h/t | : | 20 |
| Output capacity, kg/h | : | 200-300 |
| Cost of operation, Rs/t | : | 240/- |

## Benefits over conventional/traditional practices

- Capacity enhancement over operation without machine.
- Reduces drudgery.
- Low price, low power requirement, easy construction, versatility for different sizes of commodities, light in weight (can be carried by two persons).

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for Commercialization

## Contact:

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Grain Flour Separator

## Utility

It is a electric motor operated equipment for separating milled wheat flour into bran, fine flour (Maida), semolina (Suji) and coarse flour (Atta). It is suitable for milled wheat, gram and soy flour, It consists of hopper, separation chamber with appropriate screens, shaking unit and outlets.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.75 kW, single phase electric motor |
| Weight, kg | : | 127 |
| Cost of equipment, Rs. | : | 20,000/- |
| Labour requirement, man-h/t | : | 10 |
| Output capacity, kg/h | : | 80-120 |

## Benefits over conventional/traditional practices

- Capacity enhancement over operation without machine.
- Reduces drudgery.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s. Fine fabrication works, Govindpura, Bhopal, Phone: 0755 425 1574
- M/s. Manak Industries, Govindpura, Bhopal, Email: manakindustriesbhopal@gmail.com
- Director, ICAR-CIAE, NabiBagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Onion Size Grader

## Utility

The onion size grader is suitable to grade the onion bulbs into four different grades. The dried onion bulbs are fed in the hopper fitted at the upper side of elevated perforated rotating cylinder of MS rods and passed over it. The bulbs are graded based on the different size of openings on the cylinders.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 1.5 kW, electric motor |
| Weight, kg | : | 200 |
| Specification | : | Equally spaced rods with 3 grade dimensions used to grade the onion |
| Cost of machine, Rs. | : | 2,50,000 |
| Capacity, kg/h | : | 1000 |

## Benefits over conventional/traditional practices

- Saving of time (70%), labour and cost over traditional practice.

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

## Contact:

- M/s Omega Metallic,Bengaluru – 560 058, Mobile: +918123415828, E-mail: omegametalic@gmail.com
- M/s Concorde Engineering Works, Bangalore – 560 015, Mobile: +919886781667; E-mail: sivakumar1671@gmail.com

# Power Operated Multiplier Onion Grader

## Utility

Multiplier onions are known for its pungency and these onions are used in large quantity in the catering and pickling industries. Multiplier onion grader facilitates removal of the damaged / spoiled bulbs and delivers the uniform size bulbs in three grades. The bulbs are graded based on their size when passed over perforated rotating cylinders of varying hole size of the perforation.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Electric Motor |
| Cost of equipment, Rs. | : | 70,000/- |
| Field capacity, kg/h | : | 580 |
| Cost of operation, Rs./kg | : | 0.2 |

## Benefits over conventional/traditional practices

- Faster, drudgery free operation, saving of labour and time.
- Higher grading accuracy in comparison to manual grading.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Stonehat technologies, Coimbatore, Tamil Nadu, Mr. Gopalakrishna Raja Raguramraja, Email: businesshead@stonehat.in, accounts@stonehat.in, Phone: 9965512244.
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# PEELING, CUTTING AND PULPING EQUIPMENT

# Manually Operated Palmyra Endosperm Remover

## Utility

Palmyra tender fruit is cut and opened to remove the endosperm, by the road side vendors using traditional knife in an unhygienic way, which needs special skill and also laborious. A manually operated Palmyra endosperm remover developed for easy extraction of the endosperm. The machine consists of the main frame, cutting assembly, tray holder with tray for endosperm collection and fruit waste dropping chute. The blade is fixed to a spring-loaded hand lever. A fruit holder frame is also an integral part of the cutting assembly. There is a hollow bottom holder to keep the fruit for holding with a thin rod so that the hand doesn't come in Contact: with the blade while cutting the fruit. A stainless-steel tray is kept below the cutting platform to collect the endosperm. The cut fruit waste passes through an outlet chute and gets collected separately. Similarly, the other two sockets are cut opened and the endosperm is scooped out from the fruit using a stainless-steel spoon.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Manual |
| Weight, kg | : | 22 |
| Extraction efficiency, % | : | 100 |
| Capacity, Fruits/h | : | 50 |

## Benefits over conventional/traditional practices

- User friendly.
- Does not require any specialised skill for cutting.
- Safe method of operation.
- Portable.
- Hygienic method of extraction.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

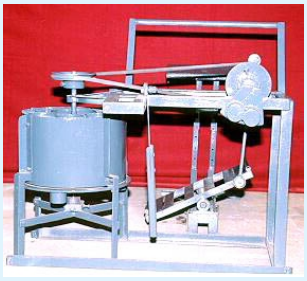
## Contact:

- Head, ICAR-Central Institute of Agricultural Engineering, Regional Centre, Coimbatore-641007 ciaerccbe@gmail.com.
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Pedal Operated Cassava Chipping Machine

## Utility

The pedal operated cassava chipping machine is equipped with a pivoted pedal for transmitting the power to the cutting disc through suitable belt and pulley drive mechanism. A trimming knife is also provided on the frame to remove the woody neck portion of the tubers before feeding into the compartments. Four castor wheels are fixed to the legs of the machine to make it portable.



| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | Manual |
| Weight, kg | : | 72 |
| Man power | : | 02 |
| Suitability for crop/ commodity | : | Cassava |
| Cost, Rs | : | 14,000/- |
| Output capacity, kg/h | : | 83 to 768 kg/h for increase in chip thickness from 0.9 to 6.9 mm. |
| Efficiency, % | : | 95 |
| Cost of operation, Rs/kg | : | 0.20/- |

**Design:** AICRP on PHET

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Research Engineer, AICRP on PHET ICAR-Central Tuber Crops Research Institute, Thiruvanthapuram-695017 (Kerala), Ph No.: (+91)(471) 2598551-4

# Pedal Operated Potato Peeler

## Utility

The pedal operated potato peeler has been especially developed for small scale entrepreneurs where electricity is not available. The perforated stainless steel drums having abrasions on their inner surfaces during rotation remove skin of potatoes as in manual peeler.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Manual |
| Weight, kg | : | 75 |
| Cost, Rs. | : | 17,000/- |
| Labour requirement, man-h/t | : | 5.3 |
| Output capacity, kg/day | : | 188 |
| Cost of operation, Rs/tonne | : | 300/- |

## Benefits over conventional/traditional practices

- Enhanced capacity compared to work without machine.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Laxmi Steel Fabs, Sehore, Madhya Pradesh, Email: Dhanlaxibhopal@yahoo.in, Contact: No.: 9425607880, 9425017929
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Pedal Operated Potato Slicer

## Utility

The pedal operated potato slicer is suitable for small scale entrepreneurs where electricity is not available. It consists of main frame, feeding unit, stainless steel blade etc.The peeled potato tubers get sliced through the blades fitted at the inner side of rotating disk.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Manual |
| Weight, kg | : | 46 |
| Cost, Rs. | : | 17,000/- |
| Labour requirement, man-h/t | : | 5.3 |
| Output capacity, kg/day | : | 1881 |
| Cost of operation, Rs/t | : | 300/- |

## Benefits over conventional/traditional practices

- Enhanced capacity compared to work without machine.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Laxmi Steel Fabs, Sehore, Madhya Pradesh, Email: Dhanlaxibhopal@yahoo.in, Contact: No.: 9425607880, 9425017929
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Pedal Operated Turmeric/Ginger Slicer

## Utility

Side view of turmeric/ ginger slicer

Isometric view of turmeric/ginger slicer

Slicing of turmeric/ginger is necessary for achieving faster drying where the thickness of slices affects the drying rate. A lightweight slicer which includes blade assembly, pedal mechanism, hand mechanism, input hopper, chassis, outlet, etc. The cutting mechanism consists of a shearing plate, cutting plate, coupler, spring, and a thickness adjustment knob. The change in gap between the cutting edge of the blade and the shearing plate which ultimately changes the thickness of cutting slices. Through hopper, turmeric will be put inside blade assembly for chopping and blades will be rotated inside blade assembly using handle or pedal chain mechanism. Due to this, turmeric will be sliced and collected in a bucket through an outlet provided at the bottom. As compared to manual chopping using knives, this machine works 3.5-4 times faster when operated by a single person.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Manual |
| Man Power | : | 01 |
| Weight, kg | : | 47 |
| Capacity, kg/h | : | 38 |
| Cost of the slicer, Rs. | : | 19, 200/- |
| Time saving as compared with manual method | : | 3.5 to 4 times |

**Design:** AICRP on PHET

**Commercialization Status:** To be commercialized

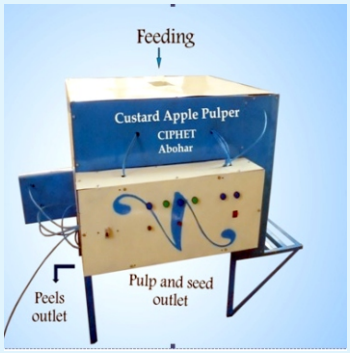
**Contact:**

- PI, AICRP on PHET, Division of System Research and Engineering, ICAR RC for NEH, Umiam, Meghalaya, Tel: 91-364-2570276

# Automatic Custard Apple Pulper

## Utility

Custard apple fruits have a short post-harvest life, it is very delicate and pulp extraction is tedious process. Manual process is also unhygienic. The custard apple pulper machine separates the peels, seeds and the intact pulp from custard apple fruits. It contains three mechanism viz. fruit cutting mechanism, fruit scooping mechanism and pulping mechanism. Fruit cutting and scooping mechanism are made with pneumatic actuators and electronic controls. The machine is fully automatic.




| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | Electric Power |
| Capacity, kg/h | : | 120 |
| Efficiency (Cutting-Scooping), % | : | 94 |
| Coarse / Intact pulp recovery,% | : | 70-72 |
| Fine pulp recovery, % | : | 28-30 |
| Pulp wastage, % | : | 6% along with peels |
| Operating cost, Rs/kg | : | 0.5/- |

## Benefits over conventional/traditional practices

- Automatic machine for separating the peels, seeds and the intact pulp from custard apple fruits.
- Machine is very easy to use and can be operated with very less power.

**Design:** ICAR-CIPHET, Ludhiana

**Commercialization Status:** Commercialized

## Contact:

- Mr. Shivananad M. Shelge, M/s Nexgen drying systems,# C902 Sigma One building, Pune - 411038, Phone 2024392372, Fax- 2024390700
- Director, ICAR-Central Institute of Post-Harvest Engineering and Technology (CIPHET), PAU, Ludhiana- 141004, Punjab, Ph No. 0161 2313103, Email:director.ciphet@icar.gov.in

# Pomegranate Aril Extractor

## Utility


Pomegranate arils are so firmly attached to each other and; with rind and peel that it makes difficult to separate manually for industrial processing in large quantity. The "Pomegranate Aril Extractor" relates to a mechanical and continuous system suitable for whole pomegranate of any size, shape and variety; and for recovery of clean, whole and undamaged arils. The system comprises pomegranate fruit breaking unit, drive unit, collection trays where separated arils and extraneous matters are received, vibrating sieve unit; and collection troughs. The fruit-breaking unit consists of knives arrangement to continuously break the fruit in such a way that the major portion (85-90%) of arils is safely separated out from the broken peels. The rest of the arils that is about 10-15% remains attached with the peels are further being separated over the vibrating screen.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | 0.75 kW electrical motor |
| Aril extraction capacity, t/h | : | 0.5 |
| Aril extraction/separation efficiency, % | : | 90-94 (depending on variety and other fruit characteristics) |
| Man power required | : | 2-3 |

## Benefits over conventional/traditional practices

- Highly efficient with little damage and waste.
- continuous operation for rapid processing of large quantities in any shape, size and variety of the pomegranate.
- Yields clean arils that can be used for further processing or for fresh eating/marketing.

**Design:** ICAR-CIPHET, Ludhiana

**Commercialization Status:** Commercialized

## Contact:

- M/s Padma tech Engineering Systems, Bhosari Pune, Mobile:- + 91 98225 52882, Email:-marketing1@padmatech.in
- Director, ICAR-Central Institute of Post-Harvest Engineering and Technology (CIPHET), PAU, Ludhiana- 141004, Punjab, Ph No. 0161 2313103, Email: director.ciphet@icar.gov.in

# Turmeric Slicer

## Utility

The power operated turmeric cutting cum slicing machine cuts the turmeric rhizomes into slices of desired thickness (2 to 5 mm). The machine consists of the feeding unit, slicing mechanism, driving mechanism, frame and the housing. The washed turmeric rhizomes fed through hopper are subjected to centrifugal force and strikes on the stationary SS blade fixed on the casing. The slices are collected through outlet provided below the blade.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | 0.75 kW,Electrical motor |
| Weight, kg | : | 70 |
| Man power | : | 1 |
| Suitability for crop/ commodity | : | Turmeric rhizomes, potato, ginger |
| Cost, Rs. | : | 60,000/- |
| Output capacity, kg/h | : | 380 |
| Efficiency, % | : | 74 |
| Cost of operation, Rs/tonne | : | 220/ - |

**Design:** AICRP on PHET

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Research Engineer, AICRP on PHET College of Agricultural Engineering Dr. Punjabrao Deshmukh Krishi Vidyapeeth, Krishi Nagar, Akola - 444 104 (Maharashtra), Email: info@pdkvu.in

# Pricking Machine for Petha Preparation

## Utility

In petha industry, manual cutting and pricking is unhygienic and time-consuming process. Petha cutting and pricking machine with the help of stainless steel needles and suitable mould/ dies provides uniform shape and size of petha sweet. This machine is helpful in increasing the capacity of production besides maintaining quality and hygienic conditions.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | 1.12 kW, single phase, electric motor |
| Weight, kg | : | 100 |
| Man power | : | One |
| Suitability for crop/ commodity | : | Commodities used for Petha making |
| Cost, Rs. | : | 50,000 |
| Output capacity, kg/h | : | 200 |
| Pricking Efficiency, % | : | 95 |
| Cost of operation, Rs/t | : | 1500/- |

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

**Contact:**

- M/s Moti Engg Works, Hisar Plot No. 42-43, Gali No. 1, Ganesh Nagar, Industrial Area, Hisar, Phone: 092151 86634
- Research Engineer, AICRP on PHET, College of Agril Engineering, CCS Haryana Agricultural University, Hisar-125 004 (Haryana), Email: dr@hau.ac.in, Ph No. : 01662-284340.
- Head, Deptt. of Post-Harvest Engg. & Tech, Aligarh Muslim University, Aligarh- 202002 (UP)

# Coconut Testa Removing Machine

## Utility

The machine consists of a circular wheel covered with an emery cloth or water paper. This friction wheel is rotated using an electric motor. Coconut kernel is pressed to the surface of the rotating friction wheel either by hand or using a fork. Removed testa is collected at the bottom. The emery cloth/ water paper needs to be replaced periodically when the surface gets smoothened.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | 0.75 kW, Electrical motor |
| Weight, kg | : | 60 |
| Man power | : | 1 |
| Suitability for crop/ commodity | : | Coconut |
| Cost, Rs | : | 15,000/- |
| Output capacity, coconuts/h | : | 75 |
| Cost of operation, Rs/unit | : | 0.30/- |

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized.

**Contact:**

- Research Engineer, AICRP on PHET,ICAR-Central Plantation Crop Research Institute Kasargod - 671124 (Kerala), Email: directorcpcri@gmail.com
- National Research Development Corporation, Bangalore, E-mail : write2@nrdc.in, Ph. No.: +91-11-29240401 to +91-11-29240407

# Peeler cum Polisher for Ginger and Turmeric

## Utility

The machine peels the outer skin from fresh ginger rhizomes and abrade off outer shriveled skin of dried rhizomes of ginger and turmeric. The peeling operation helps for faster drying and polishing facilitates in value addition & quality improvement of dried rhizomes. The machine works on the principle of friction and abrasion. It consists of a perforated drum with a common opening for feeding and discharge of rhizomes. The machine has a perforated drum coated with emery strips at inner surface. The drum is rotated at 40 rpm. Water supply through hollow shaft helps in removal of peel/skin through the drum perforation. In case of polishing dehydrated rhizomes are rotated in the drum with disconnected water supply.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | 0.75 kW, single phase electric motor |
| Weight, kg | : | 57 |
| Man power | : | 1 unskilled labour |
| Suitability for crop/ commodity | : | Ginger, carrot, turmeric |
| Cost, Rs | : | 15,000/- (without motor) |
| Output capacity, kg/h | : | 40-50 for peeling & 50-60 for polishing |
| Efficiency, % | : | 80 |
| Cost of operation, Rs/t | : | 250 /- |

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized.

**Contact:**

- M/s Kalpana Enterprises, N.B. Complex, Pratapnagar,Udaipur-313001, Phone: 094137 72301
- Research Engineer, AICRP on PHET, College of Technology & Agricultural Engineering, Maharana Pratap University of Agricultural & Technology, Udaipur– 313 001 (Rajasthan), Tel: 91-294-2470119.

# Garlic Peel Remover for Dehydrated Flakes

## Utility

The dry garlic clove peel remover/de-skinner machine can detach and separate peel from dehydrated garlic cloves/flakes. The machine consists of a scrubber made of canvass strips which rotates in a barrel. The peels get detached of due to abrasion and friction and an aspirator sucks the light peel and dehydrated clove/flakes is obtained through the discharge trough.


| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | 0.75 kW Single phase Electric motor |
| Weight, kg | : | 95 |
| Man power | : | 01 |
| Suitability for crop/ commodity | : | Garlic |
| Cost, Rs. | : | 17000/- (without motor) |
| Output capacity, kg/h | : | 50 |
| Efficiency, % | : | 80-85 |
| Cost of operation, Rs/t | : | 530/- (For dried flakes) |

## Benefits over conventional/traditional practices

- The machine results in saving of almost 300% in cost over conventional practice.

**Design:** AICRP on PHET

**Commercialization Status:** Ready for commercialization

## Contact:

- Research Engineer, AICRP on PHET, College of Technology & Agril. Engineering, Maharana Pratap University of Agricultural& Technology, Udaipur– 313 001, Rajasthan, Tel: 91-294-2470119.

# Aloe Vera Gel Extraction Machine

## Utility

Aloe vera gel extraction machine consists of three pairs of stainless steel roller arranged in vertical plane. The front pair has more clearance than the rear pairs. The front pair just compresses the leaf while rear pairs helps in extraction. The clearance between rollers can be adjusted with the help of nuts provided on top frame according to the thickness of leaves. Maximum gel recovery could be obtained at roller speed 75-90 rpm.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | 2.25 kW, Single phase Electric motor |
| Weight, kg | : | 77 |
| Man power | : | 1 unskilled labour |
| Suitability for crop/ commodity | : | Aloe vera |
| Cost, Rs | : | 45,000/- |
| Output capacity, lit /day | : | 100-150 |
| Efficiency, % | : | 90 |
| Cost of operation, Rs/lit | : | 30/- |

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

**Contact:**

- Research Engineer, AICRP on PHET, College of Technology & Agril. Engineering, Maharana Pratap University of Agricultural & Technology, Udaipur– 313 001, Rajasthan, Tel: 91-294-2470119.

# Ginger Peeler

## Utility

The ginger peeling machine mechanically peeled the rhizome with minimum ginger meat loss. The peeler mainly consists of peeling unit, power transmission system and supporting frame. Ginger rhizomes roll on abrasive surface of roller brushes where peeling takes place due to abrasive action of nylon wire brushes and rhizomes. The developed ginger peeler works satisfactorily with brush wire thickness of 150 gauges at a115 rpm speed of brush rollers for peeling time 10 min.


| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | 0.75 kW, electric motor |
| Man power | : | 1 unskilled |
| Suitability for crop/ commodity | : | Ginger rhizome |
| Cost, Rs. | : | 60000/- |
| Output capacity, kg/batch | : | 5 |
| Efficiency, % | : | 92 |
| Cost of operation, Rs/t | : | 500/- |

**Design:** AICRP on PHET

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Research Engineer, AICRP on PHET, College of Technology & Agril. Engineering, Maharana Pratap University of Agricultural& Technology, Udaipur– 313 001, Rajasthan, Tel: 91-294-2470119.

# Double Blade Rotating Grate type Banana Sucker Paring Equipment

## Utility

A blade and rotating grating type banana sucker paring machine replace the traditional laborious and tedious manual operation. The equipment consists of two rotating grating blades rotating on a vertical plane, operated by an electric motor. The banana sucker to be trimmed is held against the rotating grating blade and adjusted as per the area and the depth of the banana sucker to be trimmed.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.75 kW, electric motor |
| Diameter of grating blade, mm | : | 300 |
| Speed of operation of blade | : | 2400 rpm |
| No. of grating blades | : | 2 |
| Capacity, sucker/h | : | 200-250 |
| Cost, Rs. | : | 50,000/- |
| Cost of operation, Rs/h | : | 100/- |

## Benefits over conventional/traditional practices

- Best suited for smaller size Banana sucker.
- Saving in cost:82%.
- Saving in labour: 94%.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for commercialization

## Contact:

- Head, ICAR-Central Institute of Agricultural Engineering, Regional Centre, Coimbatore-641007 ciaerccbe@gmail.com.
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Trimming Mechanism Type Banana Sucker Paring Equipment

## Utility

The equipment contains a spring-loaded holder which gives the grip on the sucker to be trimmed and it can be locked in the required position. The holder is rotated at the required speed with the help of electric motor. The trimming knife is placed at the required position so that the banana sucker placed on the rotating holder is trimmed to the desired shape to get the paired banana sucker ready for planting. An additional knife is mounted on the working platform, which can be used to cut the bottom roots before placing it on the holder for trimming.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.75 kW , electric motor |
| No. of trimming knife | : | 1 |
| No. of root cutting knife | : | 1 |
| Capacity, sucker/h | : | 120-150 |
| Cost, Rs. | : | 80,000/- |
| Cost of operation, Rs/h | : | 120/- |

## Benefits over conventional/traditional practices

- Best suited for bigger diameter banana suckers.
- Saving in cost:75%.
- Saving in labour: 90%.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for Commercialization

## Contact:

- Head, ICAR-Central Institute of Agricultural Engineering, Regional Centre, Coimbatore-641007 ciaerccbe@gmail.com.
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Multiplier Onion Peeler

## Utility

The equipment will aid in peeling of multiplier onion, which is suitable for catering and pickle industries. It runs with a single phase electric motor and consists of an aluminum drum seated over a rotating disc. Inner surface of the aluminum drum and top surface of the disc are covered with corrugated rubber sheet which aids in peeling process.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.75 kW, single phase electric motor |
| Cost, Rs. | : | 20,000/- |
| Labour requirement, man-h/t | : | 20-30 |
| Output capacity, kg/h | : | 50-60 |
| Peeling Efficiency, % | : | 92 |
| Damage Percentage,% | : | 2 |
| Cost of operation, Rs/t | : | 1200/- |

## Benefits over conventional/traditional practices

- Easy and hygienic peeling of multiplier onion.
- Reduced drudgery.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for Commercialization

## Contact:

- Head, ICAR-Central Institute of Agricultural Engineering, Regional Centre, Coimbatore-641007 ciaerccbe@gmail.com.
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Raw Mango Slicer

## Utility

The mango slicer slices the mango longitudinally. The mangoes are cut into 4, 6 or 8 slices based on the size. The width of the slice is 20 mm, the thickness of the slice is as per the thickness of pulp and the length of the slices is as per the length of the mango. The mangoes are cut by the blades made out of AISI 420 grade hardened stainless steel (cutlery grade). The feeding of mangoes to the cutting blades is under gravity and a chute is provided. The feeding of mangoes to the cutting blades is under gravity and a particular orientation to facilitate cutting of mangoes into desired sized slices. The cut slices fall on nylon mesh and the cut pieces of kernel are separated from flush.

| Specifications and Performance results | | |
|---|---|---|
| Power source | : | 4.5 kW, electric motor |
| Weight, kg | : | 200 |
| Cost of machine, Rs. | : | 3,00,000/- |
| Capacity, t/h | : | 1 |

## Benefits over conventional/traditional practices

- Saving of time (60%), labour and cost over traditional practice.

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

## Contact:

- M/s Omega Metallic, Bengaluru – 560 058, Mobile: +918123415828, E-mail:omegametalic@gmail.com
- M/s Best Engineering Technologies, Mr. M. Sesha Sai, Hyderabad, Andhra Pradesh - 500 037, India, Mobile: +(91)-9391057812,Phone : +(91)-(40)-65908498/23070231/ 23077478, Email: bestengineering@gmail.com
- M/s Dolar Engg. Industries Pvt. Bangalore - 560 058, Tel : +91 - 80 - 28393000 / 28395000 Fax : +91 - 80 -28395006 ; Cell : 9845037555; Email : sales@dolargroup.com
- M/s Dharma Technologies, Karnataka, Ph: 0816-2292159, +919886737260, Email: info@dharmaagrotech.com

# Power Operated Onion Detopper

## Utility

Useful to mechanical de-toping of the leaves of the harvested onion crop with completely removal of human drudgery. The machine has specially designed twisted roller with sharp edges and plain roller to cut the leaves of the harvested onion.

| Specifications and Performance results | | |
|---|---|---|
| Power source | : | 1.15 kW geared motor (3 Nos.); 4 kW, 440 V electrical geared motor |
| Weight, kg | : | 250 |
| Cost of machine, Rs. | : | 6,00,000/- |
| Capacity, kg/h | : | 1500 |

## Benefits over conventional/traditional practices

- Saving of time (30%), labour and cost over traditional practice.

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

## Contact:

- M/s Concorde Engineering Works, Bangalore – 560 015, Mobile +919886781667, E-mail: sivakumar1671@gmail.com
- M/s V AGRO Tech, B112, 11th Main, 3rd Right, 4th Left Cross, Peenya 3rd Stage, Bengaluru – 560 058

# Raw Jackfruit Peeler

## Utility

Raw jackfruit peeler was used to peel the skin of the jackfruit which is used for vegetable purpose.


| Specifications and Performance results | | |
|---|---|---|
| Power source | : | 0.37 kW, electric motor |
| Weight, kg | : | 30 |
| Suitability | : | Raw tender jack fruit |
| Cost of machine, Rs. | : | 30,000 |
| Capacity, jackfruit/h | : | 20 |

## Benefits over conventional/traditional practices

- Saving of time (60%), labour and cost over traditional practice.

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

## Contact:

- M./s Sheet Profile Company, , Odisha – 760 003, Mobile: 9437576145; E-mail-sheetprofile.office@gmail.com
- M/s Datumone Applied Technologies LLP, Shyamprasanna, 3rd Floor, 39th Main, Poornapragna layout, Uttarahali, Bangalore – 61
- M/s S. R. Machineries Pvt. Ltd., Bhubaneshwar, Odisha-751 024, Mobile: 94370 06157; E-mail – srmachineries@gmail.com
- M/s Sri Jyoti Agro Tech, 1021, Bhubaneshwar, Odisha, 751 019, Mobile: 9437043422; E-mail – srijyotiagrotech@gmail.com

# DEHULLING, MILLING AND DECORTICATION EQUIPMENT

# Manual Water Chestnut Decorticator

## Utility

Traditionally, the water chestnut decortication is done manually by the growers which is slow, laborious and tiring one. Hand operated water chestnut decorticator consists of a hopper and an oscillating shoe. The decortication of water chestnuts involves cracking and rubbing under pressure in between screen and the shoe. The screen is stationary whereas the shoe rotates. While rotating the shoe, the water chestnuts get cracked due to the frictional and rubbing action between the oscillating sector and the perforated concave sieve. Decorticated kernels along with husk pass through the screen and falls at the bottom of the unit.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Manual |
| Weight, kg | : | 26 |
| Man power | : | 02 |
| Suitability for crop/ commodity | : | Water chest Nuts |
| Cost, Rs | : | 2500 |
| Output capacity, kg/h | : | 60 |
| Efficiency, % | : | 99 |
| Cost of operation, Rs/h | : | 40.00 |

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

**Contact:**

- Research Engineer, AICRP on PHET College of Agricultural Engineering, Jawaharlal Nehru Krishi Viswa Vidyalaya, Jabalpur - 482 004 (Madhya Pradesh), Ph: (0761) 2681074(O), E-mail : drsjnkvv@gmail.com

# Manual Octagonal Tubular Maize Sheller

## Utility

It is a hand operated tool to shell maize from dehusked cobs. The unit consists of galvanized mild steel pipe with four tapered fins riveted to its inner periphery. The sheller is held in left hand, a cob held in right hand is inserted into it with forward and backward twist to achieve the shelling.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | Manual |
| Weight, kg | : | 0.2 |
| Length, mm | : | 75 |
| Diameter, mm | : | 72-65 (Tapered) |
| Capacity, kg/h. | : | 18-22 |

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Manual Soybean Dehuller

## Utility

It is a manually operated equipment to get soya splits (dhal) free from hull and broken. It consists of two concentric cylinder, driving mechanism, blower fan to remove the hull and perforated screen to remove brokens, frame and hopper. The dehulling takes place in between rotating and stationary cylinder due to the abrasion, friction and shear.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 1.5 kW, three phase electric motor |
| Weight, kg | : | 35 |
| Cost of equipment, Rs. | : | 15000/- |
| Labour requirement, man-h/t | : | 30 |
| Output capacity, kg/h | : | 100 |
| Cost of operation, Rs/t | : | 330/- |

## Benefits over conventional/traditional practices

- Capacity enhancement over manual operation.
- Reduces drudgery.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Fine fabrication works Govindpura, Bhopal, Phone: 0755 425 1574
- M/s Manak Industries, Govindpura, Bhopal, Mr. M.L. Vishwakarma, Email: manakindustriesbhopal@gmail.com, Contact: No.: 91-755-2581683, 9993035566, 9425687798 8989821564
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Millet Mill (Model-I)

## Utility

Efficient in dehulling of small millets viz., foxtail millet, little millet, kodo millet, proso millet, barnyard millet in a single machine. This machine has the advantage to produce high-quality grains (with/without bran). It provides a simple, economical, and efficient method/machine for dehusking all minor millets. It can be installed as an enterprise in the millet production catchment areas under rainfed conditions and in tribal areas.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.75 kW, single phase electric motor |
| Weight, kg | : | 112 (excluding motor) |
| Mode of operation | : | Continuous type |
| Working principle | : | Gentle abrasion/attrition & (aerodynamic) cyclone separator |
| Capacity, kg/h | : | 100-110 |
| Dehulling efficiency, % | : | > 70 |
| Feed moisture % wb | : | 10-12 |

## Benefits over conventional/traditional practices

- Single machine suitable for all millets.
- Higher dehulling Efficiency.
- Delivers high-quality kernels.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s AVM Engineering Industries, Meyyanur, Salem-636004, Tamil Nadu, Rajasekaran K. G., Contact: No. – 0427-2442335, , 9443633131, E mail: avmengineering.ind@gmail.com
- M/s Valampuri Industries, Coimbatore-641014, Contact: No. – 0422-2447566, 09994941243
- M/s Perfura Technologies (India) Private Limited, Coimbatore-641006, Contact: No. – 09894800009
- KPMC Technology Limited, Indore, Madhya Pradesh 452010
- Head, ICAR-Central Institute of Agricultural Engineering, Regional Centre, Coimbatore-641007, Email: ciaerccbe@gmail.com
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Millet Mill (Model-II)

## Utility

CIAE Millet mill model-I is redesigned ergonomically. Comfortable height based on ergonomic data to suit the height of pan-Indian rural women. Efficient in dehulling of all small millets like foxtail millet, little millet, kodo millet, proso millet, barnyard millet in a single machine. Sweeping wings to clear the dehulled mass in dehulling chamber towards the outlet chute. Flow deflector for better disposal of dehulled mass from the dehulling chamber by deflecting them towards outlet chute. Acrylic window to allow visual access into dehulling chamber.

| Specifications & Performance results | | |
|---|---|---|
| Power requirement, kW | : | 0.75 kW, single phase motor |
| Weight, kg | : | 150 (excluding motor) |
| Mode of operation | : | Continuous type |
| Working principle | : | Gentle abrasion/attrition & (aerodynamic) cyclone separator |
| Capacity, kg/h | : | 100 |
| Dehulling efficiency, % | : | >90 |
| Feed moisture, % wb | : | 10-12 |

## Benefits over conventional/traditional practices

- Dehulling efficiency is more than 90%.
- Single machine suitable for all millets.
- Delivers high-quality kernels.
- Fully covered body to avoid direct Contact of workers with moving objects.
- Sturdy and compact.
- Ease of cleaning in dehulling chamber between different millet dehulling processes.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- Head, ICAR-Central Institute of Agricultural Engineering, Regional Centre, Coimbatore-641007 Email: ciaerccbe@gmail.com
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# PKV Mini Dal Mill

## Utility

The PKV Mini dal mill is developed and further refined for its multipurpose use (cleaning, grading of grains and polishing of split dal). It operates using electric motor. Almost all pulses can be dehulled with this machine and the products are quite comparable with that of commercial dal mills. The processing capacity of this dal mill is 100-125 kg/h for pigeon pea and 125-150 kg/h for green and black gram. This machine avoids dusty atmosphere and provides easy operation.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 1.5 kW electric motor |
| Weight, kg | : | 170 |
| Man power | : | 1 skilled and 1 unskilled |
| Cost, Rs. | : | 55,000/- |
| Suitability for crop/ commodity | : | Pigeon pea, green gram and black gram |
| Output capacity, kg/h | : | 125 |
| Efficiency, % | : | 72-75% recovery of dal (Pigeon pea)<br>82-85% recovery of dal (green gram, black gram, Bengal gram) |
| Cost of operation, Rs/t | : | 1000-1200 |

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

**Contact:**

- Research Engineer, AICRP on PHT College of Agricultural Engineering Dr. Punjab rao Deshmukh Krishi Vidyapeeth, Krishi Nagar, AKOLA - 444 104 (Maharashtra), Email: info@pdkvu.in
- M/s Shriram Associates, J/27, phase 3, MIDC, Akola (MS) (M) 09823090002 (O) 0724-2258325
- M/s YMB Agri Machineries, W/37-38, Phase 3 MIDC Akola (MS) (M) 09850303202 (O) 0724-2258184

# CIAE Mini Dal Mill

## Utility

It is an electric motor operated equipment for dehusking and splitting of pigeon pea, black gram, green gram and lentil. The machine operated in integration with standerdized pre-tretment process protocol and grain cleaner cum grader. The machine consists of carborundum rollers, feed hopper, concave and dal outlet. Whole pulse to be milled is first soaked in water (preconditioning), sun dried and later on fed into the mill to achieve complete milling in two passes.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 1.5 kW, three phase electric motor |
| Weight, kg | : | 90 |
| Cost of equipment, Rs. | : | 19000/- without motor |
| Labour requirement, man-h/t | : | 10 |
| Output capacity, kg/h | : | 100 |
| Dal recovery, % | : | 72 |
| Broken grain, % | : | 3-5 |
| Cost of operation, Rs/t | : | 170/- |

## Benefits over conventional/traditional practices

- Increase in dal yield and improvement in dal quality.
- Reduction in drudgery.
- Increase in capacity.
- Potential rural employment generation.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Fine fabrication works Govindpura, Bhopal
- M/s Manak Industries, Govindpura, Bhopal,
  Email: manakindustriesbhopal@gmail.com, Contact: No.: 91-755-2581683, 9993035566, 9425687798 8989821564
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Dehuller for Barnyard Millet

## Utility

It is an electric motor driven barnyard millet dehuller. The special feature of this machine is application of canvas strip as an abrasive material on impeller and replaceable sieve arrangement in bottom of the dehulling chamber.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | 0.75 kW, electric motor |
| Weight, kg | : | 168 |
| Suitability for crop | : | Barnyard millet |
| Cost , Rs | : | 45, 000/- |
| Output capacity, kg/h | : | 45 - 50 |
| Efficiency, % | : | 98 (in 4-5 passes) |
| Cost of operation, Rs/kg | : | 2/- |

**Design:** AICRP on PHET

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Research Engineer, AICRP on PHET Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora – 263 601 (Uttaranchal), Ph. No. : +91-5962-241022, 18001802311, Email: director.vpkas@gov.in, vpkas.nic.in.

# Pearler for Minor Millets

## Utility

An abrasive type conical shaped pearler has been developed. A tapered stone roller is used a pearling device. A concave is fitted over the abrasive roller, an aspirator and a cyclone to separate the dust from the milled grains. The milling unit and aspirator is operated by electric motor. The minor millets dried at 12% of MC and pearled at 1200 rpm were found to be optimum.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | 2.24 kW, Electrical motor |
| Man power | : | 1 |
| Suitability for crop | : | Minor millets- Foxtail millet, little millet, common millet |
| Cost, Rs | : | 50,000/- |
| Output capacity, kg/h | : | 40 |
| Efficiency % | : | 70 |
| Cost of operation, Rs/kg | : | 4.5 /- |

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

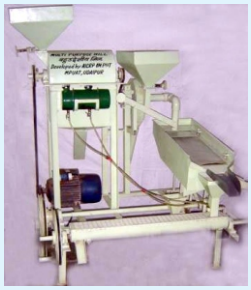
**Contact:**

- M/s. SSM Machinery and Fabrication, 43, NBC Nagar, G.N Mill (post), Coimbatore -641 029
- M/s. Universal Agro Industries, S.F.No.374/5, Near Bimetal Bearings, Maruthamalai Road, PN Pudur, Cimbatore - 641 041
- M/s. Valampuri Industries, New Thillai Nagar, Behind Bimetal Bearings, PN Pudur, Coimbatore – 641 041, Contact: No. – 0422-2447566, 09994941243.
- M/s. AG Industries, 1/460, Balaji Complex, Thoppampati Pirivu, Mettupalayam Road, Coimbatore - 641 031
- Research Engineer, AICRP on PHET and Head, Agricultural Machinery Research Centre, Tamil Nadu Agricultural University, Ph. No.: 91-422-2457576, E-mail: zrc@tnau.ac.in.

# Multi Grain Mill

## Utility

A multi grain mill has been developed for multiple uses viz. dhal milling, grain pearling/ polishing and dawning of coriander. The machine consists of an abrasive tapered roller, an aspirator, separation sieve box, mixer/conveyor, oil/water tank and a motor. The unit can be utilized for grading of grains and imparting oil/water pretreatment.



| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | 1.5 kW, single phase electric motor |
| Weight , kg | : | 220 |
| Man power | : | 01 |
| Suitability for crop | : | Pigeon pea milling, wheat and maize pearling and coriander deawning / debearding |
| Cost, Rs. | : | 50,000/- |
| Output capacity, kg/h | : | 75 |
| Efficiency | : | Pigeon pea milling : 76%,<br>maize pearling : 91-93%,<br>wheat pearling :93-96%,<br>coriander deawning : 82% |
| Cost of operation, Rs/t | : | 1000/-for dhal milling and 70/- for deawning and pearling/polishing |

**Design:** AICRP on PHET

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Research Engineer, AICRP on PHET College of Technology & Agril. Engineering, Maharana Pratap University of Agricultural & Technology, Udaipur– 313 001 (Rajasthan), Tel: 91-294-2470119.

# Chili Seed Extractor

## Utility

Traditionally, the chili seed is extracted by filling in bags and beating with wooden sticks. The method is tedious and inhalations of fine particles result in continuous sneezing and irritation of labor's body. Due to this, it is difficult to get the labor for this operation. This method has low output and efficiency. To avoid this drudgery, a chili seed extractor was developed with 100-125 kg/h capacity operated by electric motor. The recovery of seed from chili fruits is highest at 9-10% m.c. (wb) with no deterioration on seed germination. It being a closed system minimizes the sneezing and body irritation.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 1.5 kW single phase electric motor |
| Weight, kg | : | 413 |
| Man power | : | 1 skilled and 1 unskilled |
| Suitability for crop/ commodity | : | Dried chilli pod (9-10% mc) |
| Unit cost, Rs | : | 43,000/- (including prime mover) |
| Output capacity, kg/h | : | 100-125 |
| Efficiency | : | 94-99% seeds from chilli fruits (at 9-10%m.c (wb)) |
| Cost of operation, Rs/t | : | 640/- |

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

**Contact:**

- M/s YMB Agri Machineries, W/37-38, Phase 3 MIDC Akola (MS) (M) 09850303202 (O) 0724-2258184
- Research Engineer, AICRP on PHET College of Agricultural Engineering Dr. Punjabrao Deshmukh Krishi Vidyapeeth, Krishi Nagar, Akola - 444 104 (Maharashtra), Email: info@pdkvu.in

# White Pepper Outer Pericarp Removing Machine

## Utility

The machine removes outer pericarp from steeped fresh mature pepper berries (also from black pepper) to get white pepper kernels. It consists of a rotor shaft attached with 4 nylon brushes that rub the steeped pepper berries against the perforated metallic concave cylinder. During the operation continuous water supply is provided to the pulping chamber so that the loosened pulp (pericarp) is washed away by water through the sieve and the natural white pepper kernels are collected at the far end. The product should be further dried to the storable moisture content.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | 0.375 kW, electric motor |
| Weight, kg | : | 45 |
| Man power | : | 01 skilled and 01 unskilled person |
| Cost, Rs. | : | 25,000/- (without motor) |
| Output capacity , kg/h | : | 125-150 |
| Suitability for crops/commodity | : | White pepper |

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

**Contact:**

- M/s Dollar Engineering Industries Pvt. Ltd. #3, Adjacent to BIS, Tumkur Road, 1st Stage, Peenya, Bangalore - 560 058, India.
- Research Engineer, AICRP on PHET, University of Agricultural Sciences, J- Block, GKVK Campus, Bangalore - 560 065 (Karnataka), Ph. No, :+91-80-2333 0153 / 2333 0984.

# Pea Shelling Machine

## Utility


Manual removal of kernels form green pea pods take a lot of time and it is laborious and tiring job. The Power operated pea sheller consists of feeding hopper, roller, concave, frame and electric motor. The pods are fed through the hopper for shelling operation. The feed rate is controlled by the delivery leaver. The pea pods get shelled due to friction between the roller, whose surface is abrasive made of punched sheet and concave and also due to impact developed during the rotation of roller. After completion of peeling operation, the different fractions of the shelled material like whole kernels, damaged kernels and unshelled pods are collected at different outlets.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.18 kW, Electric Motor |
| Weight, kg | : | 105 |
| Man power | : | 01 |
| Suitability for crop/ commodity | : | Green Peas |
| Cost, Rs | : | 15000/- |
| Output capacity, kg/h | : | 60 |
| Efficiency, % | : | 98 |
| Cost of operation, Rs/h | : | 40/- |

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

**Contact:**

- College of Agricultural Engineering, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur- 482 004 (Madhya Pradesh), Ph: (0761) 2681074(O), E-mail : drsjnkvv@gmail.com.

# Walnut Dehuller

## Utility


Green Walnuts after harvesting are heaped under the tree for 10-15 days to get the hulls loosen and then manually dehulled by either rubbing the green walnuts with one other or by beating them by wooden logs. The juglone dye (5-hydroxy-1, 4-naphthalenedione) present in the hull gets permanently stained on the hands of workers, which takes not less than two months to go off. To overcome these problems a walnut dehuller is suitable. The pre – chemical treatment for hull dehiscence is also standardized. The walnut dehuller was found to be most effective when green walnuts were sprayed with ethephon (0.3%) as a pretreatment for hull dehiscence and were subjected to dehulling 4 days after spraying.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.75 kW, electric motor |
| Weight, kg | : | 65 |
| Man power | : | 01 |
| Suitability for crop/ commodity | : | Suitable for dehulling of green walnuts |
| Cost, Rs | : | 45,000/- |
| Output capacity, kg/h | : | 250 |
| Efficiency, % | : | 96 |
| Cost of operation, Rs/t | : | 105/- |

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

**Contact:**

- Mr. Sanaullah Fruit Company, Khaag, Budgam.
- PI, AICRP on PHET Sher-e-Kashmir University of Agri. Sciences and Technology, Shalimar Campus, Srinagar – 191 121 (J&K), Ph. No.: + 0194-2461258, Email: provc@skuastkashmir.ac.in.
- PI, RKVY sponsored project, SKUAST (K), Email: amcsskuastj@gmail.com

# Garlic Bulb Breaker

## Utility

Bulb breaking i.e. separation of individual cloves from garlic bulbs is the first and foremost unit operation in processing of garlic. The individual cloves of garlic are also used as seed material. The machine consists of a hollow cylinder with cushioned battens, a concave, an aspirator and a prime mover. The cloves are separated because of the beating action of battens and friction between bulb and concave. Aspirator separates the light paper skin, root and middle stem of bulb. Clean cloves are collected along the chute below the concave.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.75 kW, Single phase electric motor |
| Weight, kg | : | 85 |
| Man power | : | 01 unskilled labour |
| Suitability for crop/ commodity | : | Garlic |
| Cost, Rs | : | 18,000/- (without motor) |
| Output capacity, kg/h | : | 800 kg bulb/h |
| Clove separation Efficiency, % | : | 94-95 |
| Cost of operation, Rs/t | : | 250/- |

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

**Contact:**

- M/s Kalpana Entreprises N.B. Complex, Pratap nagar,Udaipur-313001
- Research Engineer, AICRP on PHET College of Technology & Agril. Engineering, Maharana Pratap University of Agricultural & Technology, Udaipur– 313 001 (Rajasthan), Tel: 91-294-2470119, 2980604 (R)

# Quinoa Pearler

## Utility

For the removal of saponin in which is mainly concentrated in the outer husk of the grain, this Pearler is useful. Quinoa Pearler is a power operated continuous feed machine. It consists of dehulling chamber and husk aspirator. Dehulling chamber houses the main shaft, half of that is overlaid with pegs longitudinally in four rows to give impact force/ pounding action on the quinoa grains and the rest is coated with emery to provide polishing effect. It is powered by electric motor and the main shaft of the unit as well as the husk aspirator rotates at the speed of 1000 rpm.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 1.5 kW, electric motor |
| Dehulling efficiency, % | : | 87 at 14% moisture content |
| Capacity, kg/h | : | 35 |

## Benefits over conventional/traditional practices

- Effectively removes husk from quinoa.
- It provides a simple, economical and efficient mechanical method for dehulling quinoa.
- It reduces saponin in content (bitter tasting component) from 40mg/100g to 28mg/100g which is organoleptically acceptable.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- Head, ICAR-Central Institute of Agricultural Engineering, Regional Centre, Coimbatore-641007 ciaerccbe@gmail.com.
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Vivek Thresher-cum-Pearler

## Utility

This lightweight millet thresher is suitable for multipurpose uses, i.e., threshing, pearling, dehusking/ dehulling and polishing. It works on the principle of impact and shear on the grain.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.75 kW electric motor |
| Weight, kg | : | 45 |
| Man power | : | 01 |
| Cost, Rs. | : | 25,500/- |
| Suitability for crop | : | Millets |
| Threshing capacity, kg/h | : | 30-35 |
| Pearling capacity (Finger millet),kg/h | : | 45 |
| Dehulling capacity (*Barnyard millet)*,kg/h | : | 4.0 – 5.0 |
| Threshing/dehulling efficiency, % | : | More than 96 |
| Cost of operation, Rs/kg | | |
| *Pearling cost* | : | 0.10 |
| *Dehulling cost* | : | 6.0 |
| *Threshing cost* | : | 0.20 |

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

**Contact:**

- Research Engineer, AICRP on PHT Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora – 263 601 (Uttaranchal), Ph. No. : +91-5962-241022, 18001802311, Email: director.vpkas@gov.in, vpkas.nic.in.
- Punjab Agricultural Implements Pvt Ltd., Railway Road, Saharanpur, UP – 247001

# Motorized Soybean Dehuller

## Utility

It is an electric motor driven equipment to get soya splits (dhal)through inbuilt four operations i.e. splitting, dehulling, winnowing and separation. It consists of two concentric cylinder, belts and pulleys, power transmission system, blower, hopper, main frame and perforated screen. Clearance between outer and inner cylinder can be adjusted with end screw.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.75 kW, single phase electric motor |
| Weight, kg | : | 80 |
| Cost of equipment, Rs. | : | 19000/- |
| Labour requirement, man-h/t | : | 13 |
| Output capacity, kg/h | : | 100 |
| Cost of operation, Rs/t | : | 200/- |

## Benefits over conventional/traditional practices

- Capacity enhancement over manual operation.
- Reduces drudgery.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s. Fine fabrication works Govindpura, Bhopal, Phone: 0755 425 1574
- M/s. Manak Industries, Govindpura, Bhopal, Mr. M.L. Vishwakarma, Email: manakindustriesbhopal@gmail.com, Contact: No.: 91-755-2581683, 9993035566, 9425687798 8989821564
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Onion Seed Extractor

## Utility

The onion seed extractor consisted of onion seed extraction unit and onion seed cleaning unit. The onion seed extraction unit consisted of feed tray, seed extraction drum, siever to remove unextracted flower and chaffy material. The onion seed cleaning unit consisted of screens for the separation of seeds and husk, blower and collection chutes. A power transmission to operate both the units. All these units were supported on a movable main frame.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.75 kW, electric motor |
| Weight, kg | : | 80 |
| Extraction efficiency, % | : | 98 |
| Cost of machine, Rs. | : | 2,50,000/- |
| Capacity, kg/h | : | 30 |
| Efficiency, % | : | 90 |
| Cost of operation, Rs/kg | : | 4.16 |

## Benefits over conventional/traditional practices

- Saving of time (60%), labour and cost over traditional practice.

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

## Contact:

- M/s Team Flame Engg& Solutions, Bangalore – 560 091 Mobile: +919844277339; E-mail: teamflame37@gmail.com

# Watermelon Seed Extractor

## Utility

Water melon seed extractor is used to separate the seeds from the fruit. It consists of circular cutting knife which makes fruit into two halves. The cut fruit was fed to the serrated nylon rotor to remove the pulp with seed. Sieve is placed at the bottom to separate the pulp and the seed.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.75 kW, electric motor |
| Weight, kg | : | 80 |
| Specification | : | Circular cutting roller, nylon serrated rotating unit, sieves for separation |
| Cost of machine, Rs. | : | 1,00,000 |
| Capacity, fruits/h | : | 200 |

## Benefits over conventional/traditional practices

- Saves (60%) time and labour source in comparison with traditional practice.

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

## Contact:

- M/s Omega Metallic, Bengaluru – 560 058; Mobile: +918123415828, E-mail: omegametalic@gmail.com

# Garlic Bulb Breaker

## Utility

Garlic bulb breaker consists of rotating disc and nylon tubes. The garlic is placed into a rotating drum operated by electric motor, when garlic hits the nylon tubes the cloves gets separated from the garlic. These cloves are used for further processing operation.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.75 kW, electric motor |
| Weight, kg | : | 40 |
| Specification | : | Rotating drum, nylon tubes, garlic |
| Cost of machine, Rs. | : | 1,00,000 |
| Capacity, kg/h | : | 50 |

## Benefits over conventional/traditional practices

- It helps in 60% saving in time and labour.

**Design:** AICRP on PHET

**Commercialization Status:** Ready for commercialization

## Contact:

- M/s Kalpana Entreprises N.B. Complex, Pratap nagar,Udaipur-313001
- Research Engineer, AICRP on PHET College of Technology & Argil. Engineering, Maharana Pratap University of Agricultural & Technology, Udaipur– 313 001 (Rajasthan), Tel: 91-294-2470119, 2980604(R)

# TREATMENT BASED PROCESSING EQUIPMENT

# Manual Paneer Pressing Device

## Utility

It is a screw type manually operated equipment to produce pressed cubical paneer out of coagulated soymilk slurry. The device virtually does three operations i.e. filter soymilk from slurry, press the paneer and cut into cubical form. It consists of a frame, square box and screw operated pressing plate

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Manual |
| Weight, kg | : | 45 |
| Cost of equipment, Rs. | : | 4000/- |
| Labour requirement, man-h/t | : | 60 |
| Output capacity, kg/h | : | 8-10 |
| Cost of operation, Rs/t | : | 600/- |

## Benefits over conventional/traditional practices

- Capacity enhancement over operation without machine.
- Reduces drudgery.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s. Fine fabrication works Govindpura, Bhopal, Phone: 0755 425 1574
- M/s. Manak Industries, Govindpura, Bhopal, Email: manakindustriesbhopal@gmail.com, Contact: No.: 91-755-2581683, 9993035566, 9425687798 8989821564
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com

# Mini Paddy Parboiling Unit

## Utility


It is a small size parboiling unit to produce quality parboiled rice by employing improved process. The unit is cylindrical in shape and is made of 20-gauge mild steel sheet. It comprises two chambers separated by a perforated partition at a lower level to enable both soaking and steaming in the same unit. The process involves soaking of paddy at 75ºC for 3.5 h followed by open steaming for 30-45 minutes. The process ensures uniform parboiling, without any bad smell and produces light coloured rice with better consumer preference. It takes 5-6 hours to parboil 75 kg of paddy in one batch.

| Specifications & Performance results | | |
|---|---|---|
| Diameter, mm | : | 570 |
| Height, mm | : | 895 |
| Weight, kg | : | 37 |
| Cost, Rs. | : | 5500/- |
| Capacity, kg/batch | : | 75 |
| Cost of operation, Rs/t | : | 300/- |

## Benefits over conventional/traditional practices

- The total rice recovery is around 74% with hardly any broken, light in colour and absolutely no bad smell.
- It reduces drudgery to farmers in parboiling operation and helps in producing quality parboiled rice.
- Lower cost of operation.

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

## Contact:

- The Director, ICAR-National Rice Research Institute, Cuttack, Odisha-753006, Phone: +91-671-2367757/67, Email:director.nrri@icar.gov.in, crrictc@nic.in

# Soybean Flaking Machine

## Utility


It is an electric motor operated equipment to press and stretch processed grain into thin elongated flakes of soybean, sorghum, corn and bengal gram. It consists of three mild steel roller (knurled and chromium plated surface), main frame, hopper, stand, collecting tray and drive mechanism. Blanched soya dhal at 25-30% moisture content is flaked between set of rollers and later on stored at 7-8% moisture contents.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.75 kW, single phase electric motor |
| Weight, kg | : | 80 |
| Cost of equipment, Rs. | : | 20000/- |
| Labour requirement, man-h/t | : | 50 |
| Output capacity, kg/h | : | 20 |
| Cost of operation, Rs/t | : | 750/- |

## Benefits over conventional/traditional practices

- Capacity enhancement over manual operation.
- Reduces drudgery.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Fine fabrication works Govindpura, Bhopal, Phone: 0755 425 1574
- M/s Manak Industries, Govindpura, Bhopal, Email: manakindustriesbhopal@gmail.com, Contact: No.: 91-755-2581683, 9993035566, 9425687798 8989821564
- Director, ICAR-CIAE, NabiBagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Grain Boiler

## Utility

It mainly consists of grain drum, agitators, water heating chamber and grain removing outlet. The cylindrical shaped tiltable stainless steel drum having a lid is fitted with 3 nos. of electric heating coils. An agitator is provided at the centre of the grain drum to get the uniform boiling of grain. A drainage valve is provided at the bottom of the drum to drain out the water after boiling. The entire boiled grain is dispensed from the drum through the curve shaped outlet to a tub by tilting the drum. It saves about 60% power and time in comparison to the grains boiled on the open pan type electric heaters.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 9 kW, electric heaters |
| Weight, kg | : | 70 |
| Cost of machine, Rs. | : | 1,50,000 |
| Capacity, kg/h | : | 100 |

## Benefits over conventional/traditional practices

- Saving of time (60%), labour and cost over traditional practice.

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

## Contact:

- M/s Scientek Services, Karnataka 560092, 9845606575, Phone: 080 2362 4434, Email: sales@scientek.in.
- M/s Dharma Technologies, Karnataka Ph: 0816-2292159, +919886737260, Email: info@dharmaagrotech.com
- M/s Pradeep Industries, Bengaluru – 91, Mobile: 080-28535997; E-mail- Pradeepindstries.9@gmail.com
- M/s Team Flame Engg& Solutions, Maruthinagar, Bangalore – 560 091, Mobile: +919844277339; E-mail: teamflame37@gmail.com

# Millet Flaking Machine

## Utility

A compact machine operated by single phase electric motor to make millet flakes by pressing conditioned millets between two textured stainless steel rollers. The adjustable gap between rollers makes it suitable for use with different sizes of millets/cereals and other food/feed materials into variable thickness flakes. The bolted acrylic inspection window helps to monitor the operation and cleaning the machine. All the machine parts, coming in Contact: with food materials are made up with food grade 304-stainless steel material for safe food production. The machine capacity is 100 kg/h.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 1.5 kW, Single phase electric motor |
| Man power | : | 01 |
| Capacity, kg/h | : | 100 |

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- Sri Balaji Industries, Coimbatore, Tamil Nadu, Mr. K. Senthil Kanna, Contact: No:9943023249, Email: sbicbe@gmail.com.
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Soybean Blanching Unit

## Utility

It is a batch type equipment to impart wet heat treatment to soya dhal (soya split) to eliminate anti-nutritional elements. It consists of burning cylinder, outer cylinder, asbestos rope insulation, stainless steel perforated cages, grate, stand and gate valve. A batch of 20 kg soy dhal in four perforated cages is placed in annular space and exposed to boiling water for 30 min.


| Specifications & Performance results | | |
|---|---|---|
| Power source | : | LPG |
| Weight, kg | : | 35 |
| Cost of equipment, Rs. | : | 18000/- |
| Labour requirement, man-h/t | : | 50 |
| Output capacity,kg/h | : | 100 |
| Cost of operation, Rs/t | : | 550/- |

## Benefits over conventional/traditional practices

- Capacity enhancement over manual operation.
- Reduces drudgery.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s. Fine fabrication works Govindpura, Bhopal, Phone: 0755 425 1574
- M/s. Manak Industries, Govindpura, Bhopal, Email: manakindustriesbhopal@gmail.com, Contact: No.: 91-755-2581683, 9993035566, 9425687798, 8989821564
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# RIPENING AND STORAGE SYSTEM

# Household Insect Trap

## Utility

The stored grain insects, like red flour beetle, saw toothed beetle, rice weevil, paddy moth, turmeric beetle, drug beetle, pulse beetle, groundnut bruchid, dermestid beetles, flat grain beetles, etc with the behavior of wandering in the bulk grain, reach the insect trap. These insects enter the trap through the perforations and reach the stem of the trap. In the stem, as the insects cannot move upward and escape, they move towards the bottom and reach the pit fall placed at the bottom.

| Specifications & Performance results | | |
|---|---|---|
| Output capacity, kg | : | Suitable for storage bin holding up to 25-50 kg grains |
| Unit cost (per machine), Rs. | : | 75/- |
| Suitability for crops/commodity | : | Cereals, pulses and Oil seeds |
| Efficiency, % | : | More than 85 |

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

**Contact:**

- Professor and Head, Agricultural Machinery Research Centre, Tamil Nadu Agricultural University, Coimbatore - 641 003. Phone: 0422-6611272; FAX: 0422-6611455; e-mail: processing@tnau.ac.in
- M/s. K.S.N.M Marketing, Hallmark Arpee Centre, 320 N, NSR Road, Saibaba Colony, Coimbatore - 641 011

# RCC Ring Bin

## Utility


It is a permanent indoor structure for storage of grain. Pre cast RCC rings (5 Nos.) of 900 mm diameter and 300 mm height are used for construction of this bin. An opening is provided with a removable cover plate either made of RCC or G.I. sheet. The inner wall of the bin is plastered with a mixture of mud and cow dung. The outside of the bin is plastered with cement-sand (1:6) mortar. A polythene sheet may be spread on the floor of the bin and then covered with mud and cow dung. The outer wall of the bin is given two times cement wash and then distempered. The bin is safe for storage of paddy at 12-13% MC for a period of 6-8 months for consumption and seed purpose.

| Specifications & Performance results | | |
|---|---|---|
| Capacity, t | : | 0.5 |
| Base height, mm | : | 420 |
| Height of Bin, mm | : | 1500 |
| Inner Diameter, mm | : | 900 |
| Wall thickness, mm | : | 100 |
| Cost, Rs. | : | 2500/- |
| Performance | : | Insect infestation was within safe limit of less than 5% and germination at 90% level during six months of storage period. |

## Benefits over conventional/traditional practices

- It is a low cost concrete bin, durable and rat proof.
- It can be made gas tight if necessary for fumigation.
- It requires less space for construction. Local artisan can easily erect it.
- Grain can be easily loaded and removed.
- It maintains the quality and quantity of stored product.

**Design:** ICAR-NRRI, Cuttack

**Commercialization Status:** Commercialized

**Contact:**

- The Director, ICAR-National Rice Research Institute, Cuttack, Odisha-753006, Phone: +91-671-2367757/67, Email:director.nrri@icar.gov.in, crrictc@nic.in

# Ripening Chamber

## Utility

It is Suitable for ripening of fruits like banana, mango and papaya using ethylene gas under controlled conditions of temperature and relative humidity.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 1.5 kW, Electrical power |
| Capacity, tonne of fruits/ batch | : | 1 (in 4-5 days) |
| Cost, Rs. | : | 2.00 lakh approx. (including ethylene generator) |
| Material of construction | : | EPE foam sheets and twin wall PC sheets as insulating wall material |
| Air conditioner capacity | | 1 TR |
| Temperature maintained °C | : | 18±1 |
| Relative humidity, % | : | 90 |
| Cost of ripening, Rs/t | : | 3000/- |

## Benefits over conventional/traditional practices

- Safe and hygienic practice leading to better quality and shelf-life of ripened products

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Anand Hitech Solution, Bhopal, Ph No.: 7566588755, 7566955499.
- M/s. Trigon Property Management Services (P) Ltd., New Delhi
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Modular Onion Storage Structure (Model-I)

## Utility

The storage system is suitable to store rabi harvest of the onion during rainy season. It is foldable and modular in nature and made from light weight, corrosion and UV resistant FRP material. The storage unit is equipped with sensor based automated aeration and fumigation system. The structure has arrangement for easy filling and easy discharge system.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.75 kW, Electrical Power |
| Cost of equipment, Rs. | : | 20,000/- |
| Labour requirement, man-h/t | : | 1.23 |
| Storage capacity, tonne | : | 1 |
| Cost of operation, Rs/t-month | : | 1500 |

## Benefits over conventional/traditional practices

- Lower storage losses
- Storage structure is rust proof & hence expected long life and durability.
- Maximum retention of quality
- Automatically controlled aeration system
- Labour saving in handling operations
- Better shelf life of store commodity

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s.G.V. Industries, Dhar, (Madhya Pradesh), Mobile: 9826469388, E-mail:gvindus32@gmail.com
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Modular Onion Storage Structure (Model-II)

## Utility

A modular storage system suitable to store the onions during rainy season. The multiple units of the structure needs to be arranged in a array with single air blowing station for scaling-up the system up to any capacity. The unit is rectangular in shape and having two cages of the storage unit each having 1200 mm of height placed one above the other. The storage unit also equipment with standardized and optimized sensor based automated aeration and fumigation unit. The material used for the construction of the structure is rust proof, UV resistant FRP.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.75 kW, Electrical power for forced aeration |
| Cost, Rs. | : | 30,900/- |
| Labour requirement, man-h/t | : | 1.0 |
| Storage capacity, tonne | : | 3 |
| Cost of operation, Rs/t-month | : | 1500 |

## Benefits over conventional/traditional practices

- Lower storage losses
- Storage structure is rust proof & hence expected long life and durability.
- Maximum retention of quality
- Automatically controlled aeration system
- Labour saving in handling operations
- Better shelf life of store commodity

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s. G.V. Industries, Dhar, (Madhya Pradesh), Mr. Kalam Singh Tagore, Mobile: 9826469388, E-mail:gvindus32@gmail.com
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel:

# DRYING EQUIPMENT

# On-farm Paddy Dryer

## Utility

On-farm paddy dryer is a Mobile – Flat and fixed bed – Non Mixing type Paddy dryer (Mixing mechanism is optional).It consists of drying chamber and plenum chamber. Ambient air which is sucked by a blower is heated to a set temperature while drawn through an indirect type of heat exchanger fired by a fuel burner. Heated air is distributed in the plenum chamber and is directed to the drying chamber due to the configuration of the plenum. Since, drying takes place in a fixed deep bed, drying proceeds from bottom layer to the top layer leaving the moisture laden air at the top drying chamber. Intermittent tempering of the grain during /after drying equalizes the moisture distribution within the grain and aid in uniform drying. Dried grains can be discharged through gravity outlets provided. Drying 5 tons of high moisture paddy from an initial moisture content of 22-24% to a final moisture content of 12-14% requires 6-8 h with a tempering time of 2-3 h.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 15 KVA Diesel generator or 3 phase electric motor |
| Weight, t | : | Empty weight 5.4 |
| Man power | : | 06 (Manual loading mechanism)<br>02 (Elevator loading mechanism) |
| Suitability for crop/ commodity | : | Paddy and other cereal crops |
| Cost, Rs. | : | 17.5 lakhs |
| Output capacity, t/ batch | : | 5 |
| Efficiency | : | Thermal efficiency : 58% (For Rabi Trial) |
| Cost of operation, Rs/kg | : | 1.20/- (Kharif), 0.87- (Rabi) |

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

**Contact:**

- Research Engineer, AICRP on PHET Acharya N. G. Ranga Agricultural University, Bapatla-522 101 ; Guntur (Dist), Andhra Pradesh Ph: 08643-225180, phtcbapatla@gmail.com.
- M/s. Kardi Dryers Pvt .Ltd 284,Avvai Shanmugam Salai,Chennai-600086 Phone No:044-26880001, Cell:09791664050 www.kardidryers.com.

# Vegetable Dryer

## Utility

It has been developed for is drying of vegetables like cauliflower, cabbage, onion etc. with small capacity at rural level. It consists of drying chamber, plenum chamber, heating unit chamber and a air blowering with device twenty trays of Nylon or wiremesh are fitted on Aluminium frame. The temperature in the drying chamber is controlled with the help of a the thermostate it can reduce moisture content from 90% to 6% of a batch of 50 kg material in 11-14 hours.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 1.5 kW, Electrical motor |
| Weight, kg | : | 175 |
| Cost, Rs. | : | 70,000/- |
| Labour requirement, man-h/t | : | 50-60 |
| Output capacity, kg/day | : | 50 |
| Cost of operation, Rs/t | : | 4000-5000/- |

## Benefits over conventional/traditional practices

- Enhanced capacity and better quality compared to work without machine.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s. Fine fabrication works Govindpura, Bhopal, Phone: 0755 425 1574
- M/s. Manak Industries, Govindpura, Bhopal,
  Email: manakindustriesbhopal@gmail.com, Contact: No.: 91-755-2581683, 9993035566, 9425687798 8989821564
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Multi-purpose Tray/LSU Dryer

## Utility

It is a batch type twin unit i.e. LSU type for grain and tray type for food products drying. It uses hot air for drying and constructed with GI sheet and plywood with SS wire mesh button trays for LSU tray type and GI sheet inverted triangle trays for LSU type dryer respectively. It can be used for drying raw soybean before storage and for drying soy products up to its safe storage limit. It consists of blower, heating unit, plenum/drying chamber, trays and stopper for recirculation.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 1.5 kW, Electrical motor |
| Weight, kg | : | 175 |
| Cost, Rs. | : | 70,000/- |
| Labour requirement, man-h/t | : | 10 |
| Output capacity, kg/day | : | 60 |
| Cost of operation, Rs/t | : | Rs. 250-750/- |

## Benefits over conventional/traditional practices

- Enhanced capacity and better quality compared to work without machine.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s. Fine fabrication works Govindpura, Bhopal, Phone: 0755 425 1574
- M/s. Manak Industries, Govindpura, Bhopal,
  Email: manakindustriesbhopal@gmail.com, Contact: No.: 91-755-2581683, 9993035566, 9425687798 8989821564
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Mechanical Rice Dryer

## Utility

This is a batch type dryer that works on thin layer drying principle. The unit comprises of a drying chamber and a solid fuel fired furnace along with tube type heat exchanger and electric blower. Grain depth is kept at 120 mm. The conventional fuels like wood, coal and briquettes can be used for producing hot air. Both raw and parboiled paddy can be dried to a safe moisture level in this dryer.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 2 kW electric motor |
| Cost, Rs. | : | 50,000/- |
| Capacity, kg/batch | : | 150-500 |
| Drying air temp, ºC | : | 40±2ºC |
| Drying time, h | : | 6-7 |
| Moisture reduction | : | 20% to 12% |
| Fuel consumption, kg | | 10kg coal/ 15kg wood/batch |

## Benefits over conventional/traditional practices

- A group of farmers can make use of the technology for drying their crop after harvesting and add value to the crop.
- Paddy drying can be done in a compact area without forcing the farmers to use high ways and create traffic hazard.

**Design:** ICAR-NRRI, Cuttack

**Commercialization Status:** Commercialized

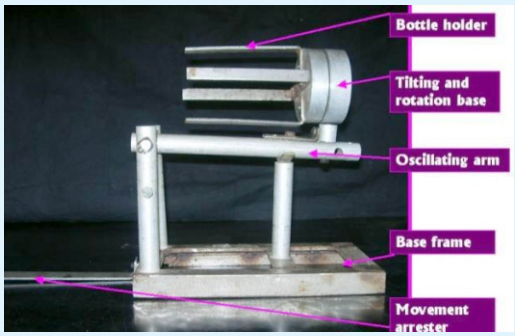
## Contact:

- The Director, ICAR-National Rice Research Institute, Cuttack, Odisha-753006, Phone: +91-671-2367757/67, Email:director.nrri@icar.gov.in, crrictc@nic.in.

# MISCELLANEOUS PROCESSING EQUIPMENT

# Spawn Inoculators

## Utility




It is suitable to inoculate the spawn. This has an axially rotatable spawn bottle holder, a suitably designed bottle oscillating arm, a sturdy base frame supports these parts and a movement arresting arm. The spawn bottle with 300 g spawn is held in the bottle holder and the oscillating arm is rotated anti-clockwise by the right hand of the person and spawn is poured inside the grain filled bag held by the left hand of the same person. This has the capacity of inoculating 105 packets per hour with one person in comparison to 85 packets per hour with two persons in manual operation

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Manual |
| Weight, kg | : | 10 |
| Cost of machine, Rs. | : | 5,000/- |
| Capacity, bags/h | : | 180 |

## Benefits over conventional/traditional practices

- Saving of time (50%), labour and cost over traditional practice.

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

## Contact:

- M/s Scientek Services, Karnataka 560092, . f9845606575, Phone : 080 2362 4434, Email: sales@scientek.in.
- M/s Dharma Technologies, Karnataka Ph: 0816-2292159, +919886737260, Email: info@dharmaagrotech.com
- M/s Pradeep Industries, Bengaluru – 91, Mobile: 080-28535997; E-mail- Pradeepindstries.9@gmail.com
- M/s Team Flame Engg& Solutions, Maruthinagar, Bangalore – 560 091, Mobile: +919844277339; E-mail: teamflame37@gmail.com

# Model Retail Outlet for Production of Hygienic Chicken Meat

## Utility

In most of the unorganized meat retail shops, meat processing procedures are not carried out properly and therefore, chances of contaminations are more, thus there is great risk of getting cases of food borne illness/infections. Keeping this in view, a modern meat/chicken outlet has been designed and developed which is helpful in production of clean and hygienic meat that reduces the spread of the meat borne pathogens and hence disease outbreaks.

| Specifications & Performance results | | |
|---|---|---|
| Weight, Kg | : | 150 |
| Man Power | : | 2 Person |
| Suitability for crop/commodity | : | Poultry Processing |
| Cost, Rs | : | 1.25 lakh |
| Output capacity | : | 50-100 Chicken processing/day |

**Design:** AICRP on PHET

**Commercialization Status:** Ready for Commercialization.

**Contact:**

- PI-AICRP on PHET, Department of Veterinary Public Health and Epidemiology, Bombay Veterinary College, Parel, Mumbai, Maharashtra

# Pilot Unit for Minimally Processed Fresh cut Vegetables

## Utility

Suitable for producing minimally processed cut vegetables like carrot slices/ shreds/ cubes/ grates, cauliflower florets, cabbage shreds etc.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.75 kW electric motor (each for washing tank; slicer and centrifuge); 0.375 kW motor for cauliflower floret cutter; 1.5 kW motor for UV treatment chamber |
| Cost, Rs. | : | 5.50 lakh |
| Output capacity, kg/h | : | 100 |
| Sanitizing agent | : | Ozone and UV-C radiation |
| Labour requirement, man-h/t | : | 20 |
| Cost of processing, Rs/t | : | 2500/- |

## Benefits over conventional/traditional practices

- Chemical or heat free sanitization of cut vegetables.
- Products in the form of Ready to Use/Ready to Cook.
- The minimally processed cut vegetables can be stored up to 9-12 days under refrigerated conditions.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for Commercialization

## Contact:

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Chemical Free Process Technology for Raisins

## Utility

A package of technology with chemical free process has been developed for the production of raisins. It includes two machines namely a grape de-bunching machine and abrasive pre-treatment equipment, drying protocol for grapes, packaging and storage of raisins. Raisins can be prepared with no use of any chemicals in entire process; there is reduction in drying time of grapes (by 30-40%).

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 1.5 kW (for grape de-bunching machine); 0.745 kW motor (for Abrasive pre - treatment system) |
| Weight, kg | : | 80 (Grape de-bunching machine), 100 (Abrasive pretreatment system) |
| Cost, Rs. | : | 1,50,000/- |
| Labour requirement, man-h/t | : | 10 |
| Output capacity, kg/h | : | 130-150(for pretreatment) |
| De-bunching efficiency, % | : | 93-95 |
| Abrasive treatment efficiency, % | : | 97 |
| Drying time | : | 5-7 days (solar); 2-3 days (hot air) |
| Cost of processing, Rs/t | : | 21750/- |

## Benefits over conventional/traditional practices

- No use of chemicals in the process of raisin production.
- Reduction in drying time by 30-40%.
- Reduction in processing cost as compared to chemical process.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for Commercialization

## Contact:

- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com
- Director, National Research Center on Grapes, Pune-Maharashtra, Phone: 91-20-26956000 Email: director.nrcg@icar.gov.in

# Wadi Making Machine

## Utility

The machine completely eliminates the hand operation thereby reducing drudgery and further contributing to food safety. The machine produces nine different shapes of wadis, which is helpful to increase the consumer appeal for the traditional product. The developed machine is an initiative in mechanizing the production of Indian traditional foods.

| Specifications & Performance results | | |
|---|---|---|
| Capacity, kg/h | : | 150 |
| Dropping size, g | : | 5 |

## Benefits over conventional/traditional practices

- Hygienic process.
- Uniformly shaped and sized wadis.
- Reduced human drudgery.
- Energy saving.

**Design:** ICAR-CIPHET, Ludhiana

**Commercialization Status:** Commercialized

## Contact:

- M/s Empire Bakery Machines Pvt. Ltd., opp. GurudwaraSomasar Sahib Vill. Tibba P.O., Sahnewal, Punjab – 141120
- Director, ICAR-Central Institute of Post-Harvest Engineering and Technology (CIPHET), PAU, Ludhiana- 141004, Punjab, Ph No. 0161 2313103, Email: director.ciphet@icar.gov.in

# Mechanized System for Primary Roasting of Raw Makhana Seeds

## Utility

Manual operation of primary roasting of makhana uses wood as energy source and having capacity is very less (25 kg/day per person), labour intensive and involves drudgery. The developed mechanized system consists of roasting pan, heating system, power transmission system and agitation system. The developed machine can roast makhana of any grade between 5-8 mm effectively with subsequent popping of more than 90% seeds. The capacity of the developed system is about 60 kg/h (10kg/batch) which can easily be scaled-up or scaled-down.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | 0.75 kW, 3-phase electric motor |
| LPG gas: For heating pan, kg gas/kg | : | 0.08 |
| Number of burners: | : | 03 |
| Manpower requirement: | : | 02 (01 skilled and 01 unskilled) |
| Rotational speed of pan, rpm | : | Variable (10-60) |
| Speed control of pan | : | Variable frequency drive (VFD) |
| Provision to control heat | : | Provided through control valves |
| Discharge gate | : | Detachable |
| Capacity, kg raw seed/hour | : | 60-80 |

## Benefits over conventional/traditional practices

- Cost effective system with high throughput capacity.
- Maintains uniform temperature.
- Roasting of all grades of makhana seeds is possible.

**Design:** ICAR-CIPHET, Ludhiana

**Commercialization Status:** Commercialized

## Contact:

- M/s Unitech Technocrats, Vill. MeerpurGurudwara, Kala Amb (Sirmour)-173030 H.P. +919315175276
- Director, ICAR-Central Institute of Post-Harvest Engineering and Technology (CIPHET), PAU, Ludhiana- 141004, Punjab, Ph No. 0161 2313103, Email: director.ciphet@icar.gov.in +919886737260, Email: info@dharmaagrotech.com

# Makhana (Gorgon Nut) Popping Machine

## Utility

The makhana popping machine is able to roast and pop 35-40kg raw wet seeds per hour and produce high amount of grade-I popped kernel. The machine consists of a hopper, screw conveyor type roaster (having two continuous barrels, one roaster is heated with thermic oil and other roaster by mounting three band heaters. The screw is rotated by belt pulley drive with motor. The residence time of roasting in barrel is controlled by controlling the speed of belt and pulley drive. Working temperature of both roasters varies between 200-340°C. Power supply to all heaters is controlled through individual switches.

| Specifications & Performance results | | |
|---|---|---|
| Capacity, kg/h | : | 35-40 (raw wet seeds) |
| Decortication efficiency, % | : | 95 |
| Popping efficiency, % | : | 90-94 |

## Benefits over conventional/traditional practices

- Mechanized process.
- Reduces time of processing.
- Reduces the drudgery.
- Energy saving.

**Design:** ICAR-CIPHET, Ludhiana

**Commercialization Status:** Commercialized

## Contact:

- M/s Jwala Engineering and Consultancy Services, # 354, Sector-2, Growth Centre, Saha, Ambala (Haryana) – 133104, Ph No.-+919416367366, 91-171-2821836
- M/s Unitech Technocrats, Vill. Meerpur Gurudwara, Kala Amb (Sirmour)-173030 H.P.+919315175276
- M/s Arkeys Scientific Instruments Company, Sehore, (M.P.), 9827259642
- Director, ICAR-Central Institute of Post-Harvest Engineering and Technology (CIPHET), PAU, Ludhiana- 141004, Punjab, Ph No. 0161 2313103, Email: director.ciphet@icar.gov.in

# Honey Processing Unit

## Utility

The processing unit especially developed for small entrepreneur to process honey in production catchment itself. This honey processing unit consists of a double walled cylinder and two electric heating elements filled with water and attached with a pump for recirculating the water for maintaining uniform temperature profile throughout the process. The heated honey is passed to the filtration unit through the hole provided at the bottom of the inner cylinder and extended through a pipe having gate valve. The filtration cylinder consists of lid of four layered muslin cloth.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | 0.18 kW, electric motor |
| Weight, kg | : | 80 |
| Man power | : | 01 |
| Suitability for crop/ commodity | : | Honey |
| Cost, Rs | : | 35000/- |
| Output capacity, kg/batch | : | 50 |
| Efficiency, % | : | 99 |
| Cost of operation, Rs/kg | : | 2/- |

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

**Contact:**

- M/s H V Industries, K- 105 Focal Point, Phase VII, Dhandhari Kalan, Ludhiana (Punjab)
- Research Engineer, AICRP on PHET, Department of Processing and Food Engineering, College of Agricultural Engineering and Technology, PAU Ludhiana- 141 004 (Punjab), Ph No. 0161 2401325, Email: registrar@pau.edu

# Mobile Starch Extraction Plant

## Utility

A portable machine suitable for extracting starch from tuber crops. An electric motor is used to operate the machine, which consist of tuber storage chamber, hopper to feed the tubers, crushing disc or cylinder with protrusions to crush the tubers, sieving tray to remove the fibrous and other cellulosic materials, stainless steel or plastic tanks to collect the sieved starch suspension and wheels for easy transportation. Addition of water during the processing can be controlled through a water pipe with holes fixed inside the hopper along its length and during sieving by a shower attachment connected to the water line.

| Specifications & Performance results | | |
|---|---|---|
| Power Source | : | 0.56 kW, single phase electric motor |
| Weight, kg | : | 165 |
| Man power | : | 01 |
| Suitability for crop/ commodity | : | Cassava, sweet potato, *Amorphophallus*. |
| Cost, Rs | : | 90,000/- |
| Output capacity, kg/h | : | 120-200 |
| Efficiency, % | : | 85 |
| Cost of operation, Rs/kg | : | 3/-per kg starch |

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

**Contact:**

- Research Engineer, AICRP on PHET, Central Tuber Crops Research Institute, Thiruvananthapuram – 695 017, Ph No.: (+91)(471) 2598551-4.

# Package of Equipment for making Rope from Outer Sheath of Banana Pseudostem

## Utility


The waste from banana plantations can be turned into wealth by value addition to useful products. Ropes from the outer sheath of banana pseudostem are in high demand for different applications but are made labour intensive with hand spinning or by rattmachines. The package contains two equipment:

i. Equipment for splitting of outer sheath of banana pseudostem
ii. Equipment for twisting and winding rope out of splitted strands from outer sheath of banana pseudostem

| Specifications & Performance results of twisting and winding equipment | | |
|---|---|---|
| Power source | : | 0.75 kW, electric motor |
| Number of twisting unit | : | 4 |
| Number of winding bobbins | : | 4 |
| Cost of twisting and winding equipment, Rs. | : | 1,25,000/- |
| Total cost of the package of equipment, Rs | : | 1,60,000/- |
| Cost of operation, Rs/m | : | 0.20 |

## Benefits over conventional/traditional practices

- Suitable for various eco-friendly handicraft materials like bags, curtains, table mats etc.
- Additional revenue to farmers/entrepreneurs/ processors.
- Higher quality rope with more uniform twist (Uniformity of 0.95 v/s 0.65 by manual method).
- Reduced space requirement (by about 80 %)
- Higher output (12000-15000 m/day)
- Saving in cost and labour to the tune of 65 and 70 %, respectively.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Trytex Machine Companies, 29 Coimbatore – 641 006, Tamilnadu, Email: trytex@rediffmail.com, Mob: 9443029753, 9442085771
- Head, ICAR-Central Institute of Agricultural Engineering, Regional Centre, Coimbatore, Email-ciaerccbe@gmail.com

# Mechanization Package for Juice Extraction from Garcinia Combogia

## Utility

Fully established mechanized garcinia vinegar making unit at Coorg, Karnataka

Garcinia Cambogia is minor forest produce which plays a major role in health food and weight loss compound: Garcinia cambogia is well known component used in anti-obesity herbal supplement around the world for decades. The outer rind obtained from tamarind is used as an alternative to tamarind in many areas. The Juice obtained from ripe Garcinia Cambogia fruit is converted to vinegar which is used as a souring agent after concentration. Package of Equipment viz, juicer/grinder, juice squeezer and juice concentration unit is developed to make vinegar for ripened Garcinia Combogia fruits.

| Specifications & Performance results of juice concentration unit | | |
|---|---|---|
| Power source | : | 0.75 kW, electric motor |
| Capacity of concentrator, lit | : | 25 |
| Rotation, rpm | : | 100 |
| No. of heating burner ( LPG) | : | 2 |
| Cost of juice concentration unit, Rs | : | 80,000/- |
| Cost of package of equipment, Rs. | : | 1,50,000/- |

## Benefits over conventional/traditional practices

- The juice extraction by this package of equipment is hygienic, without direct contact of human hands and this helps to reduce contamination.
- It takes about 4 hours for juice (25 lit) to be converted to vinegar of about 4-5 litre.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Ready for Commercialization.

## Contact:

- Head, ICAR-Central Institute of Agricultural Engineering, Regional Centre, Coimbatore-641007 ciaerccbe@gmail.com.
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Boiled Grain and Chalk Powder Mixer cum Bag Filler

## Utility

It is suitable to mix boiled grain and chalk powder and fill PP bags for spawn production. The boiled grain and chalk powder mixer consists of a main frame, mixing chamber, mixing arms, geared motor drive, collection chamber and a collection chute. Boiled grain is filled to the tilting type mixing chamber. It is allowed to cool for about 5-10 minutes by running the machine. After cooling, the required quantity of chalk powder at rate of 4 percent by weight is added manually from the top while machine is running. The mixing chamber is tilted to collect the mixed grain in to the collection chamber at the bottom. The oscillating type volumetric filling mechanism is provided at the bottom to fill pp bags with known quantity.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 1.12 kW, electric motor |
| Weight, kg | : | 90 |
| Cost of machine, Rs. | : | 1,25,000/- |
| Capacity, kg/ batch | : | 100 |

## Benefits over conventional/traditional practices

- Saving of time (60%), labour and cost over traditional practice.

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

## Contact:

- M/s Scientek Services, Karnataka 560092, . f9845606575, Phone : 080 2362 4434, Email: sales@scientek.in.
- M/s Dharma Technologies, Karnataka Ph: 0816-2292159, +919886737260, Email: info@dharmaagrotech.com
- M/s Pradeep Industries, Bengaluru – 91, Mobile: 080-28535997; E-mail- Pradeepindstries.9@gmail.com
- M/s Team Flame Engg& Solutions, Maruthinagar, Bangalore – 560 091, Mobile: +919844277339; E-mail: teamflame37@gmail.com

# Cottage Scale Soy Paneer Plant

## Utility

It is a cottage level plant to produce soy milk and paneer. Soya paneer is commonly called as Tofu. While normal paneer is a dairy product, soya paneer makes use of soy milk to create a healthier version of paneer. The cottage scale paneer plant consists of steam generation unit, grinder cum cooker, milk filtration unit and paneer pressing device. The soy splits are grinded at 80°C in air free surroundings to produce paneer.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.75 kW,electric Motor and LPG |
| Weight, kg | : | 200 |
| Cost, Rs. | : | 3.00 lakh |
| Labour requirement, man-h/t | : | 750 |
| Output capacity, | : | 200 litre soymilk or<br>50 kg soy paneer/day |
| Cost of operation, Rs./h | : | 62/h |

## Benefits over conventional/traditional practices

- Good quality soy milk and tofu can be made available to the consumer at lower cost as compared to dairy products.
- Tofu is a much healthier option.
- Iron content in tofu is more than that of dairy paneer.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s. Global Engineers &Equipments Co., Burupur, WB, Shri Gaohar Shahid, Contact: No.: 9126913763, 9932392279
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038,Tel: 0755-2521134; Email: directorciae@gmail.com

# Solar Energy Integrated Auto Clave

## Utility

It is suitable to sterilize substrate in spawn production. The solar based autoclave comprises of a separate SS boiler which is in the form of horizontally placed cylinder on a stand. The size of the boiler is designed depending on the size of the main sterilization chamber and the type, time and amount of sterilization to be done per cycle. The boiler is provided with inlets for cold water, hot water/steam inlet and a flexible outlet to be connected to the main sterilizer. The boiler is also provided with pressure gauze. It is fitted with electrical heater. The boiler is provided with a detachable enclosure so that the boiler can be heated using wood. This boiler can also be operated by gas with the aid of a longitudinal gas stove connected to a gas cylinder.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 6 kW, electric heaters |
| Weight, kg | : | 70 |
| Cost of machine, Rs. | : | 2,00,000/- |
| Capacity, kg/h | : | 120 |

## Benefits over conventional/traditional practices

- Saving of time (50%), labour and cost over traditional practice.

**Design:** AICRP on PHET

**Commercialization Status:** Commercialized

## Contact:

- M/s Scientek Services, Karnataka 560092, Mobile: 9845606575, Phone : 080 2362 4434, Email: sales@scientek.in.
- M/s Dharma Technologies, Karnataka Ph: 0816-2292159, +919886737260, Email: info@dharmaagrotech.com
- M/s Pradeep Industries, Bengaluru – 91, Mobile: 080-28535997; E-mail- Pradeepindstries.9@gmail.com
- M/s Team Flame Engg& Solutions, Maruthinagar, Bangalore – 560 091, Mobile: +919844277339; E-mail: teamflame37@gmail.com

# MISCELLANEOUS EQUIPMENT

# Banana Bunch Covering Device

## Utility

For producing export quality banana, the covering of banana bunches at proper stage of maturity, especially of 'Nendran' (plantain) varieties, is recommended to ensure quality of the fruit as well as for visual appreciation. The bunch covering is a difficult and labour intensive operation as many plantain varieties are very tall. The farmers need to use a ladder to reach the bunch for manually covering it. The stability of the ladder is a problem in rainy season and a labour is required to hold the ladder.

A simple, low cost and easy to use device for covering of banana bunches,as shown in the figure, eliminates the problems faced in traditional way of doing the same

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Manual |
| Weight, kg | : | 0.90 |
| Maximum length of telescopic pole, m | : | 2.5 |
| Material of construction | : | Aluminum |
| Diameter of ring, mm | : | 480 |
| Cost of device, Rs. | : | 2000 |
| Diameter of cover, mm | : | 520 |
| Height of banana plants, m | : | 2.0 - 3.5 |
| Time required to cover a banana bunch, min | : | 2.0 |
| Cost of operation, Rs./100 bunches | : | 450 (excluding cost of cover) |

## Benefits over conventional/traditional practices

- Reduces drudgery and time required for covering banana bunches.
- Suitable for all varieties of bananas and plantains.
- The work rate is faster and cost of covering is much lower than traditional practice.

**Design:** AICRP on FIM

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Principal Investigator, AICRP on Farm Implements and Machinery, Kelappaji College of Agril. Engg. & Tech., Kerala Agricultural University, Tavanur- 679 573 (Kerala), Ph. No. : +91-494-2686214, Email: kcaet@kau.in

# Pedal Operated Tricycle for Fruits and Vegetables Vending

## Utility

Tricycle is operated by pedaling to ride. Evaporative cooling system, audio and LED lighting are powered by solar power system fitted on the roof. It carries 16 plastic crates with total loading capacity is 150 kg. It works based on the principle of evaporative cooling, to keep the produce fresh for 36 hours.

| Specifications and Performance results | | |
|---|---|---|
| Power source | : | Manual |
| Weight, kg | : | 50 |
| Specification | : | Pedal operating system, evaporative cooler, LED lightings and audio aids |
| Cost of machine, Rs. | : | 1,20,000/- |
| Capacity, Kg | : | 150 |

## Benefits over conventional/traditional practices

- Vegetable remain fresh for 27 to 36 h.

**Design:** ICAR-IIHR, Bengaluru

**Commercialization Status:** Commercialized

## Contact:

- M/s Power Base Technlologies, Bengaluru, Mobile: 97311 81904; E-mail:aloysiusr@gmail.com
- M/s Palvi Industries, Sangli- 416 436, Mobile No. 94212 17833; E-mail :palviindustrie@gmail.com
- M/s Concorde Engineering Works, Bangalore – 560 015, Mobile: +919886781667; E-mail: sivakumar1671@gmail.com
- M/s Skycraft Technology Pvt. Ltd., Mr. Kevin Cherian, Bengaluru, Mobile: 7022736595 ; E-mail: synokvvin2008@gmail.com
- M/s Greymart Mobility Pvt. Limited, Bengaluru – 48, Mobile: 98440 08911; E-mail-rajendra@rajamane.com
- M/s SVS Power Systems, Bengaluru- 22, Mobile: 98459 47774; E-mail-svs.powersystem@gmail.com
- Director, ICAR-IIHR, Hessaraghatta Lake Post, Bengaluru-560 089. E-mail director.iihr@icar.gov.in website:https://www.iihr.res.in

# Vertical Garden Structure

## Utility

Arka Vertical garden structure consists of 3 rows and 14" pots. Each pot will be used to grow leafy vegetable, vegetable, flower and medicinal plants as per the requirement.

| Specifications and Performance results | | |
|---|---|---|
| Structure | : | Vertical |
| Weight, kg | : | 50 |
| Specification | : | Vertical structure, leafy vegetable, vegetable, flower and medicinal plants |
| Cost of machine, Rs. | : | 25,000/- |
| Capacity, pots | : | 14 |

## Benefits over conventional/traditional practices

- To grow leafy vegetable, vegetable, flower and medicinal plants at terrace garden.

**Design:** ICAR-IIHR, Bengaluru

**Commercialization Status:** Ready for commercialization

**Contact:**

- Director, ICAR-IIHR, Hessaraghatta Lake Post, Bengaluru-560 089. E-mail director.iihr@icar.gov.in website:https://www.iihr.res.in

# Animal Lifting Device for Bullocks and Equines

## Utility

It is manually operated device suitable for lifting and shifting animals weighing upto 900 kg. It has wheels to transport sick or unable to walk animals from one place to other.

| Specifications & Performance results | | |
|---|---|---|
| Lift capacity, kg | : | 900 |
| Cost of machine, Rs | : | 15,000/- |

## Benefits over conventional/traditional practices

- 65 % and 60 %, savings in labour and cost of operation respectively.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

- M/s Vasundhara Krishi Yantra, Bhopal, Madhya Pradesh, Ranjit Singh Thakur (Director) Email: vkyu.bpl@gmail.com, Contact No. – 9893018158.
- Director, ICAR-Central Institute of Agricultural Engineering, Bhopal Telephone: 0755-2731134, Email: directorciae@gmail.com, director.ciae@icar.gov.in

# Power Operated Sugarcane Sett Cutter

## Utility

The single or double eye bud cutting for making small setts for sugarcane sowing requires double time with traditional manual cutter. The manual practice is cumbersome and worker faces drudgery in continuous operation.

Timeliness requirement necessitated development of this improved gadget, Power Operated Sugarcane Sett Cutter, which enables cutting single eye bud or double eye bud setts of sugarcane at higher work rate and reduced labour cost.


| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.75 kW single phase electric motor |
| Weight, kg | : | 200 |
| Speed ratio for driver to driven pulley | : | 1:50 |
| Cost of machine, Rs. | : | 75,000 |
| Capacity, setts/h | : | 6500 |
| Time required to cut single eye bud setts for one hectare, h | : | 8.24 |
| Cost of operation, Rs./h | : | 98 |

## Benefits over conventional/traditional practices

- Saving in time (80%), labour and cost in setts cutting than traditional manual operation.

**Design:** AICRP on FIM

**Commercialization Status:** Commercialized

**Contact:**

- M/s. Sumeet Technologies, Flat No. 3, Piyush Villa, Behind Katraj Dairy, Shriram Nagar, Katraj, Pune – 411046 (Maharashtra), Phone: 090967 71942
- Principal Investigator, AICRP on FIM, Dr. ASCAET, Mahatma Phule Krishi Vidyapeeth, Rahuri–413722, Distt. Ahmednagar (Maharashtra), Ph. No.: 02426-243219, Email: dormpkv@rediffmail.com

# Power Operated Garlic Stem and Root Cutter

## Utility

About 50-60 hours' per tonne is required in manual cutting of both stem and root of garlic bulbs. The manual removing of stems and roots from the garlic bulb is tedious.

The removal of garlic roots and stems are done with the help of sickles, knives, pruners, axes and scissors. Safety and higher production cost are other issues faced by the farmers.

Power operated garlic stem and root cutter consisting of feeding unit, cutting unit, power transmission unit and garlic bulb dropping chute, facilitates higher output and safe and drudgery free operation.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.75 kW electric motor |
| Weight, kg | : | 50 |
| Cost of machine, Rs. | : | 25000 |
| Output capacity, kg/h (30h / tonne) | : | 35 |
| Cutting efficiency,% | : | 98- 99 |
| Cost of operation, Rs./h | : | 75 |

## Benefits over conventional/traditional practices

- Reduction in labour cost and drudgery of workers than doing manually.

**Design:** AICRP on FIM

**Commercialization Status:** Ready for Commercialization

## Contact:

- Principal Investigator (FIM Project), Dept. of Farm Machinery and Power Engg., College of Technology & Engineering, Maharana Pratap University of Agriculture & Technology, Udaipur- 313001 (Rajasthan), Tel: 91-294-2470119, Email : deempuatudr@gmail.com

# Sett Treatment Device (STD)–Sugarcane Planting Materials

## Utility

The principle involved in STD is vacuum infiltration by creating a negative pressure followed by absorption of the chemicals inside the setts. This method of sett treatment is being performed at prescribed vacuum level (150-250 mmHg) and duration (15-30 min) and infiltration of chemical inside setts and its efficacy is found to be equal as overnight soaking.

## Benefits over conventional/traditional practices

- Rapid, economical and environmentally safe process as it requires less chemical.
- Effective as overnight soaking.
- Less cumbersome in handling material.
- Capable of delivering more than one agrochemical.
- Suitability for large scale application under farmer's field condition.

**Design:** RC ICAR-CIAE, Coimbatore

**Commercialization Status:** Commercialized

**Contact:**

- CLEANTEK, SF No: 479/4, Site No: 22 & 23; Balaji Industrial Area, KondayamPalayam Road; Saravanampatti (PO), Coimbatore - 641 035, INDIA. & Mobile: 9994352001, 9500266693, E-mail:sales@cleantekindia.com / krishna@cleantekindia.com
- Agrinnovate India,G-2, A Block, NASC Complex, DPS Marg, New Delhi- 110012, INDIA.Phone:+91-011-25842122 Fax:+91-01125842124,Email info@agrinnovate.co.in
- Head, ICAR-Central Institute of Agricultural Engineering, Regional Station, Veerakerlam Road, Sugarcane breeding Institute Post, Coimbatore – 641 007, Tamil Nadu, India, Phone: 0422-2472624, 2472623. Fax: 0422-2474276; email: ciaerccbe@gmail.com
- Director, ICAR-Central Institute of Agricultural Engineering, Bhopal Telephone: 0755-2731134, Email: directorciae@gmail.com, director.ciae@icar.gov.in

# Sugarcane Single Bud Cutter

## Utility


Sugarcane Single Bud Cutter a cost-effective cutting tool for detaching uniform size mini single bud setts. Planting sugarcane crops with pre-germinated settling plants is the best solution for improving seed health, seed multiplication ratio, and uniformity in plant population, which ultimately assures higher sustainable crop yield."Quatro Sugarcane Single Bud Cutter" has bagged design patent "Design No. 297432" from the Patent Office of India.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 1.5 kW electric motor |
| Cost, Rs | : | 35,000-40,000/- |
| Operating slots | : | 4 (one person per slot) |
| Distance between cutting blades, mm | : | 45 |
| Per hour movement of cuttling slots | : | 2,400 x 4 = 9,600 |
| Per hour detachment of single bud setts | : | 7,200 (with 75% efficiency) |

## Benefits over conventional/traditional practices

- Nearly 2,400-2,500 single bud sets can be detached by four persons each using one bud cutter. But using this machine in an hour 7000-7500 single buds can be detached without getting tired.
- For settling up settling nursery entrepreneurship in a rural area, this machine is very effective and cost-effective.

**Design:** ICAR-SBI, Karnal

**Commercialization Status:** Commercialized

**Contact:**

- M/s Hanzra Engg Works, vill. Bansa, Karnal, Phone(Off.): 9230361427, Mobile : 9830370748,Email : inhazra@yahoo.co.in
- M/s Bhoosarthi, 115, Pocket 3, Sector 11, Dwarka, New Delhi 110075, Phone: 094681 23198, Email: sales@bhoosarthi.com
- Head, ICAR-Sugarcane Breeding Institute, Regional Centre, P.B.52, Karnal, Haryana 132001, Email: headsbirc@gmail.com

# Motorized Double Headed Sugarcane Single Bud Cutting Machine

## Utility

This is suitable for cutting and removing sugarcane buds to use them for preparing seedlings for planting. The single bud along with a portion of the nodal region is cut off and planted in raised bed nurseries/ polybags /portrays filled with FYM and sand in 1:1 proportion. The number of buds required is 24700/hac. (spacing 90 x 45 cm).

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 0.75 kW electric motor |
| Labour requirement | : | Two persons |
| Cost, Rs | : | 50,000/- |
| Capacity, buds/h | : | 3,000 |
| Cost of operation, Rs/h | : | 150/- |

## Benefits over conventional/traditional practices

- Seed material required with this technique is only 2-3 t/ha.
- The remaining cane can be sent for milling/ jaggery making.
- Nursery raising and transplanting is more economical than traditional method.
- Savings in time and cost is 89 and 64% respectively.

**Design:** RS ICAR-CIAE, Coimbatore

**Commercialization Status:** Commercialized

## Contact:

- Sri Balaji Industry, Coimbatore 641005, Phone: No: 9943023249, Email:sbicbe@ gmail.com
- Director, ICAR-Sugarcane Breeding Institute, Coimbatore - 641 007. Off: 0422-2472621 E-mail: director@sugarcane.res.in; director.sbi@icar.gov.in
- Head, ICAR-Central Institute of Agricultural Engineering, Regional Station, Veerakerlam Road, Coimbatore – 641 007, Tamil Nadu, India, Phone: 0422-2472624, 2472623. email: ciaerccbe@gmail.com

# Sugarcane Rind Removing Equipment

## Utility

This machine removes the upper, lower and two sides skin of the sugarcane. Traditional manual method by using knife is time consuming, unsafe and unhygienic. The sugarcane rind remover consists of four metallic brushes attached to the rotating shaft. When the sugarcane is inserted between the four metallic brushes, skin is removed due to the rotation of the brushes (because of the abrasion action between the brushes and the sugarcane fed). The feeding arrangement is made of two nylon roller rotating at about 270 rpm, which enables retention of the canes to be peeled for sufficient time in the peeling zone. The equipment is mounted on the wheel enabling easy transportation from one place to another.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 1.5 hp electric motor |
| Speed of cleaning brush, rpm | : | 1050 |
| Speed of feeding nylon roller, rpm | : | 270 |
| Capacity, kg/h | : | 175-200 |
| Cost, Rs. | : | 75,000/- |

**Design:** ICAR-SBI, Karnal and ICAR-CIAE Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- Celebrating Farmers Edge International Pvt.Ltd, Plot No.79, Yeshwant Bugalow, Opp. GrudutSocity, Sarmath Nagar, Nashik, Maharastra-422005, E-mail: celebratingfei@gmail.com, Phone: 9416020888, 8638980576
- Director, ICAR-Sugarcane Breeding Institute, Coimbatore - 641 007. Off: 0422 - 2472621 (Ext: 203), 0422-2473971, E-mail: director@sugarcane.res.in; director.sbi@icar.gov.in
- Head, ICAR-Central Institute of Agricultural Engineering, Regional Station, Veerakerlam Road, Sugarcane breeding Institute Post, Coimbatore – 641 007, Tamil Nadu, India, Phone: 0422-2472624, 2472623. Fax: 0422-2474276; email: ciaerccbe@gmail.com
- Director, ICAR- ICAR-Central Institute of Agricultural Engineering, Bhopal Telephone: 0755-2731134, Email: directorciae@gmail.com, director.ciae@icar.gov.in

# Growing Media Siever cum Bag Filler

## Utility

This machine is useful to sieve the rooting media viz., farm yard manure, vermicompost, cocopeat, sand and soil and removes all the particles larger than 0.5 mm in the form of stones, clods, straw etc. Two person are required to feed the media and operate it and three person is required to collect the sieved material and to fill in the bags. It can be operated by 2 HP geared motor.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | 2 HP geared motor |
| Weight, kg | : | 240 |
| Cost of machine, Rs. | : | 5,00,000/- |
| Capacity (1 kg capacity), bags/h | : | 1000 |
| No. of bags/min | : | 16.66 |
| Cost of operation, Rs./bag | : | 0.83 |

## Benefits over conventional/traditional practices

- Saving of time (60%), labour and cost over traditional practice.

**Design:** ICAR-IIHR, Bengaluru

**Commercialization Status:** Commercialized

**Contact:**

- M/s Dharma Technologies, KarnatakaPh: 0816-2292159, +919886737260Email: info@dharmaagrotech.com
- M/s Team Flame Engg& Solutions, Bangalore – 560 091, Mobile: +919844277339; E-mail: teamflame37@gmail.com
- M/s Concorde Engineering Works, Bangalore – 560 015, Mobile: +919886781667; E-mail: sivakumar1671@gmail.com
- M/s Omega Metallic, Bengaluru – 560 058; Mobile: +918123415828, E-mail: omegametalic@gmail.com
- Director, ICAR-IIHR, Hessaraghatta Lake Post, Bengaluru-560 089. E-mail director.iihr@icar.gov.in website:https://www.iihr.res.in

# Growing Media Siever cum Bag Filler (Compact Model)

## Utility

This machine is useful to sieve the rooting media viz., farm yard manure, vermicompost, cocopeat, sand and soil and removes all the particles larger than 0.5 mm in the form of stones, clods, straw etc. Two person are required to feed the media and operate it and two person is required to collect the sieved material and to fill in the bags It can be operated by 2 HP geared motor.

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 1.5 |
| Weight, kg | : | 180 |
| Cost of machine, Rs. | : | 2,50,000 |
| Capacity (1 kg capacity), bags/h | : | 500 |
| No. of bags/min | : | 8.33 |
| Cost of operation, Rs./bag | : | 0.66 |

## Benefits over conventional/traditional practices

- Saving of time (60%), labour and cost over traditional practice.

**Design:** ICAR-IIHR, Bengaluru

**Commercialization Status:** Commercialized

**Contact:**

- M/s Dharma Technologies, KarnatakaPh: 0816-2292159, +919886737260Email: info@dharmaagrotech.com
- M/s Team Flame Engg& Solutions, Bangalore – 560 091, Mobile: +919844277339; E-mail: teamflame37@gmail.com
- M/s Concorde Engineering Works, Bangalore – 560 015, Mobile: +919886781667; E-mail: sivakumar1671@gmail.com
- M/s Omega Metallic, Bengaluru – 560 058; Mobile: +918123415828, E-mail: omegametalic@gmail.com
- Director, ICAR-IIHR, Hessaraghatta Lake Post, Bengaluru-560 089. E-mail director.iihr@icar.gov.in website:https://www.iihr.res.in

# Hot Water Treatment Plant

## Utility

The mangoes are filled in the commercially available plastic crates and 24 crates can be arranged inside the tank, with a capacity of 500 kg per batch. In order to reduce the drop of water temperature the water mango ratio had to be maintained at 5:1. It has temperature and time duration control through sensors and PLC

| Specifications & Performance results | | |
|---|---|---|
| Power source, kW | : | 24 (6" nos of electric coils of 4"kW each) |
| Weight, kg | : | 500 |
| Capacity Ltr | : | 1,440 |
| Cost of machine, Rs. | : | 5,00,000/- |
| Capacity(kg/batch) | : | 500 |

## Benefits over conventional/traditional practices

- Saving of time (60%), labour and cost over traditional practice.

**Design:** ICAR-IIHR, Bengaluru

**Commercialization Status:** Commercialized

**Contact:**

- M/s Team Flame Engg & Solutions, Bangalore – 560 091, Mobile: +919844277339; E-mail: teamflame37@gmail.com
- M/s Omega Metallic, Bengaluru – 560 058; Mobile: +918123415828, E-mail: omegametalic@gmail.com
- Director, ICAR-IIHR, Hessaraghatta Lake Post, Bengaluru-560 089. E-mail director.iihr@icar.gov.in website:https://www.iihr.res.in

# Paddy Straw Pasteurizer

## Utility

Paddy straw pasteurizer was developed which consisted of stainless steel pasteurizing drum, 6kW heating coil in the water bath as a backup, solar water inlet and outlet, temperature-time control with temperature sensor, tilting mechanism for loading and unloading pasteurized straw and compression mechanism. After pasteurization, drum is tilted with the help of titling mechanism and hot pasteurized straw is directly unloaded onto meshed portable trolley using a stainless steel hook to make handling of hot paddy straw in much convenient way. When paddy straw is compressed and held at maximum compressed level for pasteurization 210 litre of water is required for soaking and pasteurization as compared to conventional method (360 litre). The total time taken for pasteurization is 5 h 30 min using electric heaters only.

| Specifications & Performance results | | |
|---|---|---|
| Power source, KW | : | 9 |
| Weight, kg | : | 50 |
| Cost of machine, Rs. | : | 1,00,000 |
| Capacity, bags/h | : | 75 |

## Benefits over conventional/traditional practices

- Saving of time (50%), labour and cost over traditional practice.

## Design:

**Commercialization Status:** Commercialized

## Contact:

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- M/s Team Flame Engg& Solutions, Bangalore – 560 091, Mobile: +919844277339; E-mail: teamflame37@gmail.com
- M/s Concorde Engineering Works, Bangalore – 560 015, Mobile: +919886781667; E-mail: sivakumar1671@gmail.com
- M/s Omega Metallic, Bengaluru – 560 058; Mobile: +918123415828, E-mail: omegametalic@gmail.com

# Pilot Scale Continuous Pyrolysis System

## Utility

The pilot scale pyrolysis system generates bio-oil and biochar for different applications based on the equipment. The same system can be effectively used for the torre faction of the feedstock.

| Specifications & Performance results | | |
|---|---|---|
| Biomass type | : | Loose feedstock |
| Feeding capacity, kg/h | : | 20 |
| Optimized feedstocks | : | Sawdust, Groundnut shell, Cotton stalk |
| Average bio-char yield, % | : | 27-30 |
| Average bio-oil yield, % | : | 30-45 |
| Avg. pyro-gas yield, % | : | 30-40 |
| Avg yield of organic phase, % | : | 10-15 |
| Cost of Technology, Lakh Rs. | : | 26.00 |

## Benefits over conventional/traditional practices

- Bio-oil and biochar production industries, farmers, industries having thermal requirements and chemical industries.
- The payback period for the upscaled technology:
  - 1 TPD feeding capacity: 4 years
  - 10 TPD feeding capacity: 2.1 years

**Design:** AICRP on EAAI (SPRERI, Vallabh Vidhya Nagar)

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Principal Investigator, AICRP on EAAI, Tel: 91-755-2521168, E-mail:-pc_eaai.ciae@icar.gov.in

# Domestic Solar Dryer

## Utility

It is a low cost cabinet type domestic solar dryer to hold 0.5 – 1 kg food material. The dryer is box type, small in size, and has single perforated wire mesh tray to dry food materials like, chilli, turmeric, nuggets, spices (after washing), chips etc. The top glazing is of 4mm plane glass. The bottom and four sides are double walled and insulated with 12mm thermocol. A number of openings are made both at the lower and upper sides of the dryer for entry of ambient air and exit of hot air. The maximum stagnation temperature of the dryer under no load is found to be in the range of 69$^0$C to 95$^0$C.

| Specifications & Performance results | | |
|---|---|---|
| Shape | : | Rectangular |
| Cost, Rs | : | 2,000 |
| Capacity, kg/batch | : | 0.5–1 |
| Weight, kg | : | 12.5 |
| Time to dry potato chips, h | : | 5 |
| Time to dry carrot chips, h | : | 6 |
| Power requirement | : | One labour |

## Benefits over conventional/traditional practices

- The gadget is easy to fabricate and use. Practically, it does not need any maintenance except to take care of the glass.
- It reduces the drying time and also the quality of dried product is good and no harm by dust particles.

**Design:** ICAR-NRRI, Cuttack

**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-National Rice Research Institute, Cuttack, Odisha-753006, Phone: +91-671-2367757/67, Email:director.nrri@icar.gov.in

# Chaff and Husk Stove

## Utility

The stove uses rice husk and chaff to provide heat energy for cooking. It is a low cost technology with possible high benefits. It works on the principle of gasification and induced natural air draft. It burns the husk or chaff without producing smoke. Sustainability rating of this technology is very high; it uses the available rice husk in the rural places. It consumes 1.5-2.0 kg husk in one batch and burns for 45-60 minutes.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Rice husk |
| Dia x Ht, mm | : | 370 x 430 |
| Weight, kg | : | 2.6 |
| Cost, Rs. | : | 700/- |
| Fuel holding capacity, kg | : | 1.2 |
| Fuel consumption, kg husk/chaff | : | 2 and 160 |
| Burning time, min/h | : | 45 |
| Useful life of the stove, year | : | 5 |

## Benefits over conventional/traditional practices

- Boon to rural people for boiling of water, cooking of rice etc.
- Trouble free.
- Produce less smoke.
- Gives a clean atmosphere.
- Saving of fuel.
- Can be fabricated by small scale industry.

**Design:** ICAR-NRRI, Cuttack

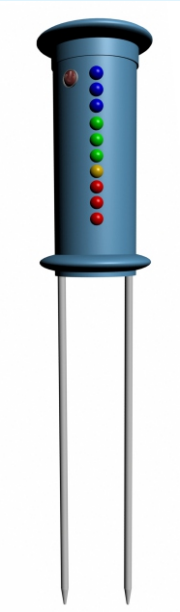
**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-National Rice Research Institute, Cuttack, Odisha-753006, Phone: +91-671-2367757/67
  Email: director.nrri@icar.gov.in

# Soil Moisture Meter

## Utility



Efficient irrigation management practices such as irrigation scheduling, based on soil moisture status is rarely in practice. In an effort to save water and to facilitate irrigation scheduling, a handy and user friendly electronic moisture indicating device, named “Soil Moisture Indicator” is developed with the active participation of farmers. Soil moisture indicator is found better than tension meter in assessing the moisture status of the fields and helping farmers to decide when to irrigate. Based on the farmers' experience, it is found that scheduling irrigations based on soil moisture status considerably reduce the number of irrigations required for cultivating crops, thereby saving precious water without affecting the productivity.

## Specification

The field capacity and the permanent wilting point are two levels of moisture that are used to calculate available water for plant. This soil moisture indicator has been designed to objectively indicate soil moisture status. This device works based on the principle that electrical conductivity of the soil is directly proportional to soil moisture or soil electrical resistance is indirectly proportional to soil moisture content (similar to gypsum block technique). Three LEDs are provided for approximation and to suit different soils. The device indication is as follows:

Moisture status slightly above permanent wilting point is indicated by red or orange LED light. This status indicate immediate requirement for irrigation.

Soil moisture status sufficiently above wilting point and less than field capacity (sufficient soil moisture) is indicated by Green light. No need for immediate irrigation can wait for few more days.

Soil moisture at field capacity is indicated by Blue glow. Excess or more than sufficient soil moisture.

Approximate price per unit is Rs. 1500/-+GST.

**Benefits over conventional/traditional practices**

- Scheduling irrigations based on soil moisture status require 36 irrigations per sugarcane crop (12 months) compared to conventional farmers practice which require about 42 irrigations.
- About 30 lakh litre water is saved per hectare.
- Device is user-friendly
- Based on soil moisture status improves the irrigation water use and helps in irrigation scheduling.

**Design:** ICAE-SBI, Coimbatore

**Commercialization Status:** Commercialized

**Contact:**

- M/s KSNM Marketing, SF No. 29/1B, Ona Palayam,Vadavalli to Thondamuthur Road, Coimbatore Tamil Nadu 641 109, India, +91 93632 61175 , +91 93603 88900, Email: info@ksnm.in
- M/s Nagarjuna Agrochemicals Pvt. Ltd., G-01, D.No. 6-3-1218/6/2, Street No.6, Spring Heaven, Umanagar, Begumpet, Hyderabad-500016, Andhra Pradesh, India, Email: minilab2015@yahoo.com, Phone: 7660000650,
- M/s Tech Source Solutions, #163, Rajeshwari Complex, 2nd Floor, Above Karnataka Bank, R V Road, Near Minerva Circle, Bengaluru 560004, Email: info@techsourcesolutions.in., Mobile: +91 9035067427
- M/s G.T. Biosciences Pvt. Ltd., Plot No. 47,48, PremSailV, Shilpa Co-op. Housing Society, Narendra Nagar, Nagpur - 440024 (MS), E-mail: gtbiosciences38@gmail.com, Ph . 07232 255154
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- M/s GayathriAgri Inputs Regd.Office : Plot No.10,Block No.25, IndFloor,APIIC Industrial Area, Autonagar, HayathnagarMandal,R.R., Dist. Hyderabad-500070 E-Mail: gayatriagri14@gmail.com, Ph. :+91 99595 22537, +91 91777 55523
- M/s SKR AGROTECH, No. 5, Mohta Market, Main Road, Wardha (M.S.), Pin – 442001E-mail: info@skragrotech.com, Phone: 07152-242662; Mobile: 9665022980
- M/s. LABTRONICS, Plot No.129, Phase- II, Industrial Area, PANCHKULA 134113. HARYANA, INDIA. E-mail: info@labtronicsindia.com. Mobile: 9814177389
- M/s ParasharAgrotech Bio Pvt Ltd., No. S-15/2-14-4-5, Mohankung

Apartment, Ghausabad,Varanasi-221002 (U.P.) E-Mail : Parasher76@gmail.com, Ph: 9918470920, 8173844260

- M/s HARIT BIO-CONTROL LAB Siddhant, 74 Mangesh Nagar, Dehankar layout, Bhosa road, Yavatmal-445001, Email: haritbio'123@rediffmail.com, Mobile:7745067481; 9422167481
- M/s Solvent Connect India (P).Ltd, H.O.-2/58,Rajanikhand, Sarda Nagar Yogna, Lucknow-226002(U.P), Email:solventindias@gmail.com. Mobile:8004990075; 9889130949.
- M/s Richardson Agriclinic& Agribusiness Pvt. Ltd 375 B, Singapore township, Tatawalichanda, Indore-452010 Email: richardsonacabpvt.ltd.112@gmail.com. Mobile: 9039012443, 9039012440
- M/s Oxytech Corporation No.1279A, Mettupalayam Road, SAHS College post, Coimbatore, Tamilnadu E-mail: oxytechcbe@gmail.com; oxytech3@gmail.com Phone/Fax : 0422 4220390 Mobile:09894064432
- M/s Network Solution, 5/607, Uma Nagar , Deoria, Uttar Pradesh, 274001 Email:sanjaydubey.aman1995@gmail.com., Phone: 8853264915
- RANAJI BIOTECH (INDIA) PVT.LTD G-1517 AwasVikas, No.1 Kalyanpur, Kanpur-208017(U.P), E-mail: ranajibiotech@gmail.com, Mobile: 9140334350, 7800000040
- M/s Celebrating Farmers Edge International Pvt.Ltd. Plot No.79, Yeshwant Bugalow, Opp. Grudut Socity, Sarmath Nagar, Nashik, Maharastra-422005, E-mail: celebratingfei@gmail.com, Mobile: 9416020888,
- M/s Varsha Agrotech, #68, Navraspur extension colony, Near Jalanagar, BIJAPUR-586103, Karnataka Email: Sales@varshaagrotech.in, Mobile: 9663179233/8618504401
- M/s MICROPLEX INDIA 36,Mohta Market,MainRoad, Wardha(M.S)-4422001 Email: Microplex.india@gmail.com, Ph: 9422141797
- M/s NEXT GEN AGRO TECH Amolbhakre, Plot No.12-B, Borgaon Industrial area, Tehsil Suasar,dist. Chhindwara, Madhya Pradesh-480106 , Ph: 9766171666
- Director ICAR-Sugarcane Breeding Institute, Coimbatore - 641 007. E-mail: director.sbi@icar.gov.in; Tel. 0422-2473971

# Vegetable Vending Van

## Utility

Arka-Vegetable vending van used to maintain the freshness of fruits & vegetables. It consists of 40 trays and each tray can be filled with approx. 10 kg. Hence, total 400 kg can be used for vending. The van works based of the principal of evaporative cooling. The freshness of the produce will be maintained upto 36 h. The vending chamber is built on any Light Commercial Vehicle chassis.

| Specifications & Performance results | | |
|---|---|---|
| Base vehicle | : | Any Light Commercial Vehicle |
| Weight, kg | : | 1400 |
| Specification | : | Solar powered evaporative cooling audio video systems and lighting |
| Cost of machine, Rs. | : | 13,00,000 (or) 16,00,000 |
| Capacity, kg | : | 1800 |
| Shelf life, hours | : | 36 |

## Benefits over conventional/traditional practices

- All the fruits& vegetables can be sold fresh upto 36 hours.

**Design:** ICAR-IIHR, Bengaluru

**Commercialization Status:** Commercialized

**Contact:**

- M/s Omega Metallic, Bengaluru – 560 058, Mobile: +918123415828, E-mail: omegametalic@gmail.com
- M/s Sickle Innovations Pvt Ltd, Ahmedabad : 380015, M 9426647045, Web-www.sickle.in, Email : nitin@sickle.in
- M/s Own Leadz, Thrissur, Kerala 680 020
- M/s Leo Industries, Bengaluru – 560 073
- M/s Rinac India Limited, Bengaluru - 560008
- M/S Freshpro Agri Solutions Pvt. Ltd., Haryana-136118, Email-freshproglobal@gmail.com; phone: 9996999909
- Director, ICAR-IIHR, Hessaraghatta Lake Post, Bengaluru-560 089. E-mail director.iihr@icar.gov.in website:https://www.iihr.res.in

# Solar Powered Tricycle for Fruits and Vegetables Vending

## Utility

Tricycle is powered by DC motor to ride. Evaporative cooling system, audio and LED lighting are powered by solar power system fitted on the roof. It carries 20 plastic crates with total loading capacity is 200 kg. It works based on the principle of evaporative cooling, to keep the produce fresh upto 36 hours.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Solar Panel |
| Weight, kg | : | 180 |
| Specification | : | Solar power motor drive, evaporative cooling, audio and LED lighting system |
| Cost of machine, Rs. | : | 2,50,000 |
| Capacity | : | 200 |

## Benefits over conventional/traditional practices

- Vegetable remain fresh for 27 to 36 h.

**Design:** ICAR-IIHR, Bengaluru

**Commercialization Status:** Commercialized

## Contact:

- M/s Power Base Technlologies, Bengaluru, Mobile: 97311 81904; E-mail:aloysiusr@gmail.com
- M/s Palvi Industries, Sangli- 416 436, Mobile No. 94212 17833; E-mail :palviindustrie@gmail.com
- M/s Concorde Engineering Works,Bangalore – 560 015, Mobile: +919886781667; E-mail: sivakumar1671@gmail.com
- M/s Skycraft Technology Pvt. Ltd., Mr. Kevin Cherian, Bengaluru, Mobile: 7022736595 ; E-mail: synokvvin2008@gmail.com
- M/s Greymart Mobility Pvt. Limited, Bengaluru – 48, Mobile: 98440 08911; E-mail-rajendra@rajamane.com
- M/s SVS Power Systems, Bengaluru- 22, Mobile: 98459 47774; E-mail-svs.powersystem@gmail.com
- Director, ICAR-IIHR, Hessaraghatta Lake Post, Bengaluru-560 089. E-mail director.iihr@icar.gov.in website:https://www.iihr.res.in

# Large Capacity Paddy Straw Based Biogas Plant

## Utility

Paddy straw can be digested by anaerobic digestion for the production of biogas as a fuel for the kitchen as well as for power generation. The latest method of anaerobic digestion of paddy straw i.e. "Dry Fermentation of organic wastes" be carried out which requires little labour and produces large amount of biogas for a period of 3 months. The digested material so produced from such anaerobic digestion is good quality manure ready for use in the fields.

| Specifications & Performance results | | |
|---|---|---|
| Volume of digester, $m^3$ | : | 135 |
| Capacity of floating drum gas holder, $m^3$ | : | 20 |
| Diameter of floating drum gas holder, m | : | 4.5 (15 ft) |
| Paddy straw required per batch, Quintal | : | 180 (18 MT) |
| Cattle dung required per batch, Quintal | : | 45 (4.5 MT) |
| Paddy straw utilization per year, Quintal | : | 720 (72 MT) |
| Paddy straw collection area | : | 12 Hectare |
| Biogas generation, $m^3$/day | : | 50 – 60 (equivalent to 2.5 – 3 cylinders of L.P.G. per day for 3 months) |
| Cost , Rs. | : | 16,29,000/- |

## Benefits over conventional/traditional practices

- Saving of 2.5 – 3.0 cylinders of L.P.G. per day for 3 months.

**Design:** AICRP on EAAI

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Bhullar enterprises, Ludhiana (141412), Contact No. – 97818-11113 , Email ID - bhullarenterprises13@gmail.com

# Model Agrivoltaic System

Junagadh Agricultural University (JAU) designed and installed 13.5 kW Agrivoltaic system in which agriculture lands could be used for generation of solar power without adversely affecting agriculture production.

## Utility

Energy to establish or run rural level industries, processing of food etc. System can help irrigate farmer's fields and augment farmer's incomes by feeding the surplus power generated into the grid.

Harvesting solar power on farmer's fields can thus act as harvesting another crop, and can provide a sort of insurance even when crop fail and ensures maximum utilization of land.

Another advantage would be the transportation losses may decrease and extra income can be generated by energy supply to the grid that will also help to reduce migration of rural people to the urban area.

## Specification:

- 13.5 kW capacity agrivoltaic system over 300 $m^2$ area, i.e. 0.044kW/$m^2$.Total 90 numbers (each having power capacity of 50Watts) of panels used.

## Cost of JAU model Agrivoltaic System

- The capital investment of 300 $m^2$ area of AV structure is ₹8,14,500. Considering the life span of structure i.e. 25 years, the fixed cost of structure is calculated as 60.55 ₹/$m^2$.

**Design:** Junagadh Agricultural University

**Commercialization Status:** Commercialized

## Contact:

- Director – IT, Information Technology Cell, Opp. University Bhavan, Junagadh Agricultural University, Junagadh 362 001, Gujarat, Email: dit@jau.in

# Bio-char Production and Gaseous Fuel for Thermal Application

## Utility

Junagadh Agricultural University (JAU) Junagadh open core throat less downdraft biomass gasifier using shredded biomass as feed stalk have been designed, developed and evaluated its performance by using shredded biomass.

The gasifier reactor system was designed for 80 MJ/h thermal capacities, by considering shredded cotton, Castor and pigeon pea stalk as a feed stalk.

| Specification | | |
|---|---|---|
| Fuel consumption, kg/h | : | 7.5 |
| Quantity of gas produced, $m^3/h$ | : | 21.2 |
| Volume of reactor, $m^3$ | : | 0.046 |
| Area required, $m^2$ | : | 0.0395 |
| Diameter of reactor and height of reactor, m | : | 0.225 and 1.5 |
| Length and diameter of cyclone separator, mm | : | 400 and 200 |

## Benefits over conventional/traditional practices

- At the maximum gasification efficiency of 75.59 % (22 $m^3/h$ gas flow rate) residual biochar were found 24.91 % for cotton stalk.
- The maximum value of gasification efficiency was found as 71.44 and 73.76% at the gas flowrate of 22$m^3/h$ shredded Castor and Pigeon pea stalk.
- The value of residual bio char production found as 18.75, 22.02, 16.84 and 18.19,22.41,17.22 at different gas flow rates of 20,22 and 24$m^3/h$ for shredded castor and pigeon pea stalk respectively.
- Cost of the gasifier system with different components is Rs. 1,75,000/-.

**Design:** JAU, Junagadh

**Commercialization Status:** Commercialized

**Contact:**

- Director – IT, Information Technology Cell, Opp. University Bhavan, Junagadh Agricultural University, Junagadh 362 001, Gujarat, Email: dit@jau.in

# Biochar Reactor for Continuous Biochar Production

## Utility

This is a modern technology which is capable of the continuous production of bio-char from crop residues, with significant recovery of heat and greater flexibility towards biomass feed stocks. The capacity of the reactor is 1-30 kg biomass per hour.

## Salient Features:

- In this reactor, biomass is transported through the heated reactor zone by means of a rotating, helical screw.
- Raw biomass is fed through hopper, which is coupled with auger and the main reactor is constructed of SS 304.
- Biomass that is loaded with hopper moved to the auger where it is converted into biochar and syngas.
- A cyclone separator is provided to separate biochar and syngas.
- The main reactor received the desired heat through its outer shell.
- The cost of production of one kg of biochar is Rs. 32 per kg.
- The payback period is 11 month by considering the selling price of produced biochar @ Rs. 75/kg.

## Benefits over conventional/traditional practices

- The design is simple and can utilize different crop residue.
- Provides solution for management of agro waste.
- A higher biochar yield of 25 to 35%.

**Design:** MPUAT, Udaipur

**Commercialization Status:** Commercialized

## Contact:

- Principal Investigator (FIM Project), College of Technology & Engineering, MPUAT, Udaipur- 313001 (Rajasthan), Tel: 91-294-2470119, Email : deempuatudr@gmail.com

# Annular Core Biochar Production System

## Utility

The unit is designed and developed to generate the char at different temperatures. The char generated at different temperatures have different properties. The crop residues which are being burnt can be converted into useful value-added products i.e., char. The generated char can be used for fuel, water cleaning agent, soil amendment and carbon sequestration agent.

## Status of Technology Transfer/ Commercialization:

The unit has been sold to three places in India. The design can be customized and supplied to user from ICAR- CIAE, Bhopal.

## Benefits over conventional/traditional practices

- The system converts the crop residues into useful valued products.
- The system process conditions can be changed depending upon the need of application.
- System design can also be changed depending upon the extent of use and type of biomass. The design can be customized for reactor capacity of 20 l to 100 l and for heating capacity of 4 kW to 12 kW.
- The char recovery is from 20-30% depending on the temperature. At higher temperature, the recovery is lower but the carbon content in the char is higher.
- The carbon content of 70-90% can be obtained. The iodine value from 200 to 500 mg/g can be obtained. The pH of char from 6 to 9 can also be altered.
- Precise thermal regulation, easy replacement of heating elements, current leakage protection, outflow gas control and customized design.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

## Contact:

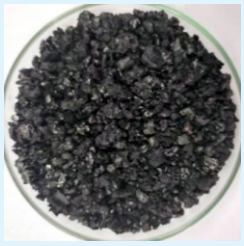
- Director, ICAR-CIAE, Nabi Bagh, Berasia Road, Bhopal 462038, Tel: 0755-2521134; Email: directorciae@gmail.com, director.ciae@icar.gov.in

# Carbon Molecular Sieves Production

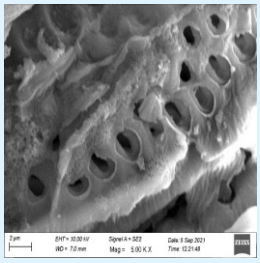
## Utility

The carbon molecular sieves can be utilized for gas purification particularly for the removal of carbon dioxide from biogas.The methodology involves activation of feedstock at a temperature of 700 °C, residence time of 90 min and impregnation ratio of 1:1 with $H^3PO^4$ followed by chemical vapor deposition at deposition temperature of 900 °C, deposition time of 30 min and benzene flow rate of 5 ml $min^{-1}$. The carbon molecular sieves prepared at this condition has surface area of 1607 $m^2$ $g^{-1}$ with micropore volume of 0.5931 $cm^3$ $g^{-1}$. The carbon molecular sieves produced using this ethodology achieved a $CO_2$ adsorption capacity of 355.8 mg $g^{-1}$and improved the calorific value of model biogas mixture from 4700 to 7300 kcal $m^{-3}$.


Fixed bed carbon molecular sieve reactor



Carbon molecular sieves



SEM micrograph of CMS

**Cost:**
Rs. 970 per kg of carbon molecular sieves.

**Design:** CRP on EA

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Principal Investigator-LCPC, CRP on EA, ICAR-CIAE, Bhopal, Email: ceronea.ciae@gmail.com, director.ciae@icar.gov.in

# Biomass Gasification Integrated Fischer-Tropsch Synthesis

## Utility

It holds the sack in vertical open position for easy loading of cleaned grains and granular materials. Its height can be adjusted to the size of the sack and suitable for all types of materials.

**Design:** CRP on EA

**Cost of the system:** Rs. 6,00,000

**Commercialization Status:** Ready for Commercialization

**Contact:**

- Principal Investigator-LCPC, CRP on EA, ICAR-CIAE, Bhopal, Email: ceronea.ciae@gmail.com, director.ciae@icar.gov.in

# SPAD (Soil Plant Analysis Development) Meter

## Utility

SPAD Meter is a compact, hand held, portable and low cost instrument [paper stapler size], which measures chlorophyll content of the plant leaves [up to one mm thickness].It assess nitrogen requirement of the crop and makes recommendation for doses of nitrogen application. It is operated through android smart phone and provides instant display of data. The accuracy of the instrument is ±1.5 SPAD units.


| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Electrical Battery |
| Cost of equipment, Rs. | : | 2,200 |

## Benefits over conventional/traditional practices

- Compact in size, can easily assess nitrogen requirement of the crop.
- Much cheaper compared to imported SPAD meter.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

**Contact:**

- M/s SKR AGROTECH, Wardha, Maharashtra, Mr. AvirajRathi, Phone No. : 07122-727722, Email: skragro.mp@gmail.com, info@skragrotech. co. in
- M/s W S Telematics Private Limited, New Delhi, Delhi, Mr. Wazir Singh Dahiya, Mobile: 9999566860
- M/s Next Gen, Nagpur, Maharashtra, Mr. Anmol Barotarao Bakare, nextgen.mpagro@gmail.com, Mob: 0712-2727722, 9977971389
- Director, ICAR-Central Institute of Agricultural Engineering, Bhopal Telephone: 0755-2731134, Email: directorciae@gmail.com, director.ciae@icar.gov.in

# Modular Backyard Poultry Cage

## Utility

This is suitable for domestic scale backyard poultry occupation. The design being modular, it can be scaled up to commercial scale by installing the multiple units. Transportation cost is also reduced due to modular structure

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | No power required |
| Capacity | : | 20 birds |
| Cost of machine, Rs | : | 15,000/- |

## Benefits over conventional/traditional practices

- Modular design.
- Reduced transportation cost.
- Made of rust free FRP material.

**Design:** ICAR-CIAE, Bhopal

**Commercialization Status:** Commercialized

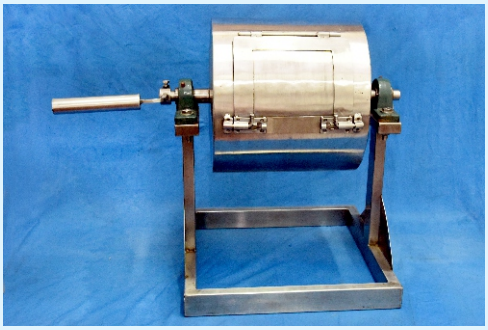
**Contact:**

- M/s Burgeon Agri Pvt Ltd., Nashik Maharashtra, Phone: 0253 235 4653
- Director, ICAR-Central Institute of Agricultural Engineering, Bhopal Telephone: 0755-2731134, Email: directorciae@gmail.com, director.ciae@icar.gov.in

# FISHERIES EQUIPMENT

# Manual Fish De-Scaling Machine

## Utility



Hand operated fish descaling machine is suitable for removing the scales of fishes easily from almost all types/sizes/ species of fishes ranging from marine to freshwater species like Sardine, Tilapia to Rohu.

De-scaling, being a laborious activity requires skilled man power and consumes over 50% of the processing time. Prevalent practice is to manually remove the scales with sharp edged knives which is very tedious. Human drudgery involved in fish descaling process is significantly reduced and the operation of the machinery does not require skilled personnel. Apart from cleaning the fish, the technology also keeps the process and surroundings clean without spilling of scales. Under full load, perfect removal of scales was achieved which reduced efforts of manual descaling.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | One person |
| Loading capacity, kg | : | 3 |
| Cost, Rs | : | 5,500/- |
| Time taken for descaling, min | : | 5-10 |
| Suitable fishes | : | Sardine, Tilapia to Rohu, Pearl spot, Thread fin bream, etc |

## Benefits over conventional/traditional practices

- Significant reduction in drudgery involved in fish descaling process.
- Savings in labor cost, duration and material handling.
- Operation doesn't require skilled personnel.

**Design:** ICAR-CIFT, Cochin

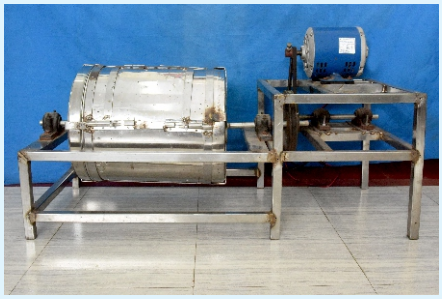
**Commercialization Status:** Commercialized

## Contact:

- Director, ICAR-Central Institute of Fisheries Technology, CIFT Junction, Willingdon Island Matsyapuri P.O., Cochin-682 029, Kerala, Ph: 0484-2412300, E-mail:aris.cift@gmail.com; akmu.cift@icar.gov.in, Website:www.cift.res.in

# Motorized Fish Descaling Machine

## Utility



Use of descaling machine removes scales from fishes. Removing the scales of fishes is a laborious and time-consuming which also requires skilled man power. Mechanization of descaling process could significantly reduce the handling time thereby shortening the pre-processing period. Moreover, it reduces the drudgery of labor involving in manual descaling of fishes. Use of descaling machine reduces the overhead costs and enhances the quality of the final product.

| Specifications & Performance results | | |
|---|---|---|
| Loading capacity, kg | : | 5 |
| Cost, Rs | : | 13,800/- |
| Time taken for descaling, min | : | 5-10 |
| Suitable fishes | : | Sardine, Tilapia to Rohu, Pearl spot, Thread fin bream, etc |

## Benefits over conventional/traditional practices

- Significant reduction in drudgery involved in fish descaling process.
- Savings in labor cost, duration and material handling.
- Operation doesn't require skilled personnel.

**Design:** ICAR-CIFT, Cochin

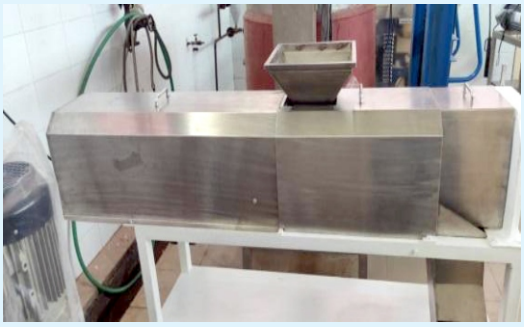
**Commercialization Status:** Commercialized

## Contact:

- Director, ICAR-Central Institute of Fisheries Technology, CIFT Junction, Willingdon Island Matsyapuri P.O., Cochin-682 029, Kerala, Ph: 0484-2412300, E-mail:aris.cift@gmail.com; akmu.cift@icar.gov.in, Website:www.cift.res.in

# Mechanical De-proteinization System for Chitin Production Line

## Utility



A simple mechanical deproteinisation unit has been developed, which can effectively remove about 80% of protein content of shrimp shell/head material as thick slurry. The volume of the shell after processing is also reduced to 40 percentage of the material volume, which means the production capacity may be increased by more than double the quantity as compared to chitin extracted by conventional chemical protocol. The machine is made fully in SS 304 and is attached with a motor.

| Specifications & Performance details | | |
|---|---|---|
| Power source | : | Electric motor |
| Weight, kg | : | 80 |
| Capacity kg/h | : | 100 |

## Benefits over conventional/traditional practices

- Clean and zero-waste process.
- Astaxanthin, a carotenoid pigment found in shrimp shells can be recovered from the caroteno-protein rich slurry separated. Astaxanthin is very valuable in the medical field, and has a high sale value.
- Astaxanthin is also good as animal and aqua feed supplement.
- Slurry serves as a good source of nitrogen and can be best utilized for foliar spray and manure production.
- Reduced quantity of alkali, the quality of both chitin and chitosan is far better than conventional protocol.

**Design:** ICAR-CIFT, Cochin

**Commercialization Status:** Ready for commercialisation

**Contact:**

- Director, ICAR-Central Institute of Fisheries Technology, CIFT Junction, Cochin-682 029, Kerala, Ph: 0484-2412300, E-mail:aris.cift@gmail.com; akmu.cift@icar. gov.in,

# Mechanized Pond Applicator (MPA) Introduction

## Utility

Mechanized pond applicator (MPA) mechanically spreads the inputs uniformly in the pond and effectively reduces the manpower requirement for the culture operation. Management of large aquaculture pond environment has always been the limitation for uniform application of the inputs due to inaccessibility from shore to the central areas. Use of floating rafts or boats help in such ponds for taking the inputs to the central portion. However, such practice is always cumbersome and labor intensive.

| Specifications & Performance results | | |
|---|---|---|
| Pump capacity, KW | : | 1 (petrol/kerosene operated) |
| Platform area, $m^2$ | : | 6.6 |
| Storage tank capacity, $m^3$ | : | 0.5 |
| Suction chamber capacity, $m^3$ | : | 0.38 |
| Total Volume of buoys, $m^3$ | : | 0.8 |
| Load capacity: Approx., kg | : | 750 |
| Cost, Rs. | : | 1,30,000 |

## Benefits over conventional/traditional practices

- Uniform distribution of inputs (lime, fertilizers, manure, therapeutics) in large pond.
- Significant reduction of manpower requirement.
- Cost efficient input application.
- Can be used as an emergency aeration device.
- Raft can also be used to provide feed in the feeding bags/platforms.
- Makes culture operation in large ponds easy.

**Design:** ICAR-CIFA, Bhubaneswar

**Commercialization Status:** Ready for commercialization

**Contact:**

- Director, ICAR-Central Institute of Freshwater Aquaculture, Kausalyaganga, Bhubaneswar, PIN-751002, Phone: 91-674-2465421,2465446, E-Mail: director.cifa@icar.gov.in

# Improved Aeration Device for Large Aquaculture Ponds

## Utility

Feed intake and growth of fish is adversely affected when dissolved oxygen (DO) level becomes low. Aeration becomes necessary to supplement natural sources of dissolved oxygen in ponds stocked at higher stocking densities. In the countryside, where fish farms are mostly located, the electric supply is either non-existent or highly uncertain. Keeping in mind the erratic power supply, a diesel operated aerator has been developed. Since, it is a mobile aerator, by using an indigenously made bottom racker, it can rack/ disturb the bottom and releases many obnoxious gas deposited in the pond bottom during the culture period.

| Specifications & Performance results | | |
|---|---|---|
| Engine, kW diesel | : | 5.5 |
| Platform | : | Wooden |
| 250 liter HDPE cylindrical barrels | : | 6 (on each side) |
| Cost of machine, Rs. | : | 50,000-60,000 |
| Efficiency | : | Maintains better oxygenation with a value of around 6.83± 0.34 |

## Benefits over conventional/traditional practices

- It can rack/ disturb the bottom and releases many obnoxious gas deposited in the pond bottom during the culture period.
- It maintains oxygenation level throughout the pond suitable for intensive aquaculture practices.

**Design:** ICAR-CIFA, Bhubaneswar

**Commercialization Status:** Ready for commercialization

## Contact:

- Director, ICAR-Central Institute of Freshwater Aquaculture, Kausalyaganga, Bhubaneswar, 751002, Phone: 91-674-2465421,2465446, E-Mail: director.cifa@icar.gov.in

# Solar Fish Dryer

## Utility

Solar fish dryer contains two stainless steel sliding trays used for drying of fish. The trays are placed at a convenient height from ground level for easy handling of materials. The space below the trays is covered to work as a hot box. The three sides are covered with aluminum sheet and black painted to act as heat absorber. The bottom is covered with water proof ply. The back side is provided with two doors. Perforations are made at the bottom of the front wall for entry of air and two chimneys are provided for exit of hot humid air after drying.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Solar energy |
| Capacity, kg | : | 20 |
| Cost, Rs | : | 15,000/- |
| Type of the dryer | : | Farm portable |
| Mode of working | : | Natural |
| Type of material used for the construction of the dryer | : | Square mild steel bars, Water proof ply. UV stabilized 200 micron polyethylene sheet |
| Initial m.c.,% (w.b.) | : | 65 |
| Final m.c., % (w.b.) | : | 14 |
| Drying temperature$^0$c | : | 47-62 |
| Thermal Efficiency,% | : | 31-38 |

## Benefits over conventional/traditional practices

- Renewable energy based low cost structure.
- It requires less space for construction. Local artisan can easily erect it.
- Fish to be dried can be easily loaded and removed.
- Maintains the quality and colour of dried product.

**Design:** ICAR-NRRI, Cuttack

**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-National Rice Research Institute, Cuttack, Odisha-753006, Phone: +91-671-2367757/67
  Email: director.nrri@icar.gov.in

# Portable Fiber Reinforced Plastic (FRP) Carp Hatchery

## Utility

It is suitable for small scale breeding with production capacity of 1.0-1.2 million spawn of Asiatic carps in one operation.The FRP carp hatchery operates with the principle of eco-hatchery. One complete unit consists of (i) Breeding/ spawning pool, (ii) Hatching/ incubation pool,(iii) Egg/ spawn collection chamber, and (iv) Overhead storage tank and water supply lines. Its efficiency is cent percent in field condition. With spawn availability in one operation from the hatchery unit and with proper seed rearing practices, about 30 hectare ponds can be stocked with good quality fish seed.

The profit to the hatchery operator can be 2-3 lakh rupees in one year with full operation of the hatchery unit.

| Specifications & Performance results | | |
|---|---|---|
| Dimensions<br>Breeding pool: | : | (2.15 m (D), 0.9 m (H), 1:22 bottom slope) |
| Hatching pool: | : | (1.4 m (D), 0.98 m (H)) |
| FRP inner chamber | : | 0.4 m (D) |
| Nylon mesh height | : | 90 cm |
| Egg collection chamber: | : | (1.0 m (L) × 0.5 m (B) × 0.5 m (H)) |
| Material of Make | : | Fiber Reinforced Plastic (FRP) |
| Cost, Rs. | : | 1,50,000/- |
| Operational Capacity | : | 20-24 kg brood stock, 1.0-1.2 million spawn in one operation |
| Annual profit, Rs. | : | 2-3 lakh to the hatchery operator. |

## Benefits over conventional/traditional practices

- Portable in nature.
- Easy to install and operate.
- Reparability and user friendly.

**Design:** ICAR-CIFA, Bhubaneswar

**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-Central Institute of Freshwater Aquaculture, Kausalyaganga, Bhubaneswar, 751002, Phone: 91-674-2465421,2465446, E-Mail: director.cifa@icar.gov.in

# FRP Portable Magur Hatchery

## Utility


The technology creates a suitable environment for high hatching percentage, where maximum 50,000 eggs can be incubated at a time. Portable Magur Hatchery has its high market demand due to its protein rich flavour and medicinal value. It comprises a stand on which are placed a row of plastic tubs (old design). Water supplied is from the overhead tank through a common pipe to all the tanks with individual control tabs. It includes hatchery, egg incubation and hatching tanks.

| Specifications & Performance results | | |
|---|---|---|
| FRP Rectangular Larval Rearing Tank | : | (4.0 m (L) x 0.9 m (B) x 0.35 m (H)) (Four Numbers) |
| FRP Round Larval Rearing Tank | : | (1.5 m diameter and 0.35 m height) (Four numbers) |
| FRP Hatching Tank | : | (1.5 m diameter and 0.35 m height) (One number) |
| Cost, Rs. | : | 1,80,000/ |
| Incubation capacity | : | 50,000 eggs at a time. |

## Benefits over conventional/traditional practices

- Portability, reparability, durability.
- Higher Productivity.
- User Friendly.

**Design:** ICAR-CIFA, Bhubaneswar

**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-Central Institute of Freshwater Aquaculture, Kausalyaganga, Bhubaneswar, 751002, Phone: 91-674-2465421,2465446, E-Mail: director.cifa@icar.gov.in

# Solar Powered IoT based Water Quality Monitoring System

## Utility


Intensification in aquaculture for higher productivity necessitates continuous water quality monitoring. IoT based monitoring systems is useful for monitoring water quality and controlling motor system remotely.

Raspberry pi 3 and Arduino mega 2560 microcontroller-based water monitoring unit has been developed with DO, temperature, pH, turbidity sensor and data monitoring is done using three mode of information transfer viz. android application, web application and SMS alert. Wireless monitoring helps in efficient management of farm system. Data's can be viewed at the regular one hours interval and alert is provided when the system crosses the optimum threshold for immediate action.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Solar/ EB |
| Microcontroller | : | Raspberry pi 3/ Arduino mega 2560 |
| Sensor | : | pH, DO, temperature, Turbidity etc. (Additional sensor can be incorporated) |
| Monitoring mode | : | Android application, Web application and SMS |
| Cost, Rs. | : | 40,000 |
| Monitoring accuracy, % | : | 85-90 |
| Android, web and SMS monitoring | : | Every 1 hr (can be changed upto 5min) |
| Alert system | : | SMS |
| Calibration | : | 15 days once |

## Benefits over conventional/traditional practices

- Realtime management and planning reduces laboratory analysis cost.
- User friendly system.

**Design:** ICAR-CIBA, Chennai

**Commercialization Status:** Ready for commercialization

## Contact:

- Director, ICAR-Central Institute of Brackishwater Aquaculture, Chennai, Tamil Nadu. 60002, Phone: +91-044-24618817, 24616948, 24610565, Email : director.ciba@icar.gov.in

# Solar Powered Automatic Feed Dispenser for Shrimp Farming

## Utility

It holds the sack in the potential productivity level of exotic white-leg shrimp, Penaeusvannamei is around 10-12t ha-1 and handling the feed during the course of culture increases considerably especially towards the end of culture period. This necessitates automation in feeding practices so that labour problem could be solved. The biosecurity requirement for vannamei farming can also be best met with the use of automatic feeders. The feeder design comprised four major components viz., feed hopper, distribution mechanism, a control unit for regulating the quantity and frequency of feeding and the power supply unit. Automation is affected through two timers with a digital display so that dispensing of the feed frequency as well as duration of feeding could be easily adjusted by the farmers. This auto feeder is highly efficient for 0.8 to 1.0 ha P. vannamei farm.

| Specifications & Performance results | | |
|---|---|---|
| Power source | : | Solar |
| Drum capacity (feed), kg | : | 100-200 |
| Dispersion type | : | 30° Trajectory propulsion |
| Timer | : | Digital control |
| Cost, Rs. | : | 50,000/- |
| Solar panel | : | 255 W 24 V |
| Battery | : | 65Ah 2'nos |
| Max Dispensing dia, m | : | 39 |
| Feed dispenses in grams | : | 620g in 5sec |
| Dispersion | : | Wide range dispersion |
| Field efficiency, % | : | 90 |
| Motor rpm controller | : | 800 to 2800 |

## Benefits over conventional/traditional practices

- Helps in continuous and mealtime feeding based on user requirement.
- Reduces labour cost and feed wastage.
- Provides better growth rate and FCR compared to manual feeding.

**Design:** ICAR-CIBA, Chennai

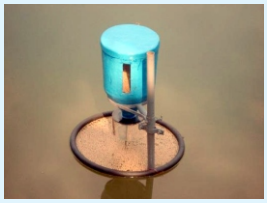
**Commercialization Status:** Ready for commercialization

**Contact:**

- Director, ICAR-Central Institute of Brackishwater Aquaculture, Chennai, Tamil Nadu. 600028, Phone: +91-044-24618817, 24616948, 24610565, Email: director.ciba@icar.gov.in.

# FRP Demand Fish Feeder

## Utility



FRP demand fish feeder has main components of 30 L capacity feed hopper and activated mechanism. The feeder is installed in a pond with the activating mechanism extending into the water through an activator rod. The activating mechanism includes steel bait rod, feed platform, feed protecting cover and pendulum or feeding tray in case of sinking feed. The feed drops by gravity onto the adjustable acrylic feed platform positioned below the hopper and above the water level. When fish activates the pendulum, feed pellets retained on the feed platform slowly drop on to the water surface. The gap (distance) between the feed platform and the end of the hopper cone is adjusted as per the size of the pellet feed.

| Specifications & Performance results | | |
|---|---|---|
| Capacity, kg pelleted feed | : | 10 |
| Dimensions | : | 485mm (L) x 330mm (D); Angle of Repose - 50º |
| Material of make | : | Fiber Reinforced Plastic (FRP) |
| Cost of one unit, Rs | : | 13,000/- with stand |

## Benefits over conventional/traditional practices

- Suitable for feed delivery to Indian major carps in outdoor culture system.
- Avoids organic pollution in the rearing ponds by delivering demanded quantity of feed .
- This can also provide indication to the culturist regarding the feed demand of fish.
- Increases feed consumption in fish by making it available to them continuously.
- Growth rates of fish are 10-15% higher in the cisterns/tanks/ponds with demand feeders than the fishes fed through feed broadcasting method.

**Design:** ICAR-CIFA, Bhubaneswar

**Commercialization Status:** Ready of Commercialization

**Contact:**

- Director, ICAR-CIFA, Kausalyaganga, Bhubaneswar, 751002, Phone: 91-674-2465421,2465446, E-Mail: director.cifa@icar.gov.in

# Sun Boat

## Utility


This is a fishing boat powered by solar energy. India has around 1,50,000 motorized boats in the marine sector. Consumption of petroleum products in India had increased up to 4000% when compared with 1950. The increasing fuel cost causes substantial loss to the fishery industry eating away fisherman's income.The exhaust gas produced from the burning of fuel pollutes the atmosphere and leads to global warming. Thus, the need of renewable and nonpolluting energy resources for boat propulsion has started spreading around the globe. CIFT SUN BOAT has been developed as a continual improvement in the renewable energy utilization of the small-scale inland fishing operation. The Boat is constructed with FRP.

| Specifications & Performance results | | |
|---|---|---|
| Length, m | : | 8.0 |
| Breadth extreme, m | : | 2.40 |
| Breadth demi hull, m | : | 0.88 |
| Depth, m | : | 0.75 |
| Fuel consumption | : | NIL |
| Carrying capacity, | : | 6 persons |

## Benefits over conventional/traditional practices

- No fuel cost. No pollution from the burning of fuel.
- Less carbon footprint. Quiet and no sound pollution.
- Clean FRP surface for fishing handling.
- Twin hull with low rolling. More deck area.
- Suitable for shallow waters.
- Canopy for protection from rain and sun.

**Design:** ICAR-CIFT, Cochin

**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-Central Institute of Fisheries Technology, CIFT Junction, Willingdon Island Matsyapuri P.O., Cochin-682 029, Kerala, Ph: 0484-2412300, E-mail:aris.cift@gmail.com; akmu.cift@icar.gov.in, Website:www.cift.res.in

# Solar Cabinet Dryer with Electrical Back-up for Fish Drying

## Utility

A solar hybrid dryer can generate higher air temperatures and consequential lower relative humidity to improve drying rates and lower final moisture content of the final products. Solar cabinet dryer with electrical back-up consists of drying chamber with stainless steel trays for keeping the product in addition to a heating coil, exhaust and inlet for drying air. The perforated trays accomplish a through flow drying pattern within the dryer which enhances drying rates. Solar flat plate collectors transmit solar energy to the air flowing through the collector which is then directed to the drying chamber. Electrical back up comes into role once the desired temperature is not attained for the drying process, particularly during rainy or cloudy days. To support drying during night and rainly times, a backup of mechanical drying is recommended.

| Specifications & Performance details | | |
|---|---|---|
| Power source | : | Solar and electrical |
| Loading capacity, kg | : | 40 |
| Suitable products | : | Fish, fish products, vegetables, fruits etc. |
| Cost, Rs. | : | 3,40,000/- |
| Drying time for fish, h | : | 6-8 (varies based on the type of fish) |
| Labor requirement | : | 1 (For on-off controls and loading/unloading) |

## Benefits over conventional/traditional practices

- Green technology supplemented by electrical back up. Faster drying rates aiding in less risk of spoilage. The product is protected against flies, pests, rain and dust. Labor saving.
- Quality of the product is better in terms of nutrients, hygiene and color
- All Availability parts are made of food grade stainless steel.

**Design:** ICAR-CIFT, Cochin

**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-Central Institute of Fisheries Technology, CIFT Junction, Willingdon Island Matsyapuri P.O., Cochin-682 029, Kerala, Ph: 0484-2412300, E-mail:aris.cift@gmail.com; akmu.cift@icar.gov.in, Website:www.cift.res.in

# Solar Tunnel Dryer for Fish Drying

## Utility

Open air sun drying of fish is the traditional method employed by fisher folks in India to dry fish and fishery products, but it often results in inferior quality of product. Also, it requires longer drying time. A low cost, energy efficient solar tunnel dryer for bulk drying of fish and fishery products can be used for bulk drying during seasonal higher catch/excess landing of fish. Three ventilator fans of 0.5 hp are provided for air inlet and moisture removal.

| Specifications & Performance details | | |
|---|---|---|
| Power source | : | Solar |
| Loading capacity, kg | : | 50 |
| Suitable products | : | Fish and fish products, vegetables, fruits and agro-products |
| Cost, Rs | : | 1,50,000/- |
| Drying time for fish, h | : | 8-10 (varies based on the type of fish) |
| Labor requirement | : | 1-2 (For loading/unloading) |

## Benefits over conventional/traditional practices

- Stand-alone system, no AC power requirement.
- Hygienically prepared premium quality uniformly dried product.
- Economically viable and eco-friendly – maximum use of solar energy.
- Lower drying time with improved product quality.
- Improved shelf life and value addition fetches higher income.
- Labor requirement is reduced compared to open sun drying.
- Re-handling process like spreading, sorting and storing are eliminated.

**Design:** ICAR-CIFT, Cochin

**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-Central Institute of Fisheries Technology, CIFT Junction, Cochin-682 029, Kerala, Ph: 0484-2412300, E-mail: akmu.cift@icar. gov.in.

# Solar-LPG Hybrid Dryer for Fish Drying

## Utility

Continuous drying of fish is possible in this system with the help of LPG back up, during unfavorable weather conditions and during night In this system, water is heated with the help of solar collectors installed on the roof Axial flow fans are provided in the drying chamber for hot air circulation across stainless steel trays loaded with fish for drying. The circulating air is heated by hot water passing through the heat exchangers. When solar radiation is not sufficient LPG back up heating system will be automatically actuated to supplement the heat requirement. Drying is carried out under controlled temperature and humidity conditions. Controlled by PLC system.

| Specifications & Performance details | | |
|---|---|---|
| Power source | : | Solar and LPG |
| Loading capacity, kg | : | 60 |
| Suitable products | : | Fish and fish products, vegetables, fruits |
| Cost, Rs. | : | 5,50,000/- |
| Drying time for fish, h | : | 6-8 (varies based on the type of fish) |
| Labor requirement | : | 1 (For on-off controls and loading/unloading) |

## Benefits over conventional/traditional practices

- Green technology.
- Faster drying rates aiding in less risk of spoilage.
- Protection against flies, pests, rain and dust.
- Labour saving.
- Hygienic drying conditions even during cold/rainy days.

**Design:** ICAR-CIFT, Cochin

**Commercialization Status:** Commercialized

## Contact:

- Director, ICAR-Central Institute of Fisheries Technology, CIFT Junction, Cochin-682 029, Kerala, Ph: 0484-2412300, E-mail: akmu.cift@icar. gov.in.

# Production Line for the Direct conversion of Fish Market waste to Livestock and Aqua Feed

## Utility

Disposal of process discard is a major constraint in domestic fish markets as these discards often invite public resistance due to environmental pollution. A simple technology and machinery line for the direct conversation of wet market waste to aqua and poultry feed has been developed. The setup consists of 3 major component equipment, which takes in the wet fish waste and delivers fish feed in pellet form. These pellets can be either sun dried or dried using solar drier for future use in fish farms. The machinery line can be easily scaled up to higher capacities.

| Specifications & Performance details | | | |
|---|---|---|---|
| | **Part 1** | **Part 2** | **Part 3** |
| Size LxWxH (cm) | 70 x 60 x 201 | 167 x 94 x 118 | 138 x 107 x140 |
| Weight kg | 400 | 80 | 300 |
| Cost,Rs | 12,00,000/- | | |
| Capacity, kg/day | 1000 | | |

## Benefits over conventional/traditional practices

- The entre bulk waste generated in the domestic fish markets can be cleared within the market hours itself.
- Conversion of fish waste to high value end products is a wiser option for the processing industry/fish market as they can potentially generate additional revenue as well as reduce the cost of disposal of these process discards.

**Design:** ICAR-CIFT, Cochin

**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-Central Institute of Fisheries Technology, CIFT Junction, Cochin-682 029, Kerala, Ph: 0484-2412300, E-mail:akmu.cift@icar. gov.in.

# Mobile Refrigerated Fish Vending Kiosk

## Utility

Exposure of fishes to the atmosphere often leads to contamination by means of dust, insects and flies apart from deterioration of quality in terms of freshness and taste. To address the challenges, this technology is developed, which is a low-cost, energy efficient, hygienic mobile fish vending kiosk to sell fish at consumer's door step under hygienic conditions in village/urban/municipality areas with proper waste disposal system. The main components of the kiosk model are well insulated fish chilled storage cum display facility unit, hand operated de-scaling machine and fish dressing deck with wash basin, water tank, cutting tool, waste collection chamber and working space.

| Specifications & Performance details | | |
|---|---|---|
| Refrigeration capacity, liters | : | 100 |
| Loading capacity, kg | : | 30 kg of fish and fishery products |
| Insulation | : | PUF insulation (3-inch thickness) |
| Power consumption, kW | : | 0.3 |
| Cost, Rs. | : | 60,000/- |
| Temperature of chilled storage | : | 2– 3 °C |

## Benefits over conventional/traditional practices

- Ideal for women who finds it difficult to carry fish as head load.
- Hygienic fish vending, free from flies, insects and bad odor.
- Insulated storage space reduces the ice melting rate.
- Quality fish is delivered without the addition of chemical preservatives.
- Shelf life of fresh fish can be extended to 4-5 days.

**Design:** ICAR-CIFT, Cochin

**Commercialization Status:** Commercialized

## Contact:

- Director, ICAR-Central Institute of Fisheries Technology, CIFT Junction, Cochin-682 029, Kerala, Ph: 0484-2412300, E-mail:akmu.cift@icar.gov.in.

# Mobile Fish Vending Trolley

## Utility


This fish vending trolley is a carriage with uni-body design as all the facilities and equipment are integrated into it. An ice box is integrated in the carriage box and packed with 1 inch thick Polyurethane Foam to serve as the insulation. The icebox can store 80-100 kg of fish. Tool box is also provided for keeping the cutting tools, money box and other items required during the marketing process. The cutting tool is made removable and more than one type of cutting tool can be used. The complete unit is fabricated with fiber reinforced plastic (FRP), because of its high strength compared to other plastics, ease of fabrication and good insulation property.

| Specifications & Performance details | | |
|---|---|---|
| Weight of cycle rickshaw, kg | : | 150 |
| Cost, Rs | : | 55,000/- |
| Capacity of the ice box, litre | : | 170 |
| Capacity of utility space, litre | : | 20 |
| Capacity of water storage, litre | : | 20 |
| Weight of the filled gadgets, kg | : | 245 |
| Fish storage compartment temperature, $^0$C | : | 9-12$^0$C |
| Fish loading capacity, kg | : | 80-100 kg in a single fill |

## Benefits over conventional/traditional practices

- Hygienic fish vending.
- Higher sales volume per load in comparison to tradition mobile fish vendors.

**Design:** ICAR-CIFT, Cochin

**Commercialization Status:** Commercialized

## Contact:

- Director, ICAR-Central Institute of Fisheries Technology, CIFT Junction, Cochin-682 029, Kerala, Ph: 0484-2412300, E-mail:akmu.cift@icar.gov.in.

# Live Fish Carrier System

## Utility


The developed system can be used for transporting fish in live condition in order to help farmers by selling their produce in live condition and earn more income. LFCS is an battery operated tri-cycle based live fish transportation system for short and medium distance (about 80 km) transportation of fish in live condition. The carrier is constituted mainly with two components i.e., the Battery Operated Self-contained Aerating Vehicle (BOSCAV) and Stackable Aerating Containers (SAC) or Non-stackable aerating container (NSAC).

| Specifications & Performance results | | |
|---|---|---|
| Total Capacity | : | 500 kg including 100 kg live fish per trip |

## Benefits over conventional/traditional practices

- Mortality rate of fish is less than 1% mortality rate.
- Labour required is less.
- Water requirement is 50% less as compared to traditional systems.
- Supply of freshest quality of fish to the consumers.
- Zero polluting system with less running cost.
- Woman-friendly.

**Design:** ICAR-CIPHET, Ludhiana

**Commercialization Status:** Commercialized

**Contact:**

- M/s E-Magic Electric, Nangla Fateh Khan, PO- Patara, Jalandhar (Punjab)- 144101, Mob: 09914702070
- Mr. Indrajith MV, Mangalath Padath House, PO: Mayannur, Dist. Thrissur, Kerala – 679105
- M/s JJ FISH (Farakka), Vill- Khaira Kandi, PO-Beniagram. PS – Farakka, Dist. - Murshidabad (West Bengal) – 742212
- Director, ICAR-Central Institute of Post-Harvest Engineering and Technology (CIPHET), PAU, Ludhiana- 141004, Punjab, Ph No. 0161 2313103, Email: director.ciphet@icar.gov.in

# Fish Descaling Hand-tool (2-sides bristled)

## Utility


Two-sided bristled fish descaling hand tool is for dislodging the scales from the skin of fish. It is made up of polypropylene and stainless steel weighing merely 110 g. Its ergonomically designed handle gives appropriate grip and SS bristles on A-Side and PP bristles on B-side along with edge bristles provide comfortable, easy and fast descaling of fish. The SS bristles are normally useful to dislodge scales from bigger fish (>2.0 kg) and PP bristles (2.0 mm thick at base and 3.0 mm long) are useful for smaller fish (<2.0 kg). However, both types of bristles are useful for any size of fish when they are used in combination as per the requirement and convenience. The triangular shaped edge bristles help removing scales from narrow areas of skin.

| Specifications & Performance results | | |
|---|---|---|
| Weight, kg | : | 0.11 |
| Efficiency | : | 95-99% |

## Benefits over conventional/traditional practices

- Handle with appropriate hand-grip facilitates comfort in continuous descaling work for longer duration.
- Removable, steel bristle plates which can be easily removed and cleaned.
- The SS bristles can be replaced with new ones when bristles get blunt or damaged.
- Single tool can be used for big, medium and small fishes.

**Design:** ICAR-CIPHET, Ludhiana

**Commercialization Status:** Commercialized

**Contact:**

- Director, ICAR-Central Institute of Post-Harvest Engineering and Technology (CIPHET), PAU, Ludhiana- 141004, Punjab, Ph No. 0161 2313103, Email: director.ciphet@icar.gov.in