Regional Catalogue of Agricultural Implements

RNAM
ETWORK FOR AGRICULTURAL MACHINERY

JANUARY 1980

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FOREWORD

Why a Catalogue of Agricultural Machinery?
Are there not enough glossy catalogues being issued by manufacturers?
Is the United Nations going into the selling business?

Such are the questions that will arise in the minds of those who are not familiar with the Regional Network for Agricultural Machinery – RNAM. Let me first say what RNAM is.

That we are advocating the use of machinery in countries with large populations and high rural unemployment might seem a paradox, which indeed it is, if we accept G.K. Chesterton's definition that "a paradox is a piece of truth standing on its head to attract attention." The truth is that humankind needs machines, tools and implements for its own advancement. What is dangerous is the use of wrong machines – those that need heavy capital investment, consume large quantities of fuel, are costly and difficult to maintain and operate, are economical only on farms of large size or need foreign exchange for their purchase.

In 1968, ESCAP (then ECAFE) and UNIDO acting jointly, sent a team of specialists to various countries in the region to study whether, and if so how, machinery could help the farmer and how the United Nations System could help Governments in promoting the use and local manufacture of well-designed and suitable machinery. It was after several years of discussion and further studies that the findings of this team were put into effect in the form of a planned, cooperative effort – the Regional Network for Agricultural Machinery.

RNAM was inaugurated in 1976 when UNDP approved it for financing as an inter-country project, to be executed by ESCAP in association with UNIDO and FAO. The developing countries participating in the project are India, Indonesia, Iran, Republic of Korea, Pakistan, the Philippines, Sri Lanka and Thailand – all of whom contribute towards the costs of the project; the Philippines provides host facilities for the project office. Japan and Australia have made substantial cash contribution and Israel has contributed in kind.

The objectives of the project are to formulate guidelines on mechanization and manufacture, to strengthen the national institutes concerned with agricultural machinery, to evaluate prototypes of various kinds of machinery, to promote local manufacture and to exchange information among the countries.

The Network links all participating developing countries through sub-networks, each of which specializes in one type of machinery – transplanters, harvesters, weeders, threshers, seed-fertilizer drills and threshers – with one of the participating countries acting as the focal point.

One of RNAM's activities is the exchange of selected prototypes for testing, evaluation, modification and adaptation to suit farming conditions in the different countries; each of them provides locally manufactured machines and implements to others, RNAM meeting the costs of shipping. The

Technical Advisory Committee of RNAM recommended that a catalogue be compiled to facilitate selection of prototypes for testing and to serve as a reference guide. The Regional Catalogue of Agricultural Machinery has been prepared in response to their recommendation. It is a collation of national catalogues prepared by institutes in the participating countries who gathered information from research institutes and manufacturers. The items of machinery have been grouped so as to follow the stages of crop cultivation – from field preparation to harvesting and threshing.

Perhaps there is another paradox. Are not the industrialized countries the source of all technology and ideas about machinery? How can developing countries promote or design machinery? The piece of truth that is standing on its head says that machinery from the industrialized countries is designed to suit their own conditions, customs and capabilities; it is only by collective cooperative action that developing countries can hope to meet their own requirements. TCDC has shown that when it comes to pooling available expertise and experience, the whole is more than the sum of the parts.

The Catalogue is a commendable product of TCDC. In addition to relying on themselves, the participating institutes have undertaken an activity to exchange their individual experience and knowledge, which is the essence of TCDC.

It is hoped that the Regional Catalogue would prove useful to all those concerned with agricultural machinery, farmers, extension officers, researchers, administrators, manufacturers and planners.

B. R. DEVARAJAN
Resident Representative
United Nations Development Programme, Philippines
and
Principal Project Representative
for Regional Network for Agricultural Machinery

ACKNOWLEDGEMENT

The Project Manager gratefully acknowledges the valuable reference materials and National Catalogues supplied by the Directors of participating National Institutes/Institutions at Bhopal (India), Bandung (Indonesia), Karaj (Iran), Multan (Pakistan), Los Baños (Philippines), Suweon (Republic of Korea), Peradeniya (Sri Lanka) and Bangkhen (Thailand) and the Head of the Agricultural Engineering Department, International Rice Research Institute (IRRI), Los Baños, Philippines, which formed the basis for this publication.

Abbreviations & Equivalents

ha	– hectare
m	– metre
li	– litre
cm	– centimetre
mm	– millimetre
kg	– kilogram
cav	– cavan (1 cav = 50 kg)
q	– quintal (1 q = 100 kg)
rpm	– revolution per minute
P	– Pesos
Rs	– Rupees

ALL DIMENSIONS IN DRAWING ARE IN MM.

CONTENTS

ROLE OF AGRICULTURAL MACHINERY

1. The agricultural sector dominates the economy of almost all the developing countries in Asia and the Pacific region. However, most of the countries are far from self-sufficient in foodgrains, with serious population problems. The climatic conditions in most of the countries permit double or even triple cropping. However, this has not been possible because of lack of adequate power, fertilizers, high yielding short duration varieties. The use of agricultural machinery has played a key role in agricultural production in the developed countries but its large-scale adoption in the developing countries has been a controversial subject. However, there is now a consensus that use of improved agricultural tools and equipment contributes directly to increased production through timely operations, better quality of work, precision in application of inputs, increasing cropping intensity and reducing post-harvest losses. There is an awareness that there is a need to increase power utilization on the land to improve productivity and efficiency, and to establish and implement a sound farm mechanization policy for each country in harmony with its socio-economic and agro-climatic conditions. In view of the various inherent advantages, nearly all the developing countries of Asia and the Pacific are attempting progressively to introduce mechanization and attention is being paid to the design and development of different kinds of improved implements suitable for small farms. Several improved implements and machines have been developed for different operations in different countries.

The Regional Network for Agricultural Machinery (RNAM) has been maintaining close touch with the design, development, manufacture and popularization of small farm agricultural implements and machinery in different countries and institutions and collecting suitable information relevant to network needs and requirement. It has undertaken three subnetwork activities on testing, evaluation and modification of rice transplanters, harvesters and weeders and another on manufacturing technology of seeders and threshers in selected participating countries. In order to bridge the information gap between countries, RNAM publishes Newsletters thrice annually presenting the progress on machines and mechanization in different countries in the region. RNAM-Digests highlighting design and development work in specific areas are also being published and the first on Rice Transplanter has been printed and released. This regional catalogue which has been compiled based on the information presented by the national participating countries gives the functions, specifications, test results, costs and availability of selected implements with line diagrams or picture. In most of the cases these machines and equipment were designed, developed and being manufactured locally after these have been found acceptable by the local farming community. The following paras highlight briefly the different categories of equipment and their usefulness for various operations from tillage to transport.

2. **Tillage Implements**: Land has to be tilled with appropriate implements to produce a favourable seedbed for germination of seeds and proper

growth of plants. This is still being done with hand tools and bullock drawn ploughs which are generally available with farmers. Seedbed preparation with such implements takes considerable time and energy, to get the same degree of tilth, and therefore, sowing operations are delayed, adversely affecting the yield. Hence attempts have been made to develop and introduce iron ploughs in the last few decades. These ploughs having various shapes and specifications are available in different countries and are more efficient than wooden ploughs of equivalent draft, making ploughing a once-over operation.

3. Ploughing leaves the land cloddy, loose and uneven, a condition not conducive for sowing crops. The soil has to be worked further with a few other tillage implements to pulverize the clods, to give a smooth, firm, compact seedbed free from weeds and with a good structure at the top. Several useful secondary tillage implements have been developed for this purpose. Some of the important ones are harrows (blade, disc, knife), clod crushers, levellers and smootheners for drylands, puddlers, comb-harrows and disc harrows for wetlands. With a good combination of mouldboard plough and secondary tillage implements, seedbed preparation which normally takes 200 to 300 hours per hectare can be done in less than 100 hours.

4. **Seed-drills and Planters**: Establishment of suitable plant population in the field is an important aim of the culturable operations. If a proper stand is not obtained all the expenditure incurred would be a waste. Methods and timeliness of sowing greatly influence germination, plant growth, weeding and ultimately the yield. Seed is sown by broadcasting, drilling or transplanting. Broadcasting though simple, entails high seed-rate and weeding becomes more difficult and expensive. Drilling is an improvement over broadcasting because the seeds are placed in lines, facilitating interculture. The seed rate required in case of drilling being less, large quantities of seed can be saved in the long run.

5. Seed-drills have been designed to sow the seeds in line and planters for placing the seeds at specific recommended spacing in the line. However, both these types have the same components with different design features and specifications. The important components are the hopper, seed-metering mechanism, wheels, drive-mechanism, depth and space adjusters, furrow-openers and seed covering attachments. In seed and ferti-drills, there is a separate fertilizer chamber to which fertilizer tubes are connected and fertilizer can be placed below the seeds with a layer of soil in between. Different kinds of drills have been developed for the important cereal seeds which are drilled continuously in line. Planters for maize, cotton and groundnut with different seed-metering devices have been developed. Some of the seed-metering devices are – fluted roller, internal and external force-feed, plate types, etc. The fluted rollers have proved best for drills. Regarding furrow-openers, shovel, knife, disc and shoe types have been developed for different soils. Efforts should be made to introduce appropriate types of seed drills. Local artisans and small scale manufacturers should be trained to manufacture and popularize the same among farmers.

6. A number of crops particularly paddy is transplanted. Transplanting of paddy is an arduous and time consuming operation. Due to labour scarcity during rice transplanting season, the transplanting operations are delayed and this results in considerable reduction of yields. In recent years, transplanting of paddy is being done in Japan using engine driven mechanical transplanters using specially prepared mat-type seedlings. Simple manual transplanters have been designed and introduced in some countries. In view of the importance of rice transplanting, testing, evaluation and modifications of selected rice transplanters has been undertaken in a number of participating countries under RNAM programme, on priority basis.

7. **Plant and Seed Protection Appliances:** Effective prophylactic measures are needed to protect the crops from insects and pests. Pesticides have to be applied on foliage uniformly and with a certain amount of force so that they reach all parts of the plants. Efficient application is called for, as often very small quantities of chemicals – about five ounces per hectare – may have to be applied. Low volume, high pressure types are more efficient and economical. Dusters are used to apply chemical dusts. Many types of sprayers and dusters are in production to meet the needs of varying crop conditions. Power-operated knap-sack models are also now being made in several countries by a number of manufacturers. Aerial spraying has been attempted with success in recent years in some countries.

8. Seeds should be treated with appropriate chemicals before sowing. An improved simple contrivance is the seed treating drum made of wood or metal with an axle fitted with a crank handle passing diagonally through it. Seed to be treated is put in the drum along with chemicals and the drum is rotated, when the seeds get effectively treated with the chemicals.

9. **Inter-cultural tools:** Weeds have always been a menace to the farmers. These compete with the crop for nutrition and space. Because of both these factors, the growth of plants and yields are affected. Several kinds of simple hand operated weeders have been developed. These tools with long handles can be worked by a person standing, much more easily and drudgery is reduced. More area can be covered in a day. Being simple in construction these could be made in rural areas.

10. **Irrigation Devices:** Two sources of irrigation are surface water and ground water. Generally, as the field cannot be commanded by gravity flow, water has to be lifted from these sources to irrigate. Lift irrigation although costly has to be resorted to for an assured supply. Simple water-lifts like trough lift, Archemedian screw, chain-pumps, pedal pumps which utilize the weight of the operator are in use. Animal power has also been used to operate reciprocating pumps. Water lifting has been mechanized to a very great extent with considerable advantage. Electric and diesel pumping units have been installed in large numbers in different countries.

11. The water lifted should be applied to the field without unnecessary waste. This can be accomplished only when the land is properly prepared, levelled, sloped and distribution furrows and channels are provided for the flow of water. Bund-formers, land-levellers, ridgers and ditchers are helpful in efficient water-management. Sustained and increased attention should be paid to the design, development and popularization of such devices.

12. **Harvesters:** Harvesting is a time-consuming and laborious operation, being done with sickles. During harvesting season, invariably rains and storms set in causing considerable damage to standing crops. Hence harvesting has to be done speedily. Design and development of bullock drawn reapers, engine mounted reapers, two-wheel tractor mounted reapers and binders for cereals and diggers for root crops have been completed in the last few years. These are suitable for small farms and are not likely to create labour problems unlike combine harvesters, which are in large scale use in highly developed western countries. Appropriate machines have to be identified, tested, modified and adopted in the developing countries of the region.

13. **Threshing and Winnowing:** Threshing is the operation by which the grains are separated from the straw and is accomplished by beating the sheaves on the floor manually or by animal trampling over a layer of harvested crop, spread on the threshing floor. As an improvement to the latter, wheat-thresher consisting of three rows of serrated discs fixed in a frame became popular in wheat growing areas. Pedal operated Japanese drum thresher have been tested in several countries and other areas where labour was scarce. Further improvement should be carried out to make them acceptable in different regions. Several power driven threshers based on IRRI design have now been tested and introduced in several countries in the region and several manufacturers have produced and sold them. In India, Indonesia, Pakistan, Philippines and Thailand, other designs of stationary power-threshers are being manufactured and marketed.

14. The threshed material has to be winnowed for separating grain from chaff. Use of natural wind is the cheapest, but it is not dependable and time is often wasted. Winnowing fans operated by hand or foot and box type winnower with enclosed fan were developed to overcome these difficulties.

15. **Processing Machines:** The farm produce has to be processed for making it suitable for marketing and also for human consumption. The methods and techniques of processing vary from crop to crop. In view of the wide variety of crops such as cereals, oil-seeds, root-crops, fruits, vegetables, etc, the processing techniques and machines are also large in this group. Some of those which have proved useful are small ricemills, maize-shellers, groundnut-decorticators, graders, cassava processing machines, feed-cutters, pulverizers, etc.

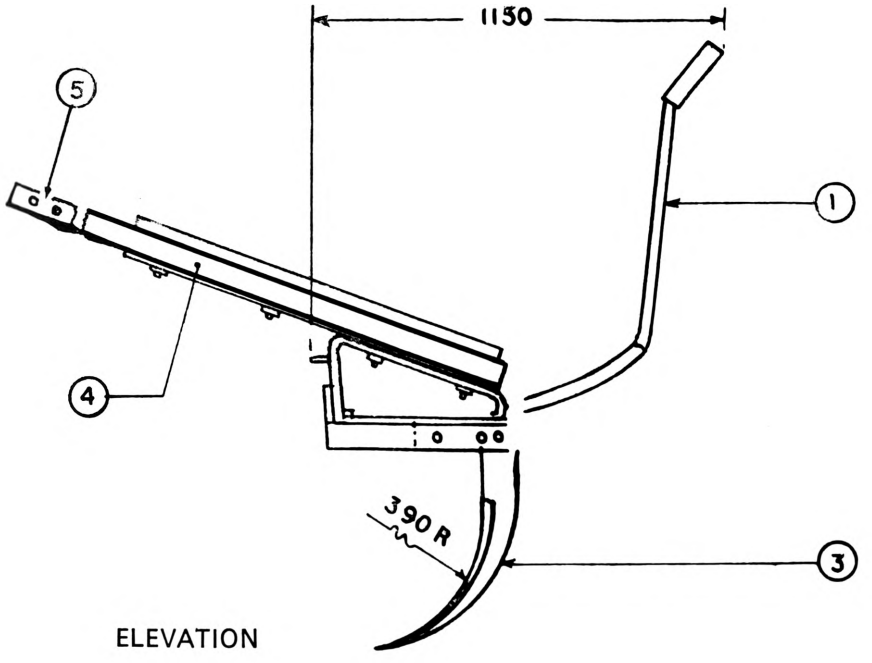
16. Storing of grains in moist conditions will affect quality of the stored grains. Sun drying has been practiced but is slow and undependable. Hence, a number of mechanical dryers have been developed and operated successfully. In view of the rising cost of commercial energy sources, design and development of solar dryers is also receiving attention in several developed and developing countries.

17. **Concluding Remarks:** It will be seen from the above that a wide variety of equipment have been developed and found acceptable in the developing countries of the region. In order to facilitate selection, the specifications of the machines described above, have been compiled in a standard format and presented in the succeeding pages. More detailed information can be obtained by approaching the concerned Directors of the participating national institutes, or manufactures whose addresses have been indicated in each case. It is hoped that the information presented in this catalogue would be of use to all concerned who are interested in the design, development, adaptation and manufacture of farm machinery in the developing countries.

A. SOIL WORKING IMPLEMENTS

CHISEL PLOUGH

1.	Function	Breaks hard soil pan
2.	Specifications	
	Make	TNAU
	Type	Animal-drawn
	Power	A pair of bullocks and a man to operate
	Length	1150 mm (without beam)
	Width	350 mm
	Height	1175 mm
	Weight	45 kg
	Width of cut	40 mm
	Depth of cut	300 mm
3.	Developed at	Tamil Nadu Agricultural University (TNAU), Coimbatore, India
4.	Test Results	
	Suitable for	Clay soil
	Work capacity	0.2 ha/hour (900 mm row spacing)
	Draft	120 kg
5.	Cost	
	Sale price	Rs 250.00 (US$ 31.00)
	Operating	Rs 8.80/ha (US$ 1.00)
6.	General	The chisel plough consists of a sharp curved chisel having a radius of curvature of 390 mm and a thickness of 30 mm. It is rigidly held in a frame which is provided with handles and a shaft pole fixture. As the soil is cut by the sharp chisel it is neither inverted nor pulverized. The hard pan of soil below the normal ploughing depth is broken up facilitating rain water infiltration.
7.	Availability	College of Agricultural Engineering Tamil Nadu Agricultural University Coimbatore, India



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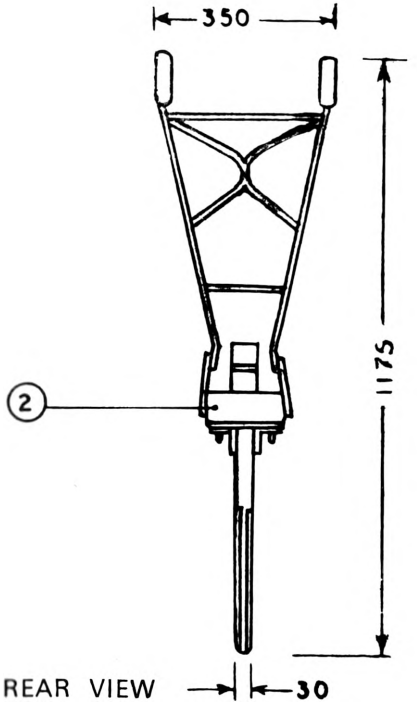


REAR VIEW

1. HANDLE
2. FRAME
3. CURVED CHISEL
4. WOODEN BEAMS
5. HOLE FOR HITCHING

CHISEL PLOUGH

PAKISTAN PLOUGH

1. Function — Cuts and inverts the soil and is used for primary tillage

2. Specifications

Make	KAZ
Type	Animal-drawn
Power	A pair of bullocks and a man to operate
Length	2745 mm
Width	230 mm
Height	1065 mm
Weight	15 kg
Width of cut	250 mm
Depth of cut	100 mm

3. Developed at — Agricultural Engineering Workshop Punjab, Lyallpur, Pakistan

4. Test Results

Suitable for	Clayey and loamy soils
Work capacity	0.05 ha/hour
Draft	74 kg

5. Cost

Sale price	Rs 160 (US$16)
Operating	Rs 62/ha (US$6.20)

6. General

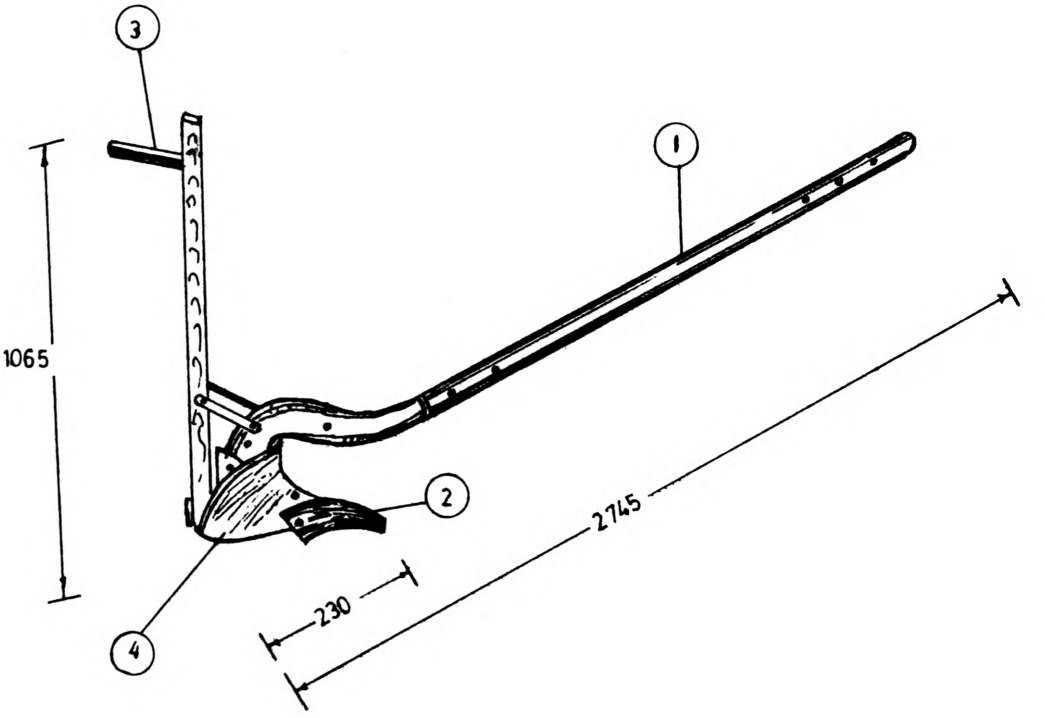
The plough is generally used for deep ploughing. The share cuts the soil horizontally and vertically while the mould board turns over the soil. Shares are available in three different sizes to suit the specific requirements. Share is detachable.

7. Availability

Karkhana Aalat-e-Zari
Bahawalpur, Pakistan

1. BEAM
2. SHARE
3. HANDLE
4. MOULD BOARD

PAKISTAN PLOUGH



SINGLE ANIMAL PLOUGH

1. Function — For ploughing the soil in areas where animals for draft are in short supply

2. Specifications

Make	Agricultural Implements Workshop Welisara, Sri Lanka
Type	Animal-drawn
Power	Single animal and a man
Length	350 mm
Width	100 mm
Height	150 mm
Weight	10 kg

3. Developed at — Agricultural Implements Workshop, Welisara Sri Lanka. Original prototype was from the Philippines

4. Test Results

Suitable for	Light soils
Work capacity	0.2 ha/day
Draft	40 kg

5. Cost

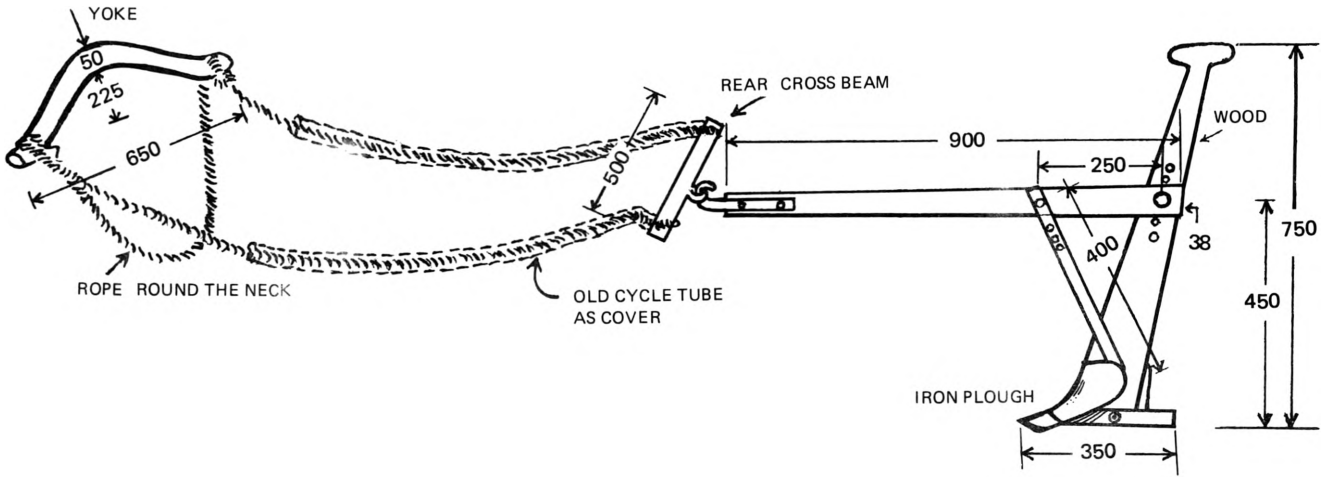
Sale Price	Rs 120 (US$ 8)
Operating	Rs 60/ha (US$ 4)

6. General

The plough consist of a wooden yoke and is attached to the hitch-bar by means of two ropes. It is becoming popular where trained animals or facilities for training animals are available.

7. Availability

Agricultural Implements Factory Welisara, Sri Lanka



SINGLE ANIMAL PLOUGH

NATIVE MOLDBOARD PLOUGH

1. Function — It is a primary tillage tool and is used for ploughing

2. Specifications

Make	Locally manufactured
Type	Animal-drawn, single furrow, moldboard plough
Power	One buffalo and a man
Length	2160 mm
Width	165 mm
Height	875 mm
Weight	12 kg
Width of cut	125 mm
Depth of cut	100 mm

3. Developed at — Already in large scale production in Thailand

4. Test Results

Suitable for	Clay soil
Work capacity	0.02 ha/hour
Draft	60-70 kg

5. Cost

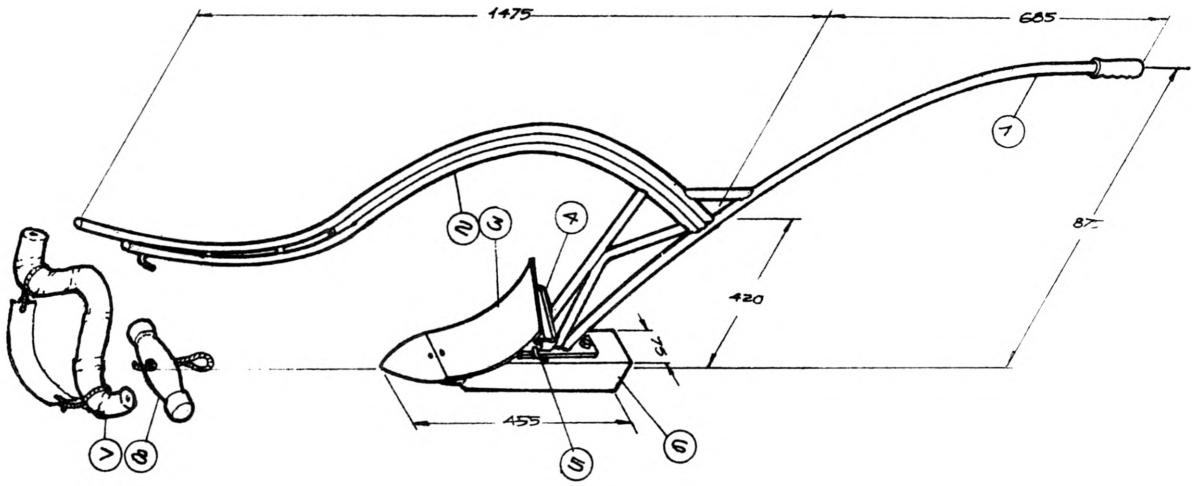
Sale Price	Bht 180 (US$ 9)
Operating	Bht 200/ha (US$ 10)

6. General

The native moldboard plough consists of a moldboard with a radius of curvature of 280 mm. It is rigidly held in a frame which is provided a handle for the operator. The soil is broken by slicing and inverting. It is used to prepare the land for growing rice and for weeding between rows of upland crop.

7. Availability

Local Manufacturers, Thailand
The Director, Agricultural Engineering
Department of Agriculture Bangkhen, Thailand



1. HANDLE
2. FRAME
3. MOLDBOARD PLOUGH
4. HOLDER
5. PIN
6. WOODEN BLOCK
7. BUFFALO YOKE
8. SMALL YOKE

NATIVE MOLDBOARD PLOUGH

BULLOCK–DRAWN DISC HARROW

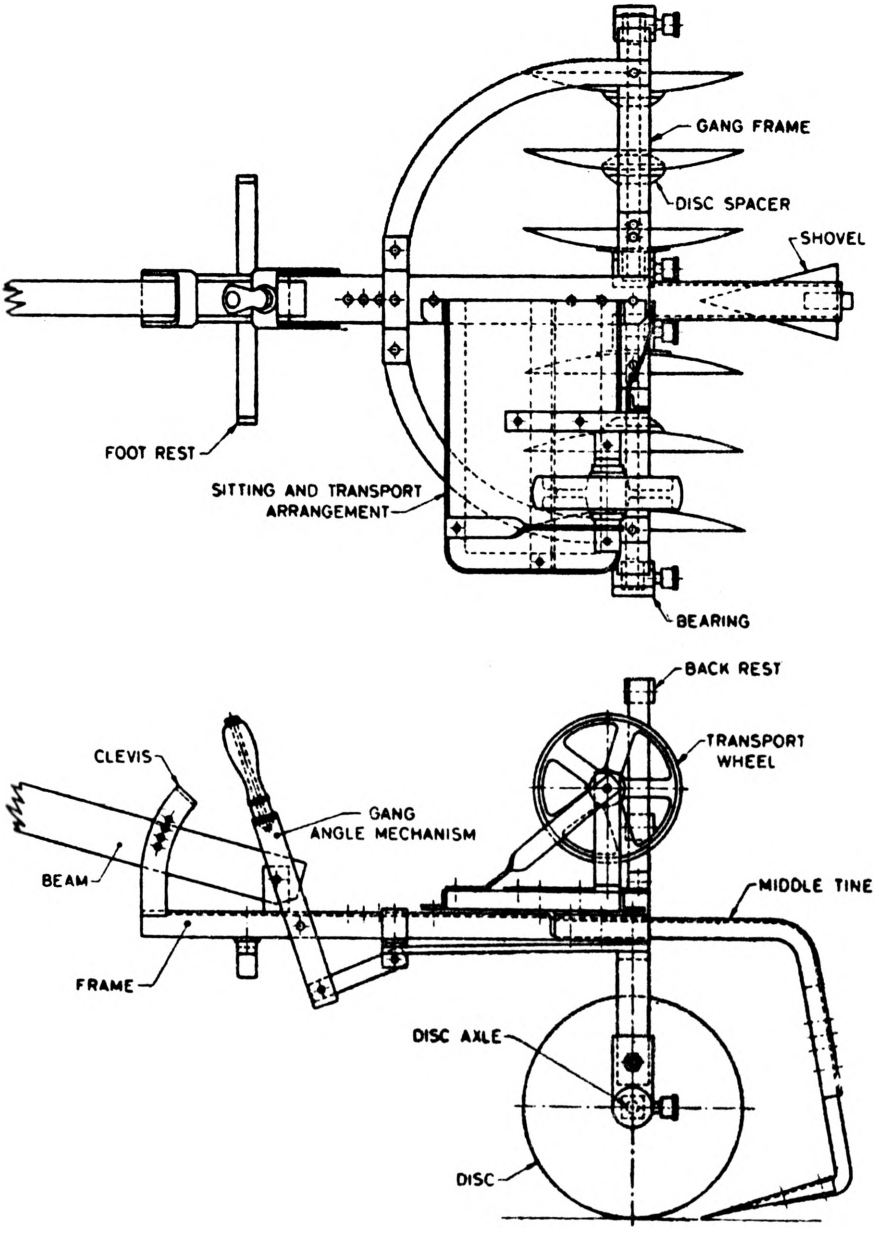
1.	Function	Seedbed preparation on light soils and puddling
2.	Specifications	
	Make	Several manufacturers
	Type	Bullock-drawn – single action
	Power	A pair of animals and an operator
	Length	750 mm
	Width	750 mm
	Height	700 mm with seat
	Weight	40 kg
3.	Developed at	In production
4.	Test Results	
	Suitable for	Primary tillage in light soil Secondary tillage in heavy and wetsoil
	Work capacity	0.2 ha/hour
	Draft	80 kg
5.	Cost	
	Sale Price	Rs 400 (US$ 50)
	Operating	Rs 12/ha (US$ 1.50)

6. General

In this single action harrow there are two axles placed in line in a frame. On each three or four high carbon steel discs are fixed. By angling the disc shaft increased cutting depths are obtained. There is a seat for an operator.

7. Availability

Being produced by a number of manufacturers.
For particulars, address to: The Director, Central Institute of Agricultural Engineering, Bhopal, India



BULLOCK-DRAWN DISC HARROW

TWO-WHEEL TOOL CARRIER

1. Function — Can be used for all cultural and field operations

2. Specifications

Make	ICRISAT
Type	Animal-drawn
Power	A pair of bullocks and a man
Length	3640 mm
Width	1700 mm
Height	1200 mm
Weight	100 kg

3. Developed at — International Crops Research Institute for Semi-Arid Tropics
Hyderabad, India

4. Test Results

Suitable for	Mounting different kinds of soil working implements
Work capacity	0.1 to 0.4 ha/hour (depending on attachment)
Draft	120 kg depending on attachment

5. Cost

Sale Price	Rs 4000 (US$ 500) (without any attachment)
Operating	Rs 20/ha (US$ 2.50)

6. General

The wheeled tool carrier consists of a frame over which is fitted a seat for operator, two pneumatic wheels, a mild steel rectangular section for fixing attachments and a spring loaded lever for adjusting the depth of operation. The required attachment is mounted on the rectangular mild steel section. One operator drives the carrier and one helper sits behind him facing backward to operate the lever whenever necessary. The carrier is a versatile unit and is most suitable for broad bed and furrow system of cultivation.

7. Availability

International Crops Research Institute for Semi-Arid Tropics, Hyderabad, India
M/s Water Development Society, Moula Ali, Hyderabad, India
M/s Vicon Limited, 35/5 Langford Road, Bangalore, India

TWO-WHEEL TOOL CARRIER

SIX-ROW SWEEP

1. Function — Tills, weeds and breaks soil crust

2. Specifications

Make	TNAU
Type	Animal-drawn. Spacing and depth are adjustable
Power	A pair of bullocks and a man
Length	4000 mm
Width	1550 mm
Height	920 mm
Weight	35 kg
Width of cut	1500 mm
Depth of cut	50 mm

3. Developed at — Tamil Nadu Agricultural University, Coimbatore, India

4. Test Results

Suitable for	All soils and row crops
Work capacity	0.25 ha/hour
Draft	30-40 kg

5. Cost

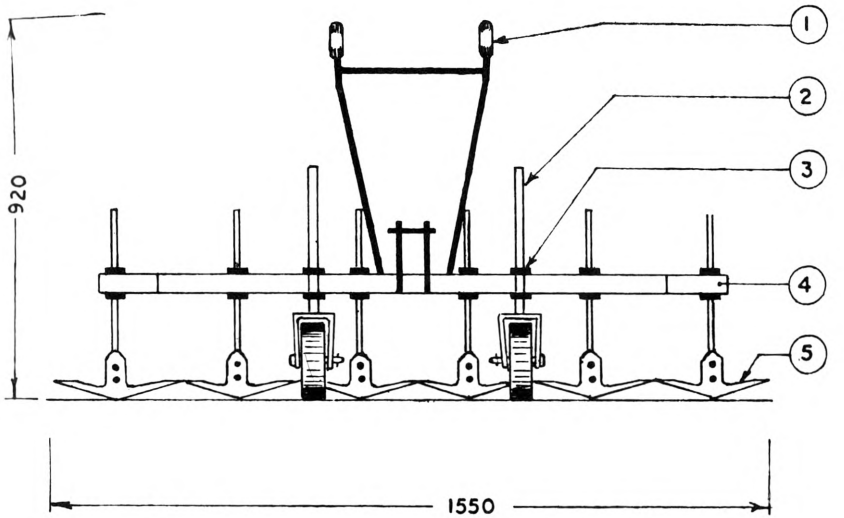
Sale Price	Rs 360 (US$ 45)
Operating	Rs 7.50/ha (US$ 1)

6. General

The sweep consists of V-shaped shovels with level edged wings. Shovels are held by tynes fixed to a framework by means of counter-sunk bolts and nuts. When the sweep is used for secondary tillage especially for dry-farming, 6 tynes with shovels can be clamped on the frame such that no gap between the shovels is left. By just skimming under the soil at a shallow depth of 20-30 mm, the sweep breaks the capillaries in soil and provides a good soil mulch. When the sweep is used for intercultural operations, the space between the shovels is adjusted to suit the row spacing of the crop.

7. Availability

College of Agricultural Engineering
Tamil Nadu Agricultural University, Coimbatore, India



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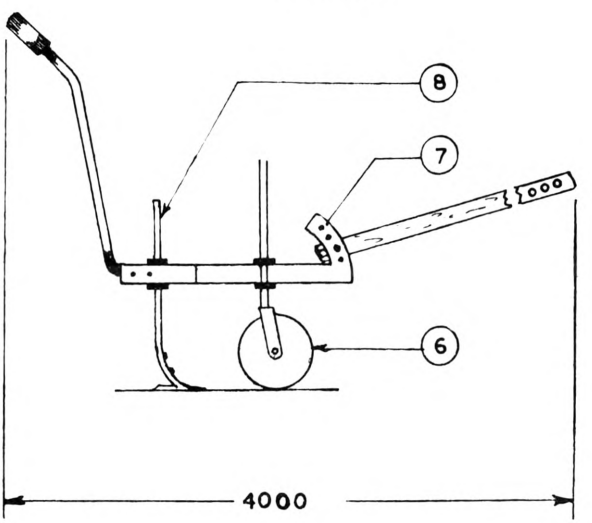


SIDE VIEW

(1) Handle
(2) Adjustable tyne
(3) Clamp
(4) Frame
(5) Sweep shovel
(6) Depth wheel
(7) Tyne
(8) Pole shaft fixture

SIX-ROW SWEEP

BUCK SCRAPER

1. Function — Final levelling of the ploughed and harrowed field

2. Specifications

Make	GBPUAT
Type	Animal-drawn
Power	One pair of bullock and a man
Length	1000 mm
Width	825 mm
Height	1000 mm
Weight	27 kg
Width of cut	1000 mm
Depth of cut	Shallow working

3. Developed at — College of Technology
University of Agriculture and Technology
Pantnagar, India

4. Test Results

Suitable for	All types of soil
Work capacity	2.8 m^3 of soil/hour
Draft	80 kg

5. Cost

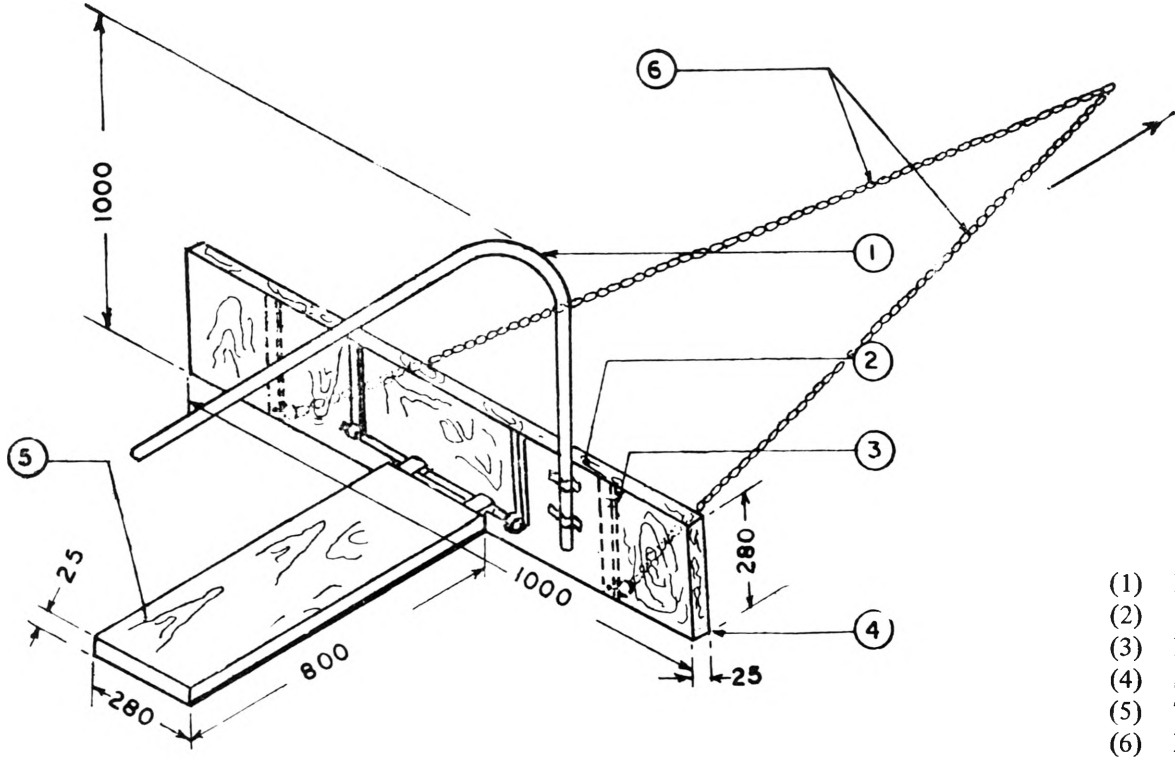
Sale Price	Rs 70 (US$ 9)
Operating	Rs 70/m^3 of soil (US$ 9)

6. General

The implements consists of locally available buck board of 1000 mm length, 280 mm width and 25 mm thickness. A 25 mm diameter steel pipe is used as handle. The tail board which is 800 mm long, 280 mm wide and 25 mm thick is hinged at the centre of the buck board. It has a blade of 100 mm length which effects the cutting. The implement is very light and can be carried by one man and its components are easily detachable for easy transport and can be assembled quickly for operation. It could be pulled by a pair of bullocks.

7. Availability

College of Technology,
G.B. Pant University of Agriculture and Technology
Patnagar, India



(1) Handle
(2) Buck board
(3) Hook
(4) Steel cutting edge
(5) Tail board
(6) Hitching ropes

BUCK SCRAPER

HELICAL BLADE PUDDLER

1. Function — Puddling the soil and making it fit for transplanting

2. Specifications

Make	TNAU
Type	Animal-drawn
Power	A pair of bullock and a man
Length	3500 mm
Width	725 mm
Height	400 mm
Weight	45 kg
Width of cut	600 mm
Depth of cut	100 mm

3. Developed at — College of Agricultural Engineering
Tamil Nadu Agricultural University
Coimbatore, India

4. Test Results

Suitable for	Rice and Soils which are ploughed and watered
Capacity	0.1 ha/hour
Draft	50 kg

5. Cost

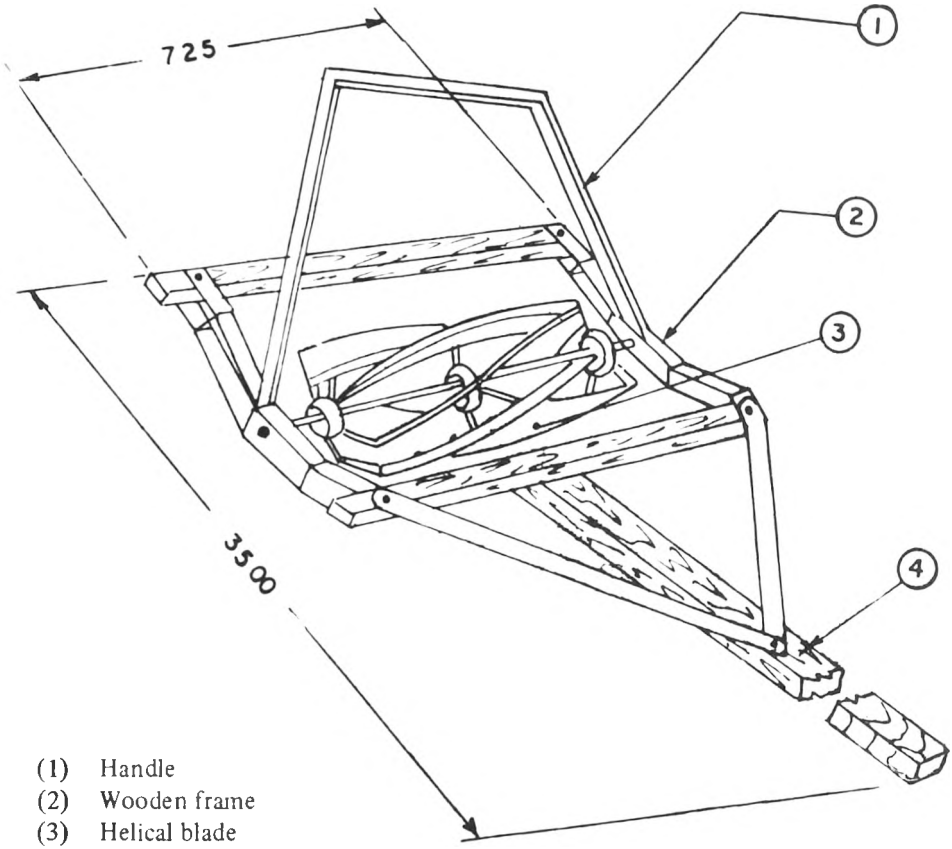
Sale Price	Rs 250 (US$ 32)
Operating	Rs 30/ha (US$ 3.50)

6. General

Five numbers of helical blades made of mild steel are fixed in a skew shape and mounted on a wooden frame having wooden bearings such that the blades rotate freely. A handle and a pole shaft are provided. Due to the helical shape of the blade, there will be a continuous contact between the blades and the soil which gives a uniform load on the neck of the bullocks. Thereby the conventional undesirable intermittent load is avoided. After ploughing the land implement can be used to puddle the soil. It operates at a depth of 80-100 mm. The helical geometry facilitates better churning of the soil as required for puddling and transplanting purposes.

7. Availability

College of Agricultural Engineering, Tamil Nadu Agricultural University, Coimbatore, India



(1) Handle
(2) Wooden frame
(3) Helical blade
(4) Pole shaft

HELICAL BLADE PUDDLER

WETLAND PUDDLER

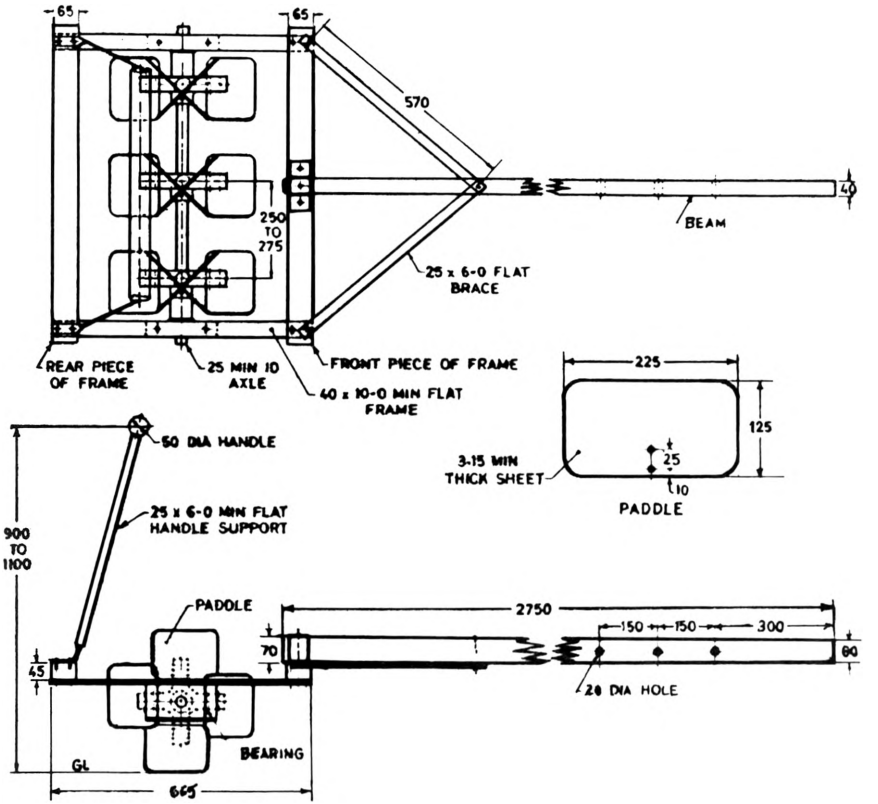
1.	Function	For preparing a puddled seedbed for transplanting rice
2.	Specifications	
	Make	Made by a number of manufacturers
	Type	Angular bladed and animal-drawn
	Power	A pair of animals and an operator
	Length	725 mm
	Width	665 mm
	Height	900 mm (with handle)
	Weight	40 kg (with beam)
3.	Developed at	Now in production in a number of small industries in India
4.	Test Results	
	Suitable for	Rice cultivation
	Work capacity	0.15 ha/hour
	Draft	80 kg
5.	Cost	
	Sale Price	Rs 320 (US$ 40)
	Operating	Rs 12/ha (US$ 1.50)

6. General

It consists of a frame at the centre of which is fixed a shaft. Three angular bladed assemblies are fitted on to the shaft which break the clods and produce the puddle.

7. Availability

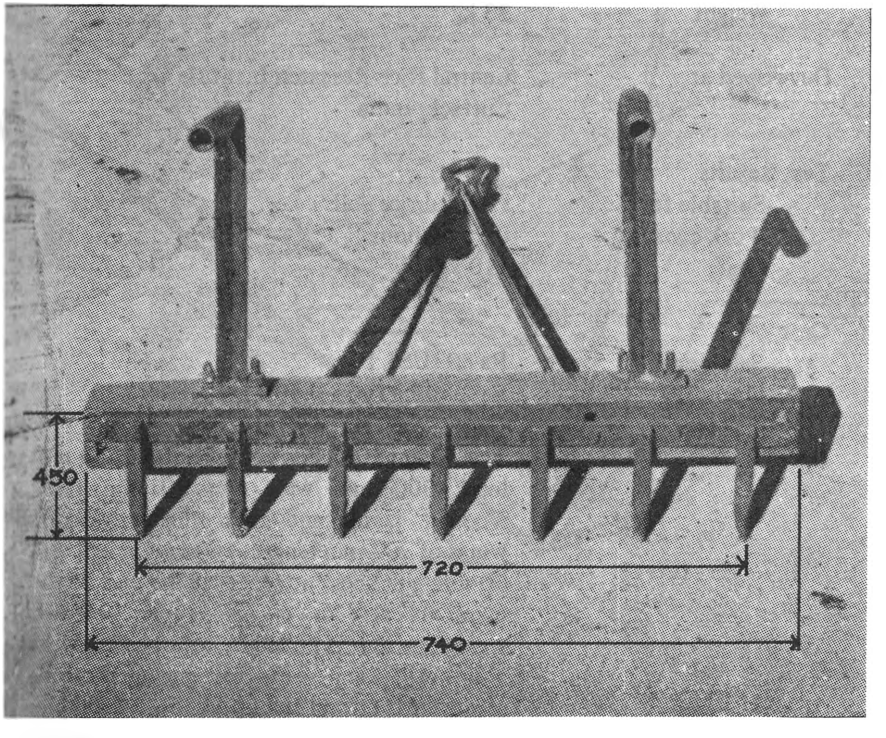
Being produced by a number of manufacturers,
For particulars, address : The Director,
Central Institute of Agricultural Engineering, Bhopal, India



WETLAND PUDDLER

PUDDLER FOR HILLS

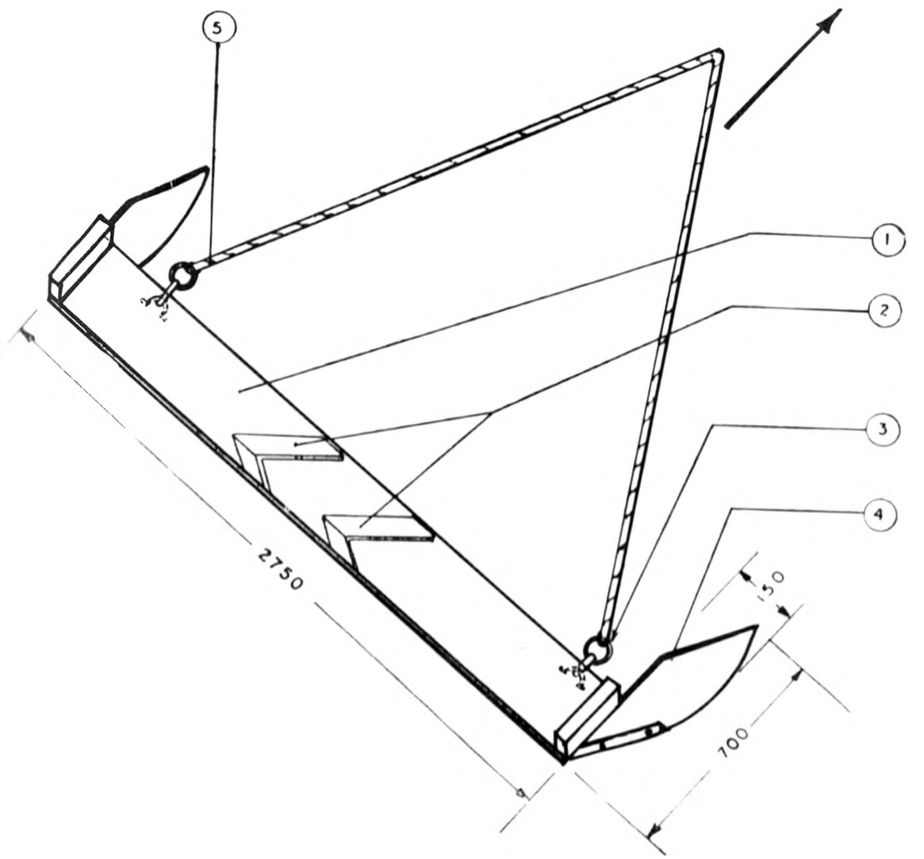
1.	Function	Puddling and levelling of paddy field
2.	Specifications	
	Make	GBPUAT
	Type	Animal-drawn, peg type
	Power	A pair of bullock and a man
	Length	800 mm
	Width	740 mm
	Height	450 mm
	Weight	9.0 kg
	Width of cut	720 mm
	Depth of cut	75 mm
3.	Developed at	College of Technology G.P. Pant University of Agriculture and Technology, Pantnagar, India
4.	Test Results	
	Suitable for	Small rice field on hill slopes
	Work capacity	0.1 ha/hour
	Draft	60 kg
5.	Cost	
	Sale Price	Rs 45 (US$ 5.50)
	Operating	Rs 24/ha (US$ 3)
6.	General	The puddler consists of a wooden rectangular beam to which are attached seven mild steel pegs welded on a steel flat. Four holes have been provided in the beam to vary the depth of operation. Two handles are fixed on the top of the beam for operation. These handles are also used for lifting the puddler while turning. For hitching, mild steel circular ring is provided to connect yoke with rope. The implement does the puddling and levelling of field simultaneously.
7.	Availability	College of Technology G.B. Pant University of Agriculture and Technology, Pantnagar, India



PUDDLER FOR HILLS

WETLAND LEVELLER

1.	Function	Levelling of puddled field
2.	Specifications	
	Make	CRRI
	Type	Animal-drawn
	Power	A pair of bullocks and a man
	Length	2750 mm
	Width	700 mm
	Height	150 mm
	Weight	33 kg
3.	Developed at	Central Rice Research Institute Cuttack, India
4.	Test Results	
	Suitable for	Puddled rice soils
	Work capacity	0.55 ha/hour
	Draft	110 kg
5.	Cost	
	Sale price	Rs 80 (US$ 10)
	Operating	Rs 2.30/ha (US$ 0.30)
6.	General	The wetland leveller consists of a 2750 mm long, 300 mm wide and 30 mm thick wooden plank and two smaller wooden wings of 700 mm length, 150 mm height and 30 mm thickness attached at the end of the plank to carry the excess puddled soil forward. The unit is pulled by a pair of bullocks and has arrangements for an operator to stand on it during the operation. The implement is very useful for levelling the puddled field for efficient water management practices required in high yielding paddy varieties.
7.	Availability	Central Rice Research Institute Cuttack, India



(1) WOODEN PLANK
(2) STAND FOR OPERATOR
(3) HOOK
(4) WOODEN WINGS
(5) HITCHING ROPE

WETLAND LEVELLER

BUND FORMER

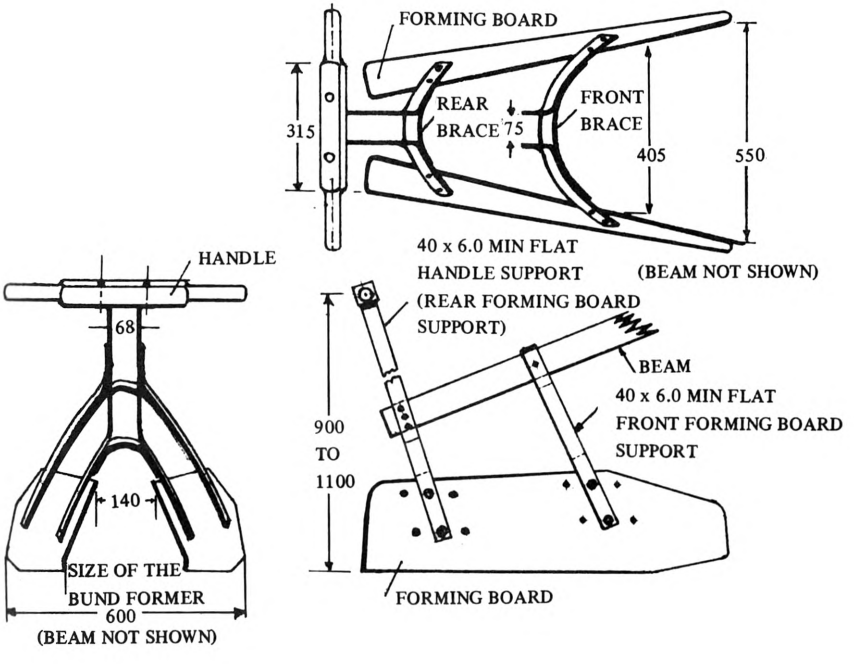
1.	Function	To form small bunds (levees) on ploughed fields for applying water
2.	Specifications	
	Make	In manufacture
	Type	Adjustable – animal-drawn
	Power	A pair of animals and a man
	Length	1000 mm
	Width	600 mm
	Height	900 mm (including handle)
	Weight	20, 30 and 50 kg
3.	Developed at	In large scale production in India
4.	Test Results	
	Suitable for	For forming field bunds (levees) for irrigating the land
	Work capacity	0.3 ha/hour
	Draft	60 kg
5.	Cost	
	Sale Price	Rs 320 (US$ 40)
	Operating	Rs 12/ha (US$ 1.50)

6. General

This is made in three sizes, with varying widths and length of blades.

7. Availability

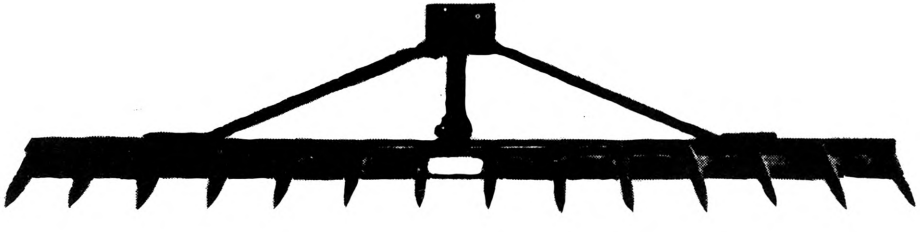
Being produced by a number of manufacturers. For particulars, address Director, Central Institute of Agricultural Engineering, Bhopal, India


FORMING BOARD
315
REAR
BRACE
75
FRONT
BRACE
405
550
40 x 6.0 MIN FLAT
HANDLE SUPPORT
(BEAM NOT SHOWN)
HANDLE
68
(REAR FORMING BOARD
SUPPORT)
BEAM
40 x 6.0 MIN FLAT
FRONT FORMING BOARD
SUPPORT
900
TO
1100
140
SIZE OF THE
BUND FORMER
600
(BEAM NOT SHOWN)
FORMING BOARD

BUND FORMER

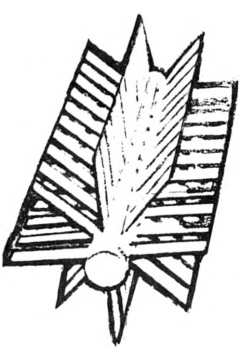
PUDDLER

1.	Function	Puddling wetland for rice transplanting
2.	Specifications	
	Make	MUSUHAMA
	Type	Bullock-drawn or two-wheel tractor
	Power	Hand-tractor and a person
	Length	1450 mm
	Width	240 mm
	Height	–
	Weight	15 kg
3.	Developed at	C.V. Musuhama Jl. Rajakajen 248 Tegal, Jaya, Indonesia
4.	Cost	
	Sale Price	–
	Operating	–
5.	Test Results	
	Suitable for	Wetland
	Work capacity	0.3 ha/hour
6.	General	The original design was from IRRI. It can either be used behind animals or two-wheel tractor
7.	Availability	As in (3) above



WETLAND CIRCLE PUDDLER

1.	Function	Puddling wetland for transplanting
2.	Specifications	
	Make	Buma Sakti
	Type	Circular
	Power	Hand tractor, 7 HP or animals
	Length	1200 mm
	Width	375 mm
	Height	75 mm
	Weight	20 kg
3.	Developed at	P.T. Buma Sakti Jl. Suriami Bandung, Indonesia
4.	Test Results	
	Suitable for	Rice fields
	Work capacity	0.3 ha/hour
5.	Cost	
	Sale Price	–
	Operating	–
6.	General	This implement is suitable for a hand tractor or a pair of animals. It is used for puddling rice fields to make it suitable for transplanting. It is made of steel flats and plates.
7.	Availability	As in (3) above



BULLOCK-DRAWN TRIANGULAR HARROW

1. Function — Breaks soil crust, eradicates and collects weeds

2. Specifications

Make	KAZ
Type	Animal-drawn triangular harrow
Power	A pair of bullocks and a man
Length	1200 mm
Width	1200 mm
Height	250 mm
Weight	40 kg
Width of cut	1200 mm

3. Developed at — Agricultural Engineering Workshop Punjab, Agricultural College Lyallpur, Pakistan

4. Test Results

Suitable for	Weeding and hoeing
Work capacity	0.25 ha/hour
Draft	90 kg

5. Cost

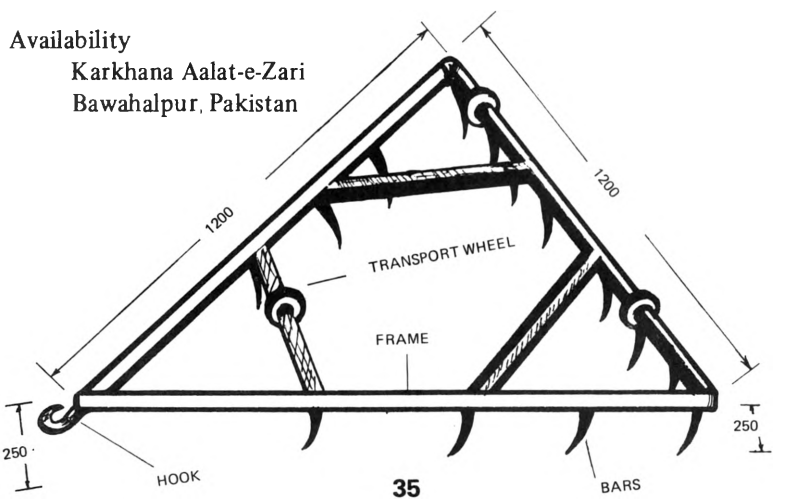
Sale Price	Rs 360 (US$ 36)
Operating	Rs 12.50/ha (US$ 1.25)

6. General

The implement is made in triangular shape of angle iron frame to which seventeen pointed steel pegs are attached. The implement is provided with transportation wheels and is commonly used for breaking the soil crust, uprooting and collecting weeds.

7. Availability

Karkhana Aalat-e-Zari
Bawahalpur, Pakistan



BULLOCK-DRAWN CULTIVATOR

1. Function — A secondary tillage implement to loosen up the soil for seedbed preparation.

2. Specifications

Make	KAZ
Type	Animal-drawn having 3 tines
Power	A pair of bullock and a man
Length	350 mm
Width	300 mm
Height	200 mm
Weight	14 kg
Width of cut	300 mm
Depth of cut	75 mm

3. Developed at — Karkhana Aalat-e-Zari, Bahawalpur Pakistan

4. Test Results

Suitable for	Light and medium clayey soil
Work capacity	0.06 ha/hour
Draft	57 kg

5. Cost

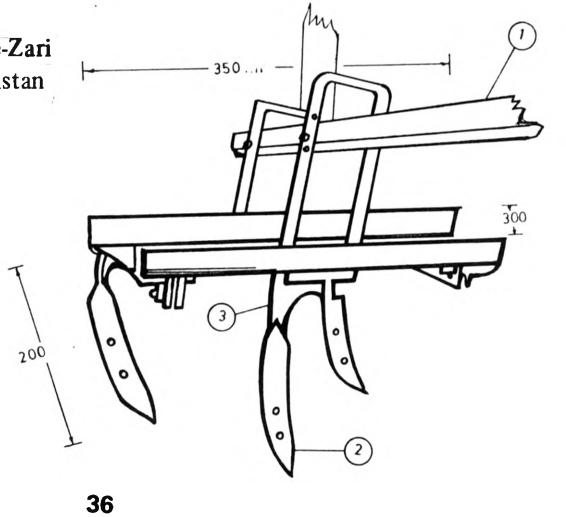
Sale Price	Rs 200 (US$ 20)
Operating	Rs 52/ha (US$ 5.20)

6. General

The bullock-drawn cultivator is used for ploughing as well as hoeing of standing crops. The implement is provided with an adjustable beam inclination which controls the depth of cultivation. The soil is tilled with the scratching action of the shares which are reversible.

7. Availability

Karkhana Aalat-e-Zari
Bawahalpur, Pakistan



BULLOCK-DRAWN HOE

1. Function — For hoeing or interculture of row crops like cotton and maize

2. Specifications

Make	KAZ
Type	Animal-drawn with 5 tynes
Power	A pair of bullocks and a man
Length	600 mm
Width	350 mm
Height	300 mm
Weight	31 kg

3. Developed at — Karkhana Aalat-e-Zari, Bawahalpur, Pakistan

4. Test Results

Suitable for	Hoeing and interculture of row crops
Work capacity	0.2 ha/hour
Draft	95 kg

5. Cost

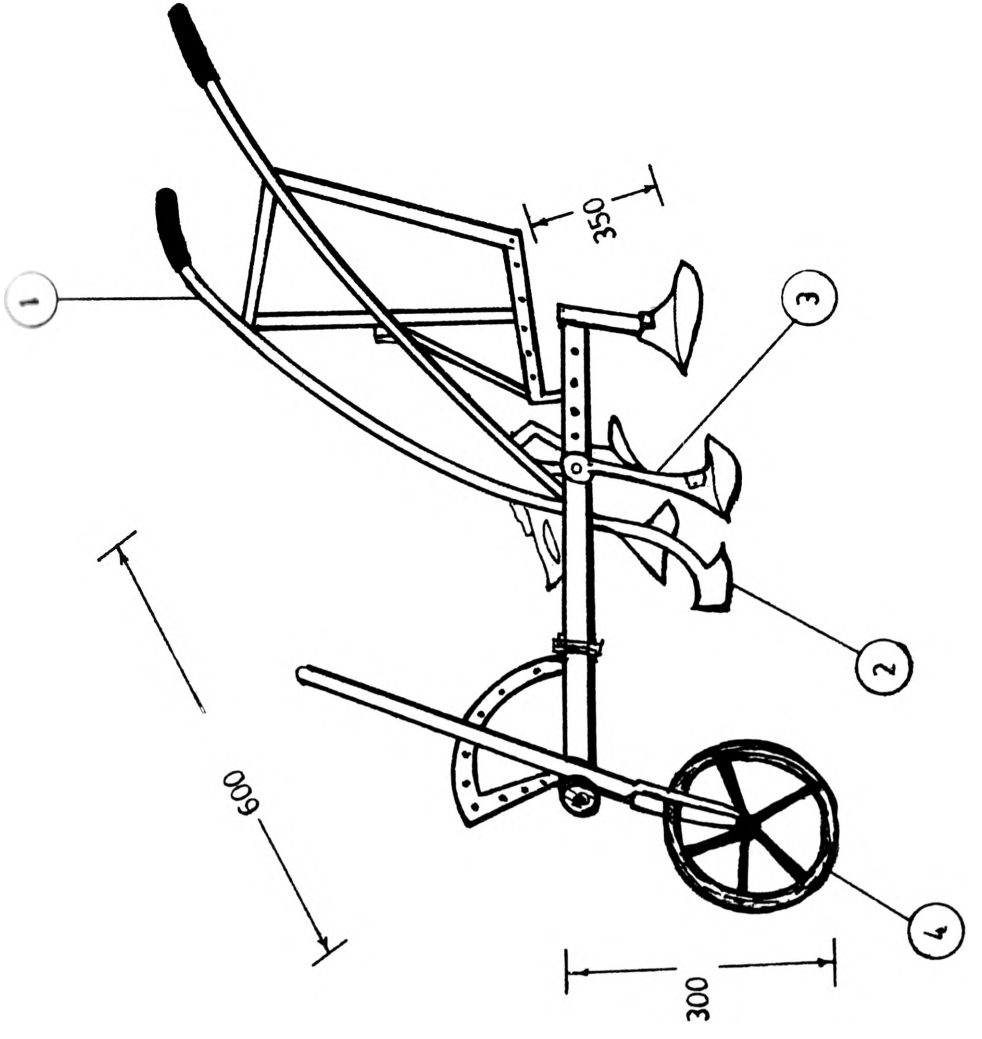
Sale Price	Rs 300 (US$ 30)
Operating	Rs 16/ha (US$ 1.60)

6. General

The implement is very useful for interculture of row crops. Width is adjustable from 600 mm to 900 mm to suit the spacing between rows. The implement has a trailing wheel which can also be used for transportation. Two handles are provided for better control of implement.

7. Availability

Karkhana, Aalat-e-Zari
Bahawalpur, Pakistan



1. HANDLE
2. SHARE
3. TINE
4. TRANSPORT WHEEL

BULLOCK-DRAWN HOE

BULLOCK-DRAWN DISC HARROW

1. Function — Secondary tillage implement used after plowing for seedbed preparation. In light soil it can be used for shallow ploughing.

2. Specifications

Make	KAZ
Type	Animal-drawn
Power	A pair of bullocks and a man
Length	200 mm
Width	600 mm
Height	200 mm
Weight	50 kg
Width of cut	600 mm
Depth of cut	100 mm

3. Developed at — Karkhana Aalat-e-Zari, Bahawalpur, Pakistan

4. Test Results

Suitable for	Light and medium soils
Work capacity	0.15 ha/hour
Draft	120 kg

5. Cost

Sale Price	Rs 400 (US$ 40)
Operating	Rs 50/ha (US$ 2.50)

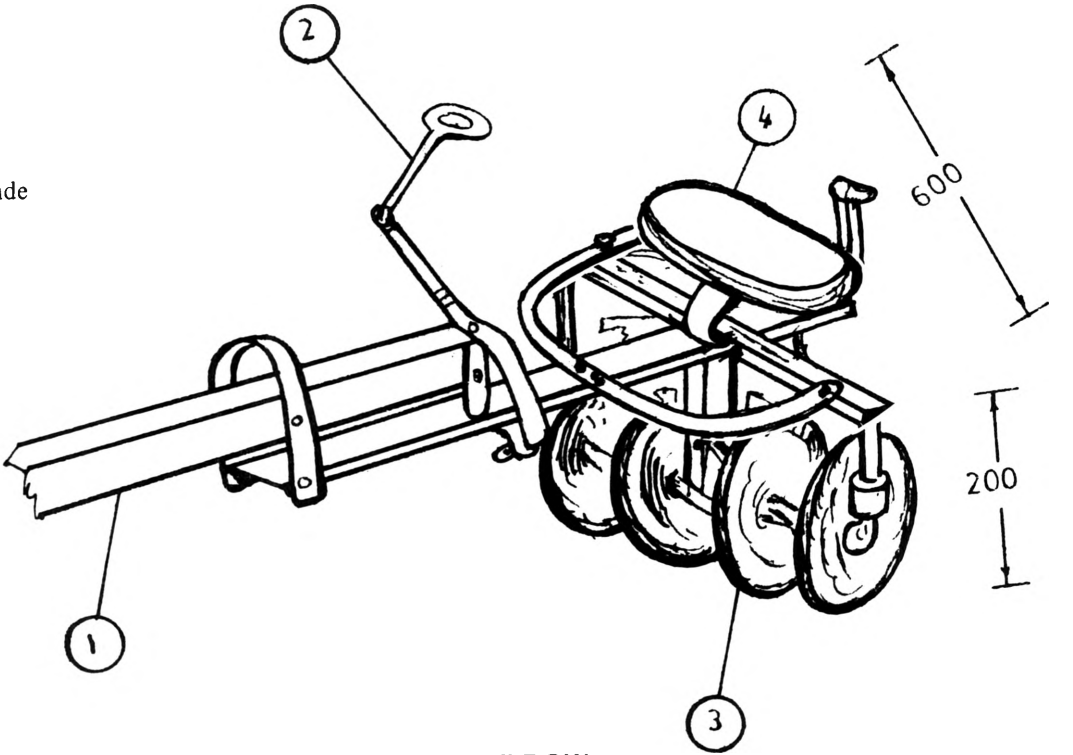
6. General

Bullock-drawn disc harrow has four discs, two mounted on each shaft and supported by bush bearings. Drivers seat and depth control adjustment are provided. By angling the disc shaft, depth of cut can be altered. In light soils it can be used even as a primary tillage implement.

7. Availability

Karkhana Aalat-e-Zari
Bahawalpur, Pakistan

(1) Beam
(2) Depth control blade
(3) Disc
(4) Seat



BULLOCK-DRAWN DISC HARROW

BORDER DISC

1. Function — To prepare the temporary borders along the field for irrigation purpose.

2. Specifications

Make	GHAZI
Type	Tractor – drawn
Power	Tractor – 16 HP
Length	1575 mm
Width	1065 mm
Height	1195 mm
Weight	125 kg

3. Developed at — Ghazi Industries Ltd., G. T. Road, Mian Channu, Multan, Pakistan

4. Test Results

Suitable for	Making border
Work capacity	3 km of border/hr
Draft	770 kg

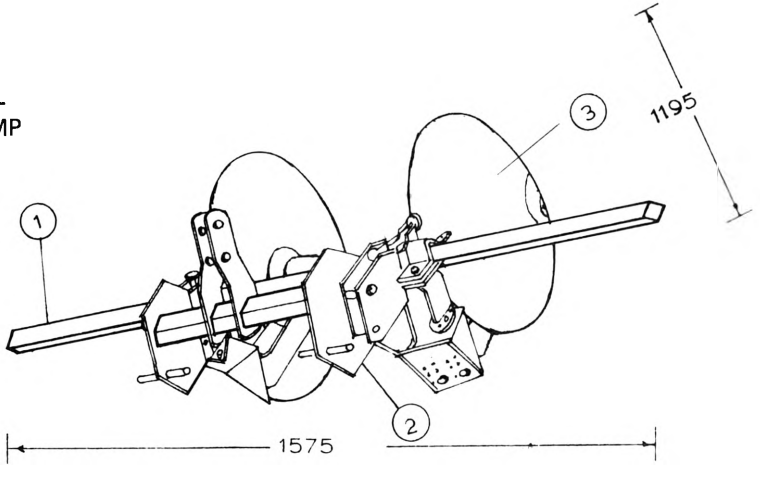
5. Cost

Sale Price	Rs 3600 (US$ 360)
Operating	Rs 40/ha (US$4)

6. General — Temporary borders are necessary to improve irrigation efficiency of farms levelled precisely. Borders at a distance of 15 meters are usually recommended before each irrigation. Disks are made of high carbon steel.

7. Availability — As in (3) above

1. TOOL
2. CLAMP
3. DISC



DITCHER

1. Function — To make temporary ditches to irrigate fields.

2. Specifications

Make	GHAZI
Type	Tractor-mounted
Power	Tractor – 25 HP
Length	1855 mm
Width	1750 mm
Height	1270 mm
Weight	150 kg

3. Developed at — Ghazi Industries, Ltd.
G.T. Road
Mian Channu
Multan, Pakistan

4. Test Results

Suitable for	Making ditches in light and medium soils
Work capacity	2 km/hour
Draft	1145 kg

5. Cost

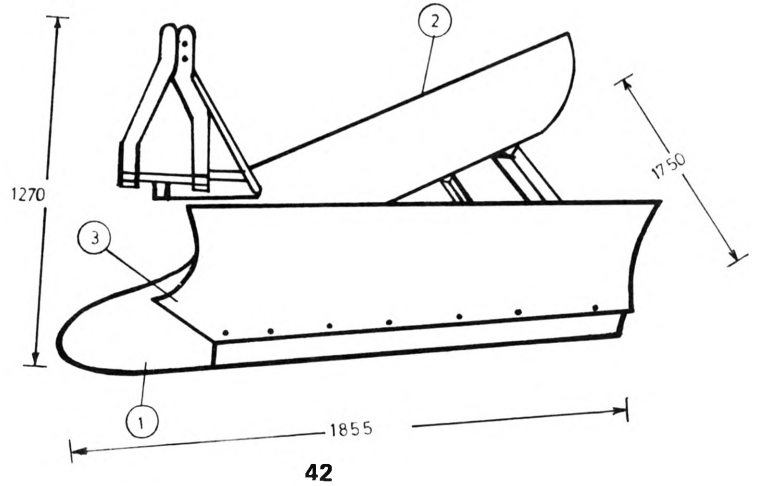
Sale Price	Rs 3200 (US$ 320)
Operating	Rs 45/hr (US$ 4.50)

6. General

Ditcher is used to make shallow ditches of about 300 mm in the fields for irrigation purpose. Tip of the ditcher penetrates into the soil while the side blades cut the soil and the wings throw the cut soil on to the left and right forming a uniform cross-section ditch.

7. Availability

As in (3) above



ANIMAL–DRAWN CULTIVATOR

1. Function — For intercultural operations

2. Specifications

Make	FMRC
Type	Animal-drawn
Power	A pair of bullocks and a man
Length	1300 mm
Width	60 mm
Height	1050 mm
Weight	28 kg
Width of cut	50 mm
Depth of cut	–

3. Developed at — Farm Machinery Research Centre, Maha Illupallama, Sri Lanka

4. Test Results

Suitable for	Weeding between row crops and for farming ridges
Work capacity	0.15 ha/hr
Draft	60 kg

5. Cost

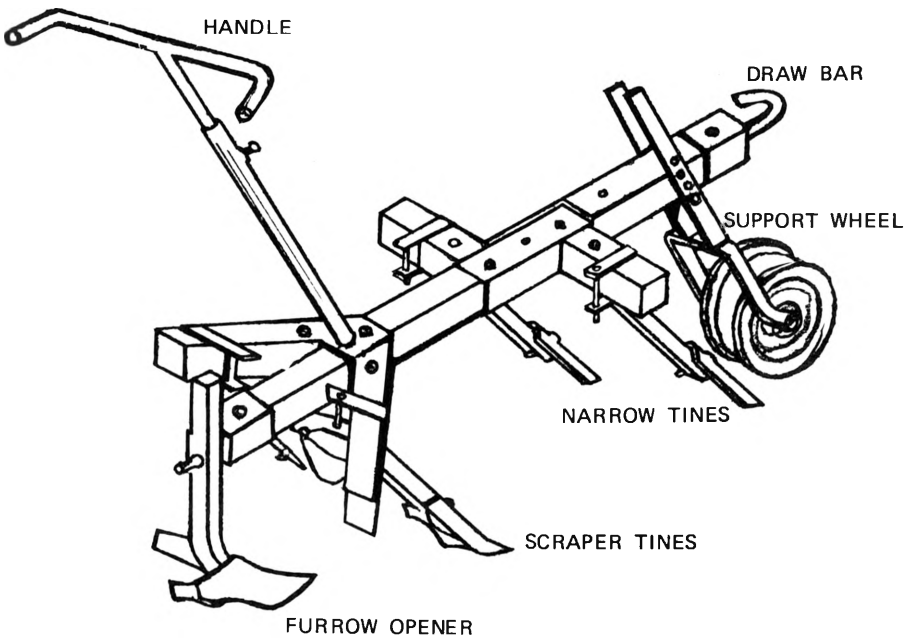
Sale Price	Rs 260 (US$18)
Operating	Rs 15 (US$1)

6. General

This cultivator is fitted with replaceable tynes, furrow opener, intercultivator and ridger. The attachments could be selected in order to i) form ridges on prepared dry land, ii) inter-row cultivation for weed control, and iii) loosening and earthing up soil in the row crops.

7. Availability

Farm Machinery Research Centre, Maha Illupallama, Sri Lanka



ANIMAL DRAWN CULTIVATOR

B. INTERCULTURAL TOOLS AND WEEDERS

WEEDER AND FERTILIZER APPLICATOR

1.	Function	For weeding and fertilizing simultaneously
2.	Specifications	
	Make	M. Djupri
	Type	Manually-operated
	Power	One person
	Length	900 mm
	Width	135 mm
	Height	450 mm
	Weight	4.5 kg
3.	Developed at	Biro Teknik M. Djupri Jl. Rongowarsito Solo, Indonesia
4.	Test Results	
	Suitable for	Wetlands
	Work capacity	0.2 ha/hour
5.	Cost	
	Sale Price	–
	Operating	–
6.	General	There are two rotors with a float made of mild steel and flats for weeding. Fertilizer also drops automatically and gets mixed with the soil.
7.	Availability	As in (3) above

DRYLAND WEEDER

1. Function — Weeding of crops

2. Specifications

Make	TNAU
Type	Rotary Drum
Power	Manual
Length	1330 mm
Width	590 mm
Height	1200 mm
Weight	6 kg
Width of cut	150 mm
Depth of cut	30 mm

3. Developed at — Tamil Nadu Agricultural University
Coimbatore, India

4. Test Results

Suitable for	Black cotton, clay and clay loam soil
Work capacity	0.025 ha/hr
Draft	

5. Cost

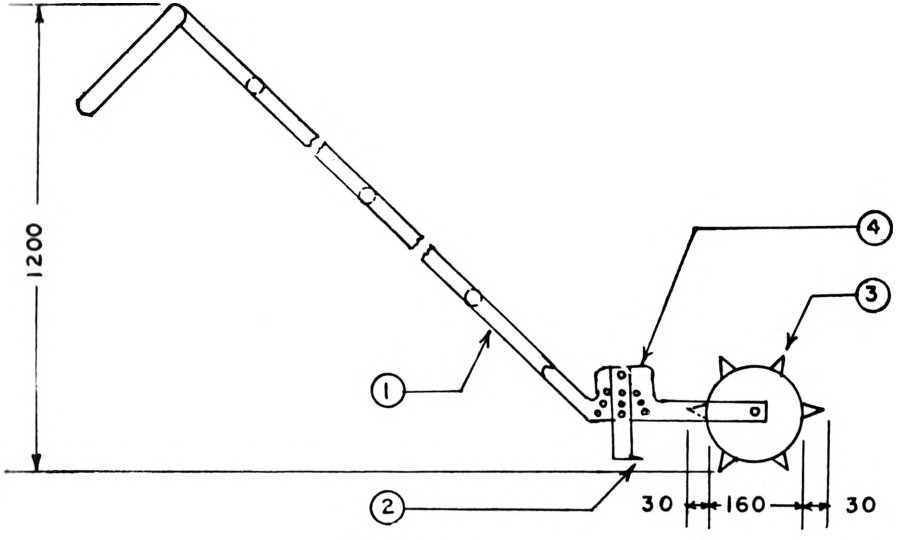
Sale Price	Rs 100 (US$ 12.50)
Operating	Rs 36/ha (US$4.50)

6. General

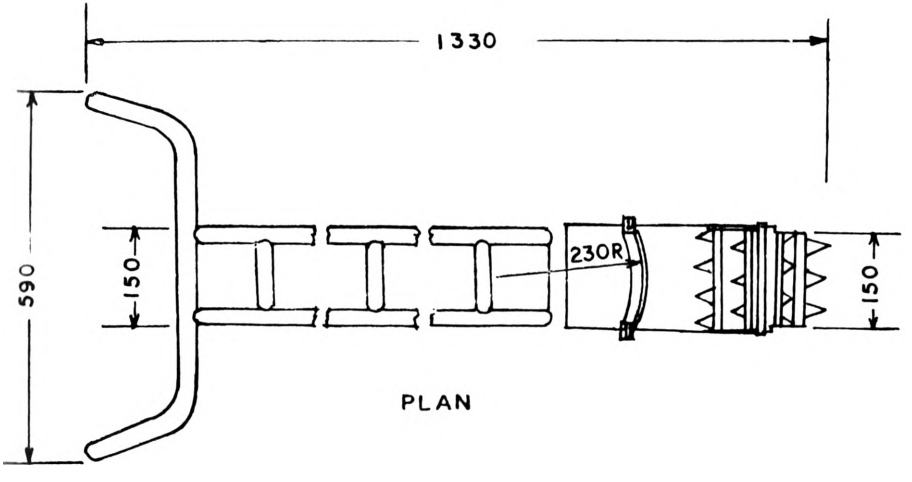
The peg type dryland weeder is a manually-operated single drum type, suitable for weeding in row crops in rainfed and garden lands. It can easily be operated by a man or woman. It is most efficient when the soil moisture is almost 10%. It performs well in plain fields where weeds are shallow rooted and thinly populated. It can also be used with some experience for removing weeds from ridges and furrows. The cutting blade can be adjusted at desired angle and depth. The peg teeth permit the movement of roller in clayey soil without getting clogged.

7. Availability

College of Agricultural Engineering
Tamil Nadu Agricultural University
Coimbatore, India



ELEVATION



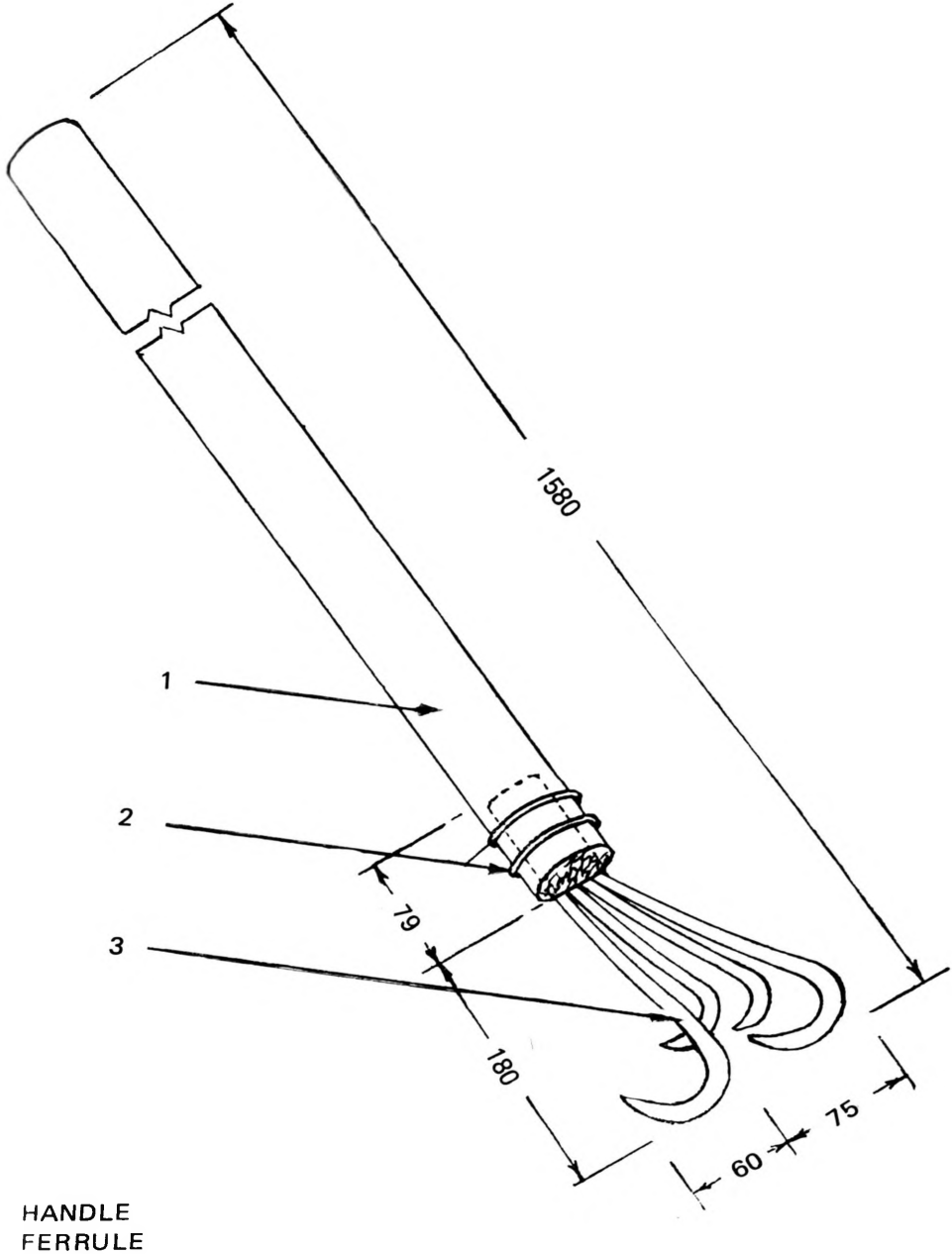
PLAN

(1) HANDLE
(2) CUTTING BLADE
(3) PEG WHEEL
(4) ADJUSTMENT BRACKET

DRYLAND WEEDER

FINGER TYPE WEEDER

1.	Function	Weeding
2.	Specifications	
	Make	CRRI
	Type	Tyne type
	Power	Manual
	Length	1580 mm
	Width	75 mm
	Height	150 mm
	Weight	1.25 kg
	Width of cut	200 mm
	Depth of cut	50 mm
3.	Developed at	Division of Agricultural Engineering Central Rice Research Institute Cuttack, India
4.	Test Results	
	Suitable for	Rice, wheat and jute
	Work capacity	0.02 ha/hour in wet soil
	Draft	10 kg
5.	Cost	
	Sale Price	Rs 8 (US$ 1)
	Operating	Rs 35/ha in wet soil (US$ 4.50) Rs 70/ha in dry soil (US$ 9)
6.	General	The weeder has four fingers of which two are longer. The longer ones are 180 mm in length and the smaller ones are of 150 mm. This is suitable for both dry and wetland conditions and weeding is effected by pulling action.
7.	Availability	Division of Agricultural Engineering Central Rice Research Institute Cuttack, India

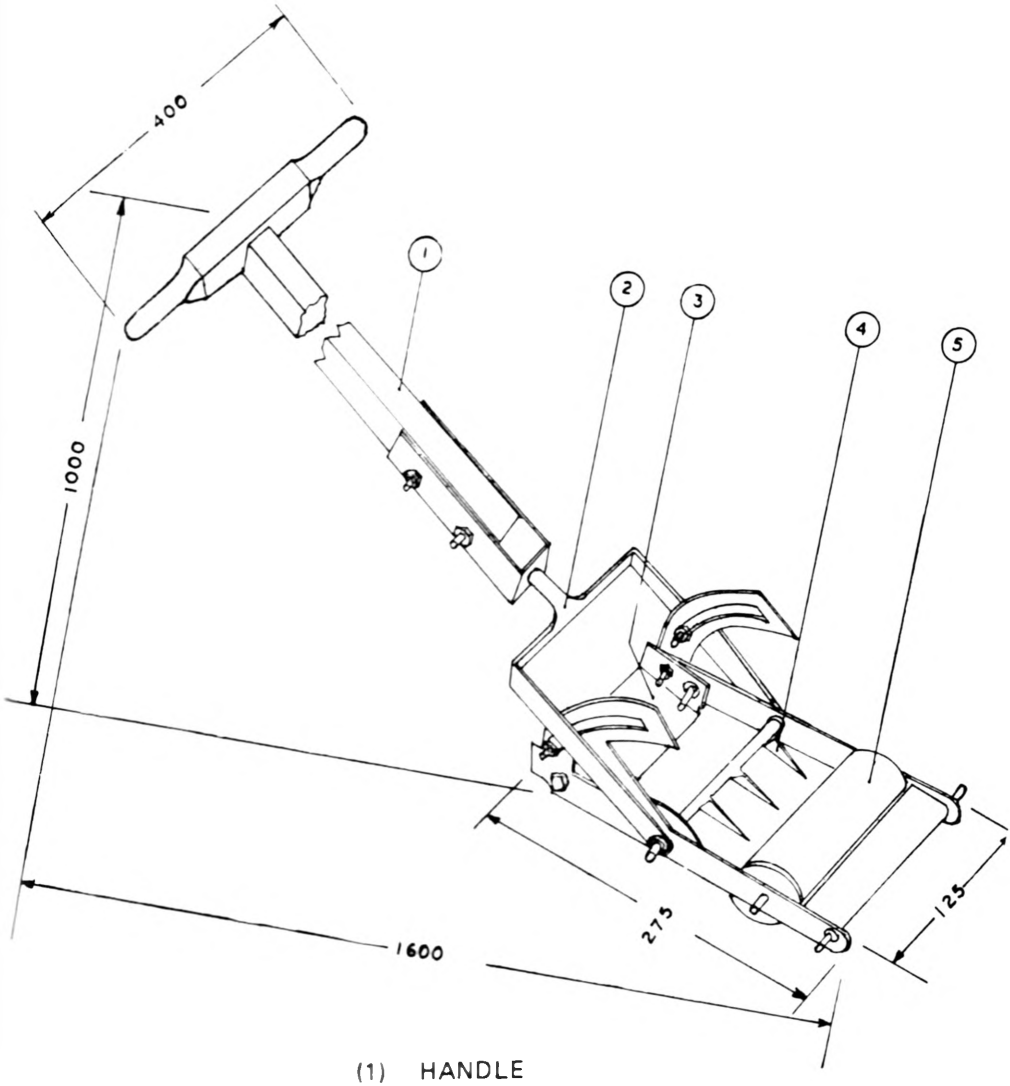


(1) HANDLE
(2) FERRULE
(3) FINGER

FINGER TYPE WEEDER

RAKE-CUM-BLADE WEEDER

1.	Function	Weeding in wetland and dryland
2.	Specifications	
	Make	CRRI
	Type	Manually-operated rake and blade type
	Power	Manual
	Length	1600 mm
	Width	400 mm
	Height	1000 mm
	Weight	3 kg
	Width of cut	100 mm
	Depth of cut	50 mm
3.	Developed at	Central Rice Research Institute Cuttack, India
4.	Test Results	
	Suitable for	All crops and light soil
	Work capacity	0.015 ha/hour
5.	Cost	
	Sale Price	Rs 15 (US$ 2)
	Operating	Rs 45/ha (US$ 5.50)
6.	General	The weeder consists of a blade of 100 mm long and 55 mm wide with a sharp edge and a rake having four teeth. The length of each tooth is 45 mm. Depth of cut of the tool can be adjusted by changing the position of the frame with the help of nuts and bolts. The position of the handle can also be adjusted so that either the rake or the blade comes to working position. The rake is used under wet land conditions and the blade under dryland conditions.
7.	Availability	i) Central Rice Research Institute Cuttack, India ii) M/s Government Implement Factory Satya Nagar, Bhubaneswar – 75100 Orissa, India

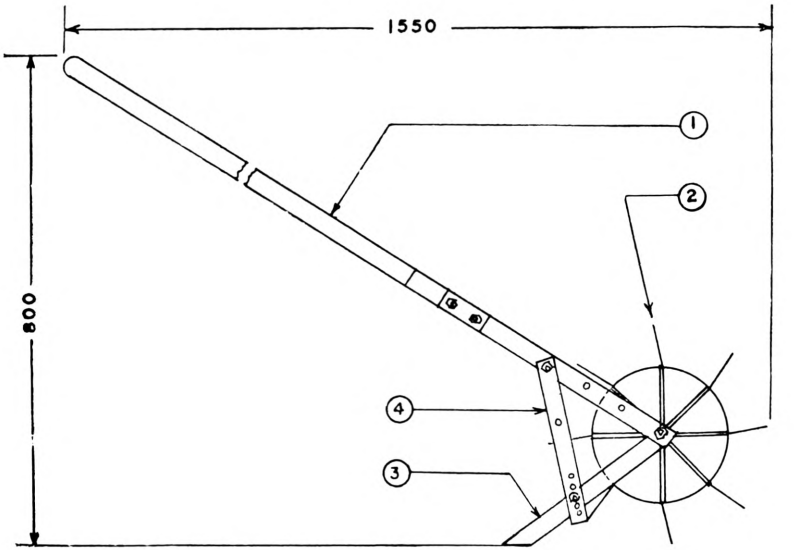


(1) HANDLE
(2) FRAME
(3) BLADE
(4) RAKE
(5) ROLLER

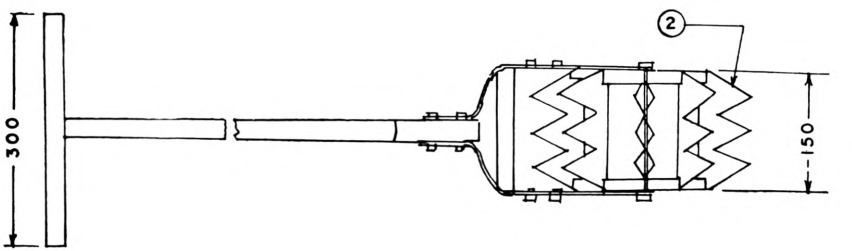
RAKE–CUM–BLADE WEEDER

WEEDER-CUM-MULCHER

1.	Function	Weeding and mulching of row-crops
2.	Specifications	
	Make	IGFRI
	Type	Rotary and blade
	Power	Manual
	Length	1550 mm
	Width	300 mm
	Height	800 mm
	Weight	5 kg
	Width of cut	150 mm
	Depth of cut	30 mm
3.	Developed at	Indian Grassland and Fodder Research Institute, Jhansi, India
4.	Test Results	
	Suitable for	All row-crops
	Work capacity	0.004 ha/hour
5.	Cost	
	Sale Price	Rs 70 (US$ 9)
	Operating	Rs 190/ha (US$ 24)
6.	General	It consists of a blade, a floating wheel, a handle and an adjustment bracket for changing the angle of the blade. It is used as weeder-cum-mulcher in row crops. For deep tilling, three small tynes can also be fitted on this hand tool. The blade does tilling upto a maximum depth of 20 mm whereas with tynes tilling could be done up to a maximum depth of 50 mm. This two-in-one hand-tool is specially designed for inter-cultural operations.
7.	Availability	Indian Grassland and Fodder Research Institute , Jhansi, India



ELEVATION

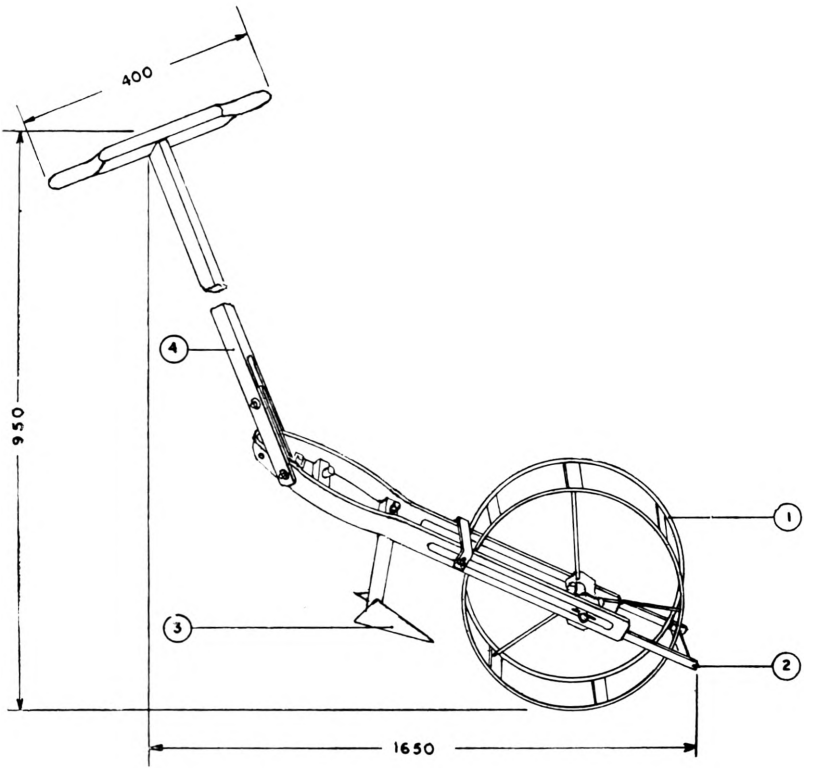


(1) HANDLE
(2) FLOATING WHEEL
(3) STRAIGHT BLADE
(4) ADJUSTMENT BRACKET

WEEDER–CUM–MULCHER

WHEEL HOE

1.	Function	Weeding and earthing
2.	Specifications	
	Make	CRRI
	Type	Wheel and shovel
	Power	Manual
	Length	1650 mm
	Width	400 mm
	Height	950 mm
	Weight	6 kg
	Width of cut	150 mm
	Depth of cut	40 mm
3.	Developed at	Central Rice Research Institute Cuttack, India
4.	Test Results	
	Suitable for	All row crops
	Work capacity	0.015 ha/hour
5.	Cost	
	Sale Price	Rs 50 (US$ 6)
	Operating	Rs 45/ha (US$ 5.50)
6.	General	The implement consists of a sweep type hoe, a wheel and a frame. The sweep is 150 mm long and 150 mm wide. The height of the implement is fixed (950 mm). It does complete weeding in one operation. While working, it removes soil from the centre of the row spaces and deposits the same along the row for forming a short ridge. Thus it also performs an earthing operation.
7.	Availability	Central Rice Research Institute Cuttack, India

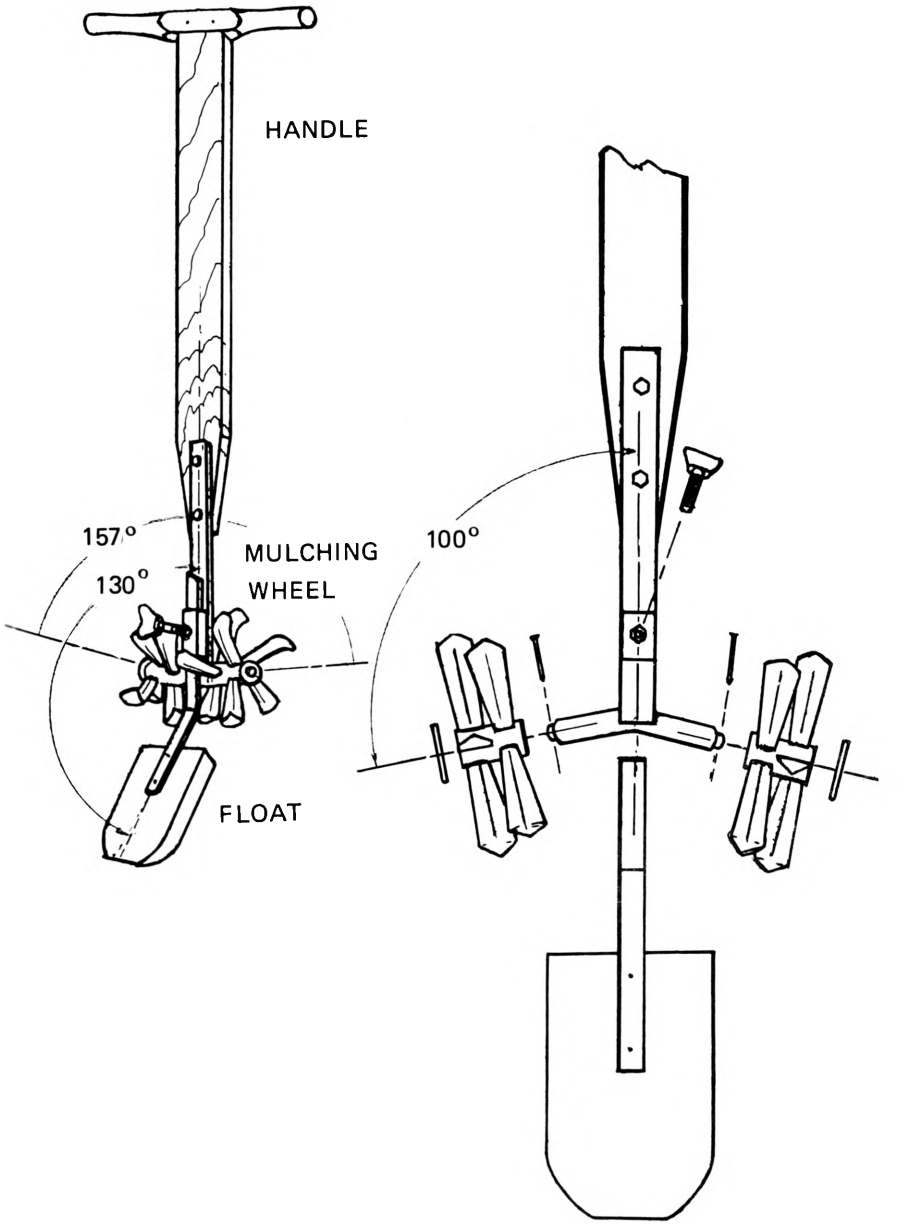


WHEEL HOE

(1) WHEEL
(2) FRAME
(3) SWEEP TYPE HOE
(4) HANDLE

MUDLAND WEEDER

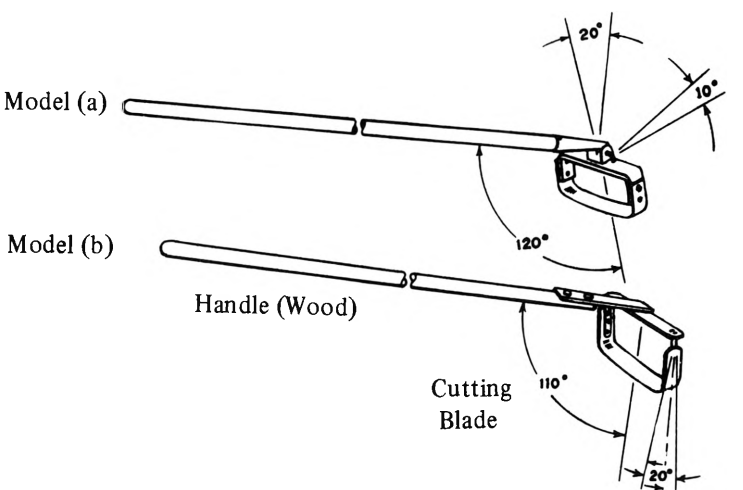
1.	Function	Weeding
2.	Specifications	
	Make	Welisara
	Type	Rotary
	Power	One man
	Length	300 mm
	Width	150 mm
	Height	150 mm
	Weight	4 kg
	Width of cut	125 mm
	Depth of cut	50 mm
3.	Developed at	Implements Factory, Welisara, Sri Lanka
4.	Test Results	
	Suitable for	Wetland condition
	Work capacity	0.02 ha/hour
5.	Cost	
	Sale Price	Rs 70 (US$ 5)
	Operating	Rs 7/day (US$ 0.5)
6.	General	It comprises of a handle to the end of which is attached a bent axle. Two rotors are fitted on to the axle. A float is provided at the front to prevent bogging and for smooth working.
7.	Availability	Implements Factory, Welisara, Sri Lanka



MUDLAND WEEDER

BLADE HOE

1.	Function	Weeding and crust breaking
2.	Specifications	
	Make	FMRC
	Type	Pull and push blade type
	Length	150-250 mm
	Width	25 mm
	Height	100 mm
	Weight	2 kg
	Width of cut	120-225 mm
	Depth of cut	10-20 mm
3.	Developed at	Design Centre, Maha Illupallama, Sri Lanka
4.	Test Results	
	Suitable for	Shallow rooted crops and breaking hard soil crust
	Work capacity	0.01 ha/hour
5.	Cost	
	Sale Price	Rs 30 (US$ 2)
	Operating	Rs 45 (US$ 3)
6.	General	It has been found to be an excellent tool for drylands. As the two edges are sharp, weeding is effective both by pulling and pushing. The cutting blade can be raised or lowered.
7.	Availability	Implements Manufacturing Workshop Welisara, Colombo, Sri Lanka



C. SEEDERS AND PLANTER

UNI-AUTOMATIC HAND JABBER

1. Function — To plant field legumes such as corn, sorghum, soybeans, etc.

2. Specifications

Make	UPLB
Type	Single-row manually-operated
Power	one man
Length	410 mm
Width	170 mm
Height	890 mm
Weight	4 kg.

3. Developed at — Institute of Agricultural Engineering & Technology, University of the Philippines at Los Baños (UPLB)

4. Test Results

Suitable for	All types of soil and requires minimum land preparation
Work capacity	0.05 ha/hour

5. Cost

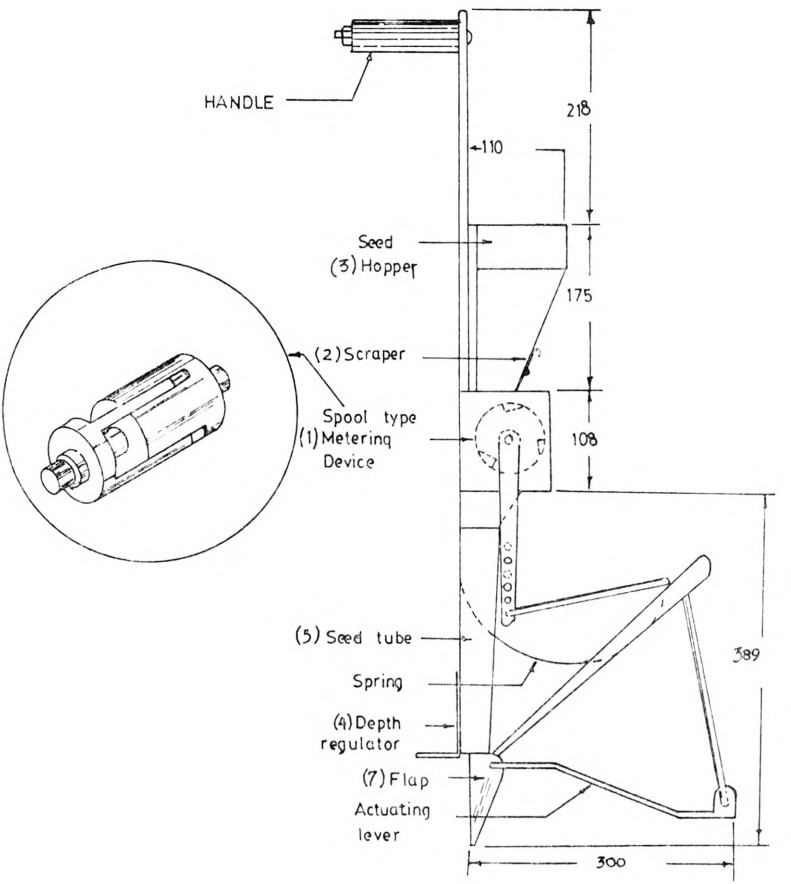
Sale Price	P350 (US$ 47)
Operating	P36/ha (US$5)

6. General

The jabber is fitted with a wooden metering device that can be readily manufactured locally at a cheap price. Prior to the planting operation, the spool type metering device is adjusted depending on the kind of seeds and the seeding rate. A scraper is provided in the seed hopper, to limit the number of seeds in the grooves. The depth of seeding which can be varied from 0 to 70 mm is controlled by the depth regulator located at the lower end of the seed tube. During planting, the operator has to jab the equipment to the desired depth and then push it forward. Thus, the actuating lever is deflected upwards, simultaneously actuating the metering device and opening of the flap.

7. Availability

Institute of Agricultural Engineering and Technology
University of the Philippines at Los Baños



UNI-AUTOMATIC HAND JABBER

DIRECT HAND SEEDER (SPADE TYPE)

1. Function — Open the furrows, metre and deposit seed

2. Specifications

Make	Local manufacturers
Type	Direct hand seeder (Spade type)
Power	Manual – one person
Length	300 mm
Width	186 mm
Height	1370 mm
Weight	2.5 kg

3. Developed at — Agricultural Engineering Division, Department of Agriculture, Bangkok, Thailand

4. Test Results

Suitable for	Maize, sorghum, soybean, husked rice, mungbean etc.
Work capacity	0.07 ha/hour

5. Cost

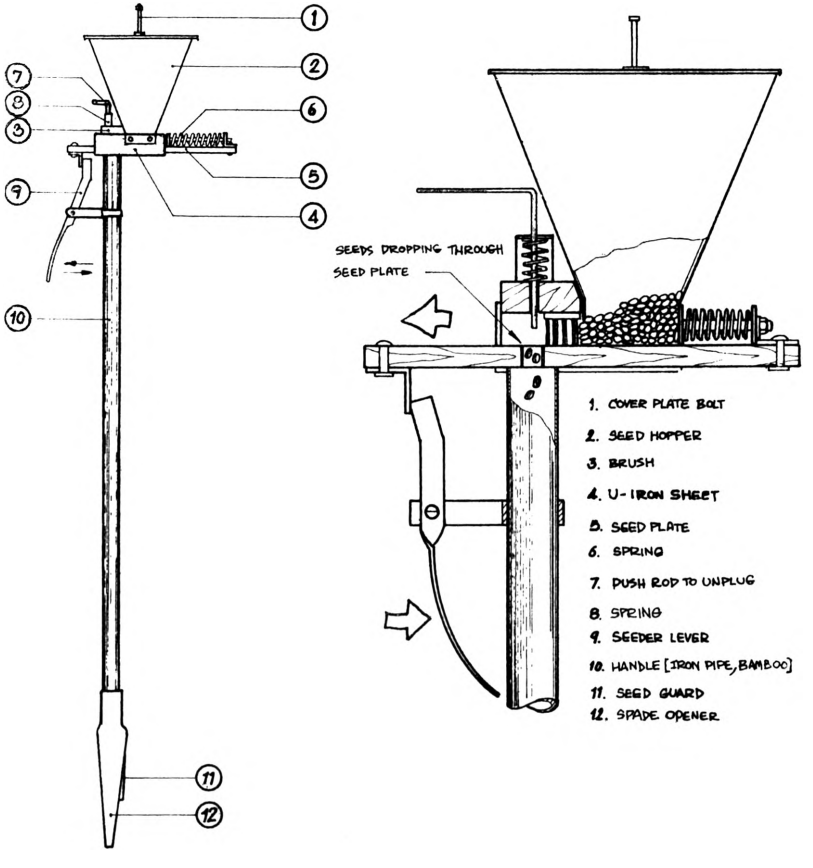
Sale Price	Bht 300 (US$ 15)
Operating	Bht 60/ha (US$ 3)

6. General

The spade type direct hand seeder consists of an iron spade opener, an iron pipe (or bamboo) handle which also acts as seed tube. By pressing the seeding lever, the seed in the hopper drops through seed plate, pipe handle to the furrow. It is then covered and compacted by foot.

7. Availability

Several manufacturers. The Agricultural Engineer in charge of the Division (3. above) may be contacted.



DIRECT HAND SEEDER (SPADE TYPE)

SUGARBEET DRILL

1. Function — Sowing of sugarbeet

2. Specifications

Make	IISR
Type	Manually-operated, single-row, adjustable depth
Power	Manual – two persons to operate the drill
Length	1110 mm
Width	830 mm
Height	1000 mm
Weight	18 kg
Depth of sowing	50 mm

3. Developed at — Agricultural Engineering Division, Indian Institute of Sugarcane Research, Lucknow, India

4. Test Results

Suitable for	Sugarbeet
Work capacity	0.1 ha/hour
Draft	8.0 kg at 50 mm depth in sandy loam soil

5. Cost

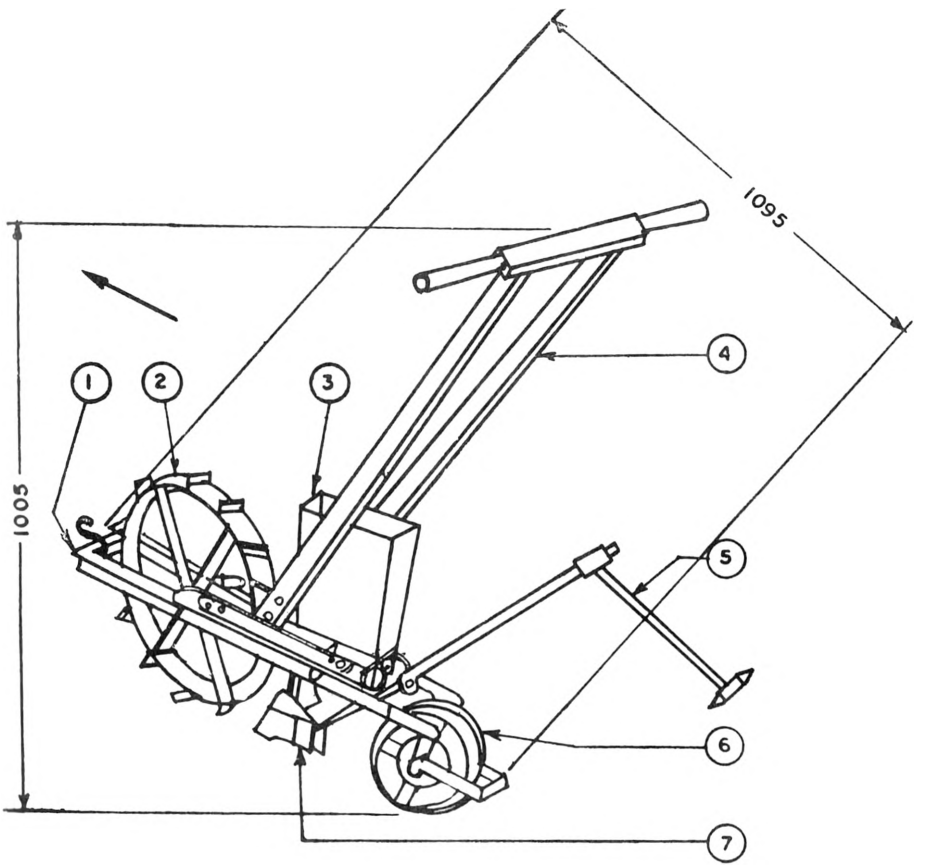
Sale Price	Rs 125 (US$ 16)
Operating	Rs 20/ha (US$ 2.50)

6. General

This implement consists of a rectangular frame on which a seed hopper with metering mechanism, a lugged drive wheel, a furrow opener, a press wheel, handle and a marker are fitted. The furrow opener is kept between the drive and press wheel and the metered seeds are dropped behind the furrow opener through sheet metal chute. The metering mechanism consists of a stationery hole with a nylon brush agitator. The location of the agitator is such that when it moves, the brushes rub against the metering hole and allows one or two seeds only. The seed rate is regulated from 5 kg to 12 kg/ha through a metering disc having different sizes of holes.

7. Availability

Agricultural Engineering Division
Indian Institute of Sugarcane Research
Lucknow, India

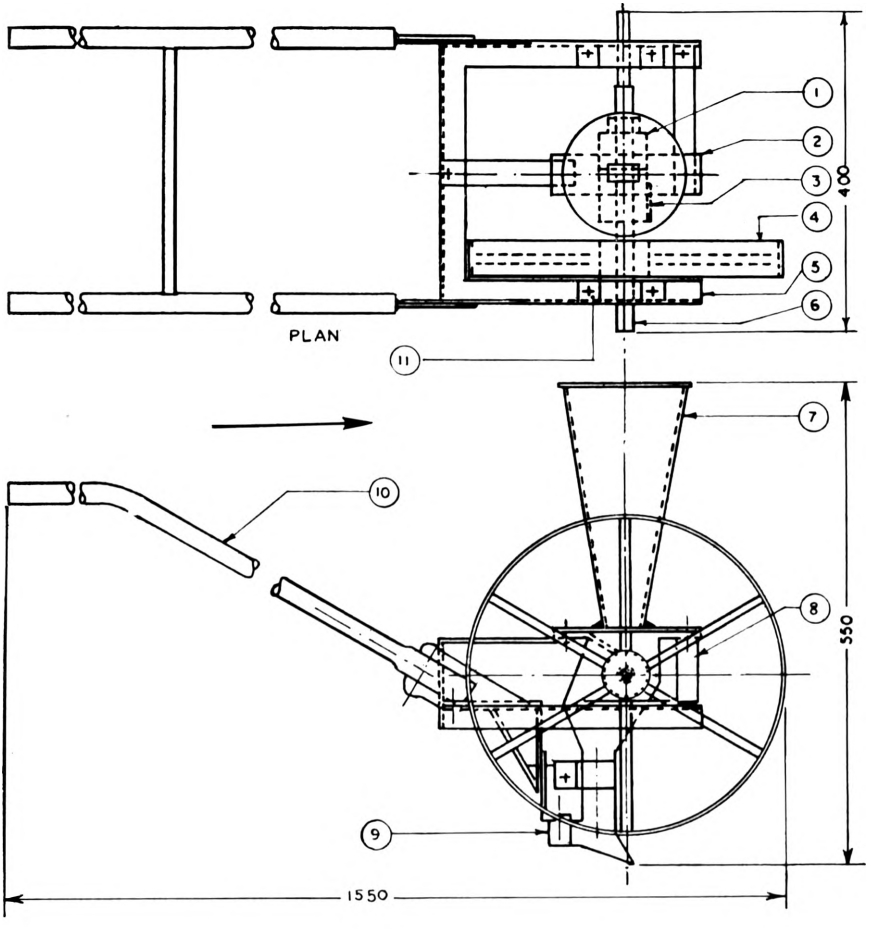


(1) FRAME
(2) DRIVE WHEEL
(3) SEED HOPPER
(4) WOODEN HANDLE
(5) MARKER
(6) PRESS WHEEL
(7) FURROW OPENER

SUGARBEET DRILL

MULTICROP SEED DRILL

1.	Function	Sowing a variety of seeds
2.	Specifications	
	Make	GBPUAT
	Type	Hand operated, single row, adjustable depth
	Power	Manual-one person
	Length	1550 mm
	Width	400 mm
	Height	550 mm
	Weight	9 kg
	Depth of sowing	50 mm
3.	Developed at	College of Technology G.P. Pant University of Agriculture and Technology, Pantnagar, India
4.	Test Results	
	Suitable for	Wheat, maize, pigeon pea, green gram and soybean
	Work capacity	0.025 ha/hour
	Draft	About 20 kg
5.	Cost	
	Sale Price	Rs 100 (US$ 12.50)
	Operating	Rs 35/ha (US$ 4.50)
6.	General	The hand operated seed drill consists of seed hopper, fluted roller seed-metering mechanism, shoe type furrow opener, handle, support and wheel. There is a provision for the adjustment of depth of seeding. Seed rate can be maintained with the help of a marker provided with the machine. The unique feature of this machine is that the fluted roller is mounted directly on the wheel axle on which seed box is also mounted. This avoids power drive unit to the seed metering mechanism. The machine is useful for hilly areas.
7.	Availability	College of Technology G.P. Pant University of Agriculture and Technology, Pantnagar, India



ELEVATION

MULTICROP SEED DRILL

JAMUNA SEED-CUM-FERTILIZER DRILL

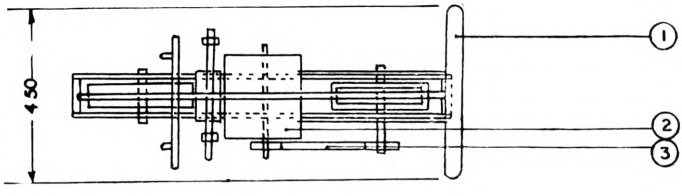
1.	Function	Dropping seed and fertilizer simultaneously
2.	Specifications	
	Make	IARI
	Type	Manually–operated, single row, adjustable depth
	Power	Manual – three persons to operate or one bullock and one man
	Length	1040 mm
	Width	450 mm
	Height	900 mm
	Weight	24 kg
	Width of sowing	40 mm
	Depth of sowing	75 mm
3.	Developed at	Division of Agricultural Engineering Indian Agricultural Research Institute New Delhi, India
4.	Test Results	
	Suitable for	Wheat, barley, peas, mustard, pearl millet, cowpea, sorghum, maize, black gram, green gram, pegion pea and safflower
	Work capacity	0.04 ha/hour (average)
	Draft	20 kg
5.	Cost	
	Sale Price	Rs 250 (US$ 30)
	Operating	Rs 28/ha (US$ 3.50)

6. General

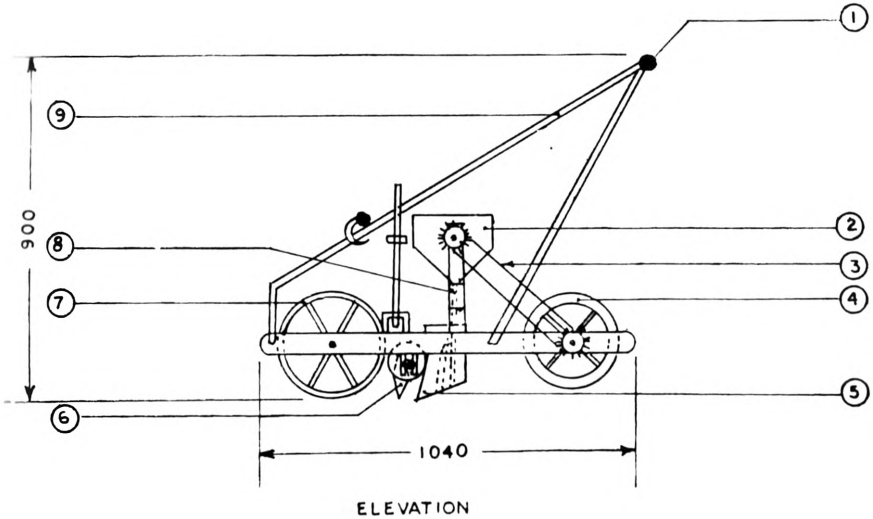
The drill consists of two hoppers, tubes, furrow opener, drive chain,, drive wheel and furrow marker. One kg each of seed and fertilizer can be placed in separate hoppers. Furrow is opened by a shoe type furrow openers. Standard granular fertilizer is placed by the side and 20 mm below the seeds simultaneously in the same furrow. Calibrated wooden rollers are used for metering seeds and fertilizer. The metering mechanism gets its drive from the front ground wheel through chain sprocket arrangement. Rollers of the fertilizer and various seeds can easily be replaced within 2-3 min. Depth of furrow and quantity of seeds and fertilizer can be adjusted. Soil compacting wheel is provided to cover the seeds and compact the soil. The machine is simple in construction and can be made and repaired by the village artisans.

7. Availability

Division of Agricultural Engineering
Indian Agricultural Research Institute
New Delhi, India



PLAN



ELEVATION

(1) HANDLE
(2) SEED-CUM-FERTILIZER HOPPER
(3) CHAIN
(4) SOIL COMPACTING WHEEL
(5) FURROW OPENER
(6) FURROW MARKER
(7) FRONT WHEEL
(8) SEED & FERTILIZER TUBES
(9) IRON FRAME

JAMUNA SEED–CUM–FERTILIZER DRILL

SINGLE ROW SEEDER

1. Function — Seeding highland crop

2. Specifications

Make	M.I. 76
Type	Manually-operated
Power	One man
Length	1400 mm
Width	750 mm
Height	500 mm
Weight	18 kg
Width of sowing	single row
Depth of sowing	750 mm

3. Developed at — Farm Machinery Research Centre
Maha Illupallama, Sri Lanka

4. Test Results

Suitable for	groundnut, maize, sorghum, onion
Work capacity	0.05 ha/hour
Draft	6 kg

5. Cost

Sale Price	Rs 350 (US$ 25)
Operating	Rs 60/ha (US$ 7)

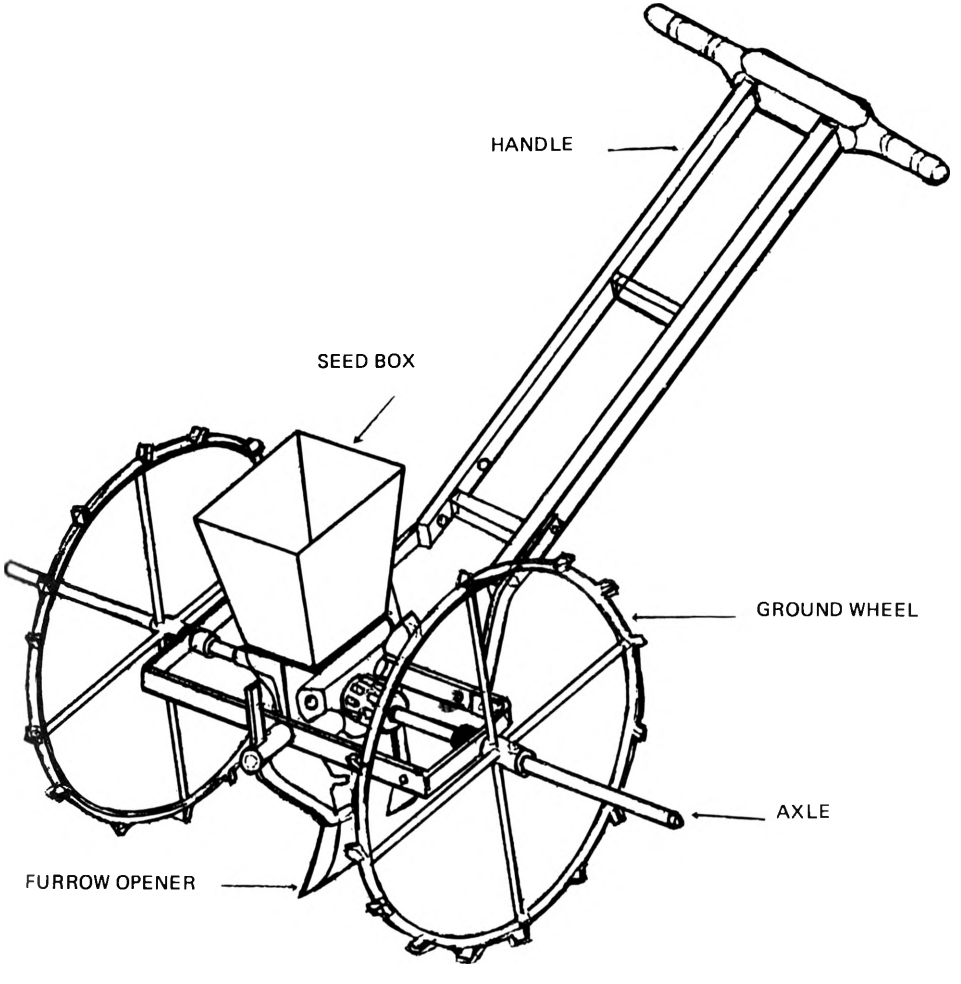
6. General

A cast aluminum seed box is mounted on a rigid frame through which passes an axle carrying a slotted force-feed shaft inside the box. The axle is supported at the two ends with two lugged wheels. The seeder is provided with furrow opener, seed covering shovel and adjustable wooden handle. This seeder could be operated on the prepared dry field. The roller consists of five different slots. The operator pushes the seeder and walks forward. The seeds will be delivered continuously into the furrow and covered by soil pushed by the covering shovel. Seed rate is adjustable from 5 kg to 50/hectare.

7. Availability

i) Farm Machinery Research Centre
Maha Illupallama, Sri Lanka

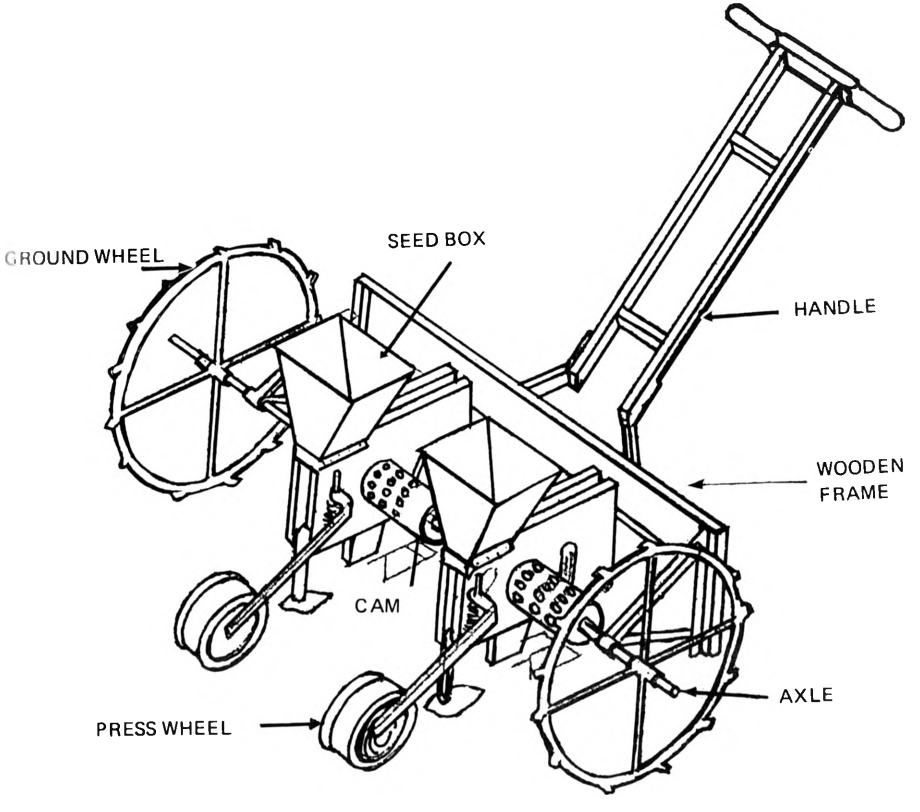
ii) Hector & Co.
Colombo, Sri Lanka



SINGLE-ROW PUSH TYPE SEEDER

TWO-ROW HAND SEEDER

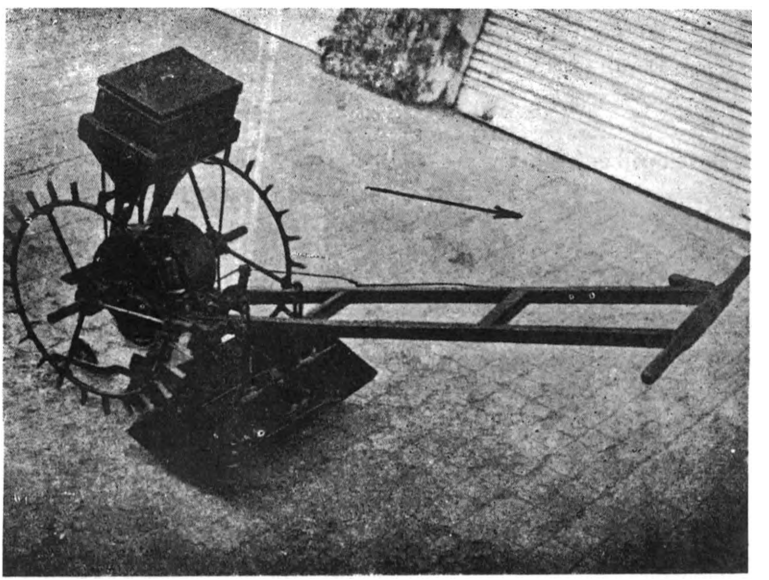
1.	Function	For sowing seeds
2.	Specifications	
	Make	FMRC
	Type	M.I. 76 General Purpose
	Power	Manual – one man
	Length	1400 mm
	Width	750 mm
	Height	500 mm
	Weight	25 kg
	Width of sowing	400 mm
	Depth of sowing	50 mm
3.	Developed at	Farm Machinery Research Centre Maha Illupallama, Sri Lanka
4.	Test Results	
	Suitable for	Multicrops
	Work capacity	.075 ha/hour
	Draft	12 kg
5.	Cost	
	Sale Price	Rs 500 (US$ 35)
	Operating	Rs 75/ha (US$ 5)
6.	General	The wooden frame carries a wooden seed box with sheet metal extension. Through the seed box passes an axle carrying slotted wooden cam set inside the box. The axle passes through the frame and supported at the ends with two iron wheels. Furrow openers, seed covering shovels, press wheels and a handle are provided on this seeder. The operator pulls the seeder and walks backward. The seeds are drilled into the furrows, covered by the soil and pressed by the trailing wheel. The previous furrow mark or the wheel mark would be aligned for the next row to be sown. On an average at 300 mm spacing, 0.075 ha/hour pulse crop per man per day could be seeded with the single row seeder.
7.	Availability	See (3) above



TWO–ROW HAND SEEDER

TWO-ROW SEED DRILL

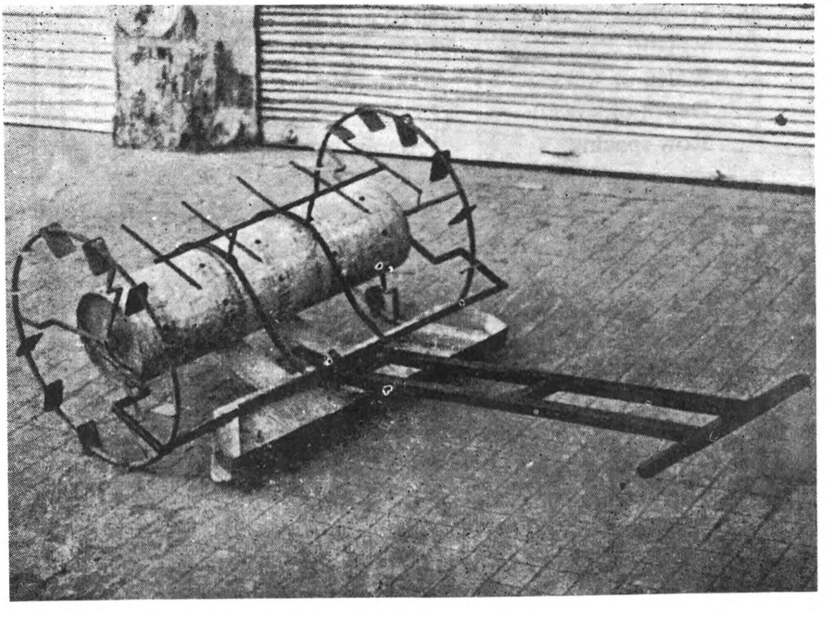
1.	Function	Sowing multi crops
2.	Specifications	
	Make	CRRI
	Type	Manually-operated
	Power	Manual – one person
	Length	1400 mm
	Width	650 mm
	Height	670 mm
	Weight	20 kg
	Width of sowing	300 mm
	Depth of sowing	15 mm
3.	Developed at	Agricultural Engineering Division Central Rice Research Institute Cuttack, India
4.	Test Results	
	Suitable for	Rice, maize, sorghum and jute
	Work capacity	0.04 ha/hour
	Draft	About 12 kg
5.	Cost	
	Sale Price	Rs 500 (US$ 65)
	Operating	Rs 15/ha (US$ 2)
6.	General	The seed drill mainly consists of a seed hopper, cup and disc type metering device, shoe type furrow opener, seed covering device and frame. It has no depth adjustment system. The wheels directly transmits power to the metering device through its axle.
7.	Availability	As in (3) above



TWO – ROW SEED DRILL

FIVE-ROW PREGERMINATED PADDY PLANTER

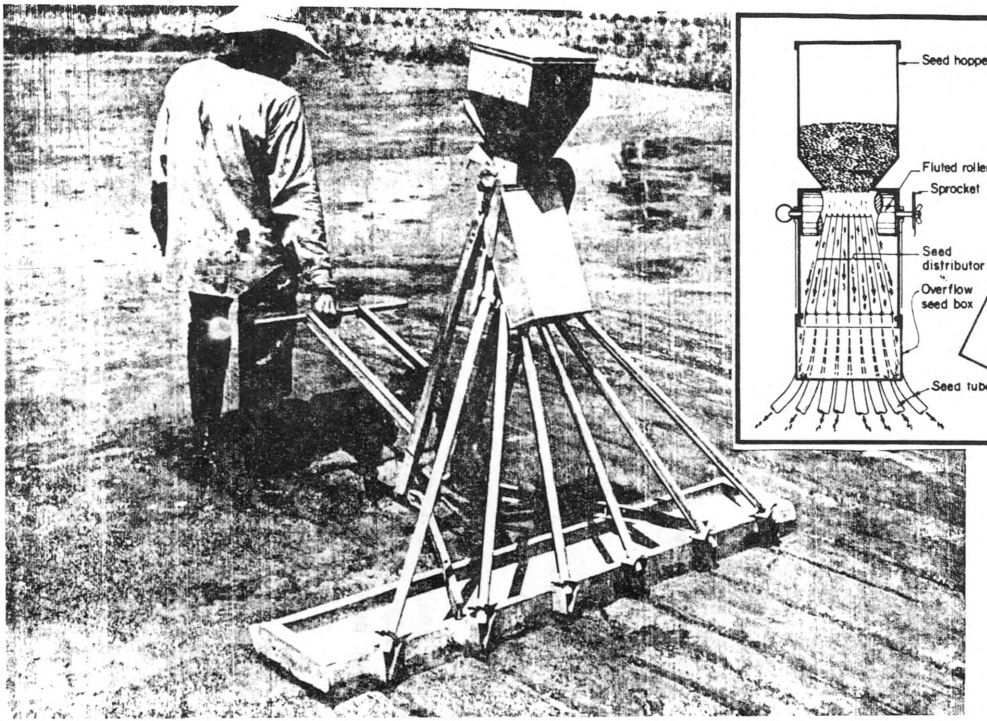
1.	Function	Sowing of pregerminated paddy
2.	Specifications	
	Make	Cuttack
	Type	Manually-operated, fixed depth
	Power	Manual – one person to operate
	Length	1425 mm
	Width	750 mm
	Height	670 mm
	Weight	16 kg
	Width of sowing	750 mm
	Depth of sowing	45 mm
	Row spacing	150 mm
3.	Developed at	Division of Agricultural Engineering Central Rice Research Institute Cuttack, India
4.	Test Results	
	Suitable for	Rice
	Work capacity	0.15 ha/hour
	Draft	20 kg
5.	Cost	
	Sale Price	Rs 350 (US$ 32)
	Operating	Rs 30/ha (US$ 4.50)
6.	General	The five row planter has a drum for carrying germinated seeds, two wheels, a wooden float and five shoe type furrow openers. Length and diameter of the drum are 760 mm and 220 mm respectively. There are 5 rows of holes along the circumference of the drum at 150 mm spacing between the rows and 7 holes in each row. The opening of the holes are adjusted with the help of metal strip to control the seed rate. The seed drum is only half filled during the operation.
7.	Availability	i) As in (3) above ii) Shri R. N. Mahapatra 62-Surya Nagar Bhubaneswar, India



FIVE – ROW PREGERMINATED PADDY PLANTER

SIX-ROW PREGERMINATED PADDY SEEDER

1.	Function	Sowing of pregerminated paddy seeds in rows
2.	Specifications	
	Make	IRRI
	Type	Manually-operated, fixed row spacing
	Power	Manual – two persons to operate
	Length	940 mm
	Width	910 mm
	Height	1420 mm
	Weight	20 kg
	Width of sowing	900 mm
	Depth of sowing	25 mm
	Row spacing	150 mm
3.	Developed at	International Rice Research Institute Los Baños, Laguna
4.	Test Results	
	Suitable for	Pregerminated rice and puddled soil
	Work capacity	0.1 ha/hour
	Draft	About 25 kg
5.	Cost	
	Sale Price	P450 (US$ 60)
	Operating	P18/ha (US$ 2.50)
6.	General	The pregerminated paddy seeder consists of a seed box, fluted roller metering device and a skid with furrow openers. Seed is dropped in the furrow through plastic tubes. Power to the fluted roll is transmitted from a ground wheel through chain and a sprocket arrangement. Covering of the seed is automatic due to puddled condition of the soil. This has been tested and modified in several countries.
7.	Availability	As in (3) above



SIX–ROW PREGERMINATED PADDY SEEDER

MULTI HOPPER SEEDER

1. Function — For sowing rice and puddled soil

2. Specifications

Make	IRRI
Type	Manual pull type
Power	Manual-two persons
Length	1500 mm
Width	900 mm
Height	750 mm
Weight	23 kg
Width of sowing	1500 mm
Depth of sowing	750 mm

3. Developed at — IRRI, Los Baños, Philippines

4. Test Results

Suitable for	Rice
Work capacity	0.06 ha/hour
Draft	25 kg

5. Cost

Sale Price	Rs 450 (US$ 30)
Operating	Rs 30/ha (US$ 2)

6. General

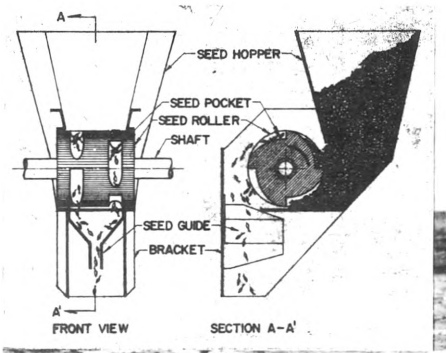
Six small seed boxes spaced at 250 mm apart are fitted on the vertical sides of two light metal floats. Each box carries a slotted wooden cam bolted to the axle. A lugged wheel is fitted at the centre of the axle in the space between the two sections of the seeder. A tubular handle frame is also provided. The operator pulls the seeder and walks backward. As the wheel rotates the axle with cams also rotates. The cams pick up the seeds from the box and drops them into the furrows opened by the small furrow openers fitted at the bottom of the float. This has been tested in several Asian countries.

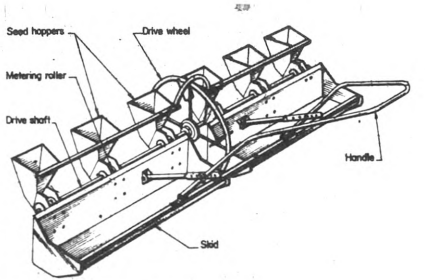
7. Availability

i) International Rice Research Institute
Los Baños, Laguna

ii) Implements Factory
Welisara, Sri Lanka

iii) Metal Industries Dev. Centre;
Jl. Sangkuriang, 12 Bandung, Indonesia;

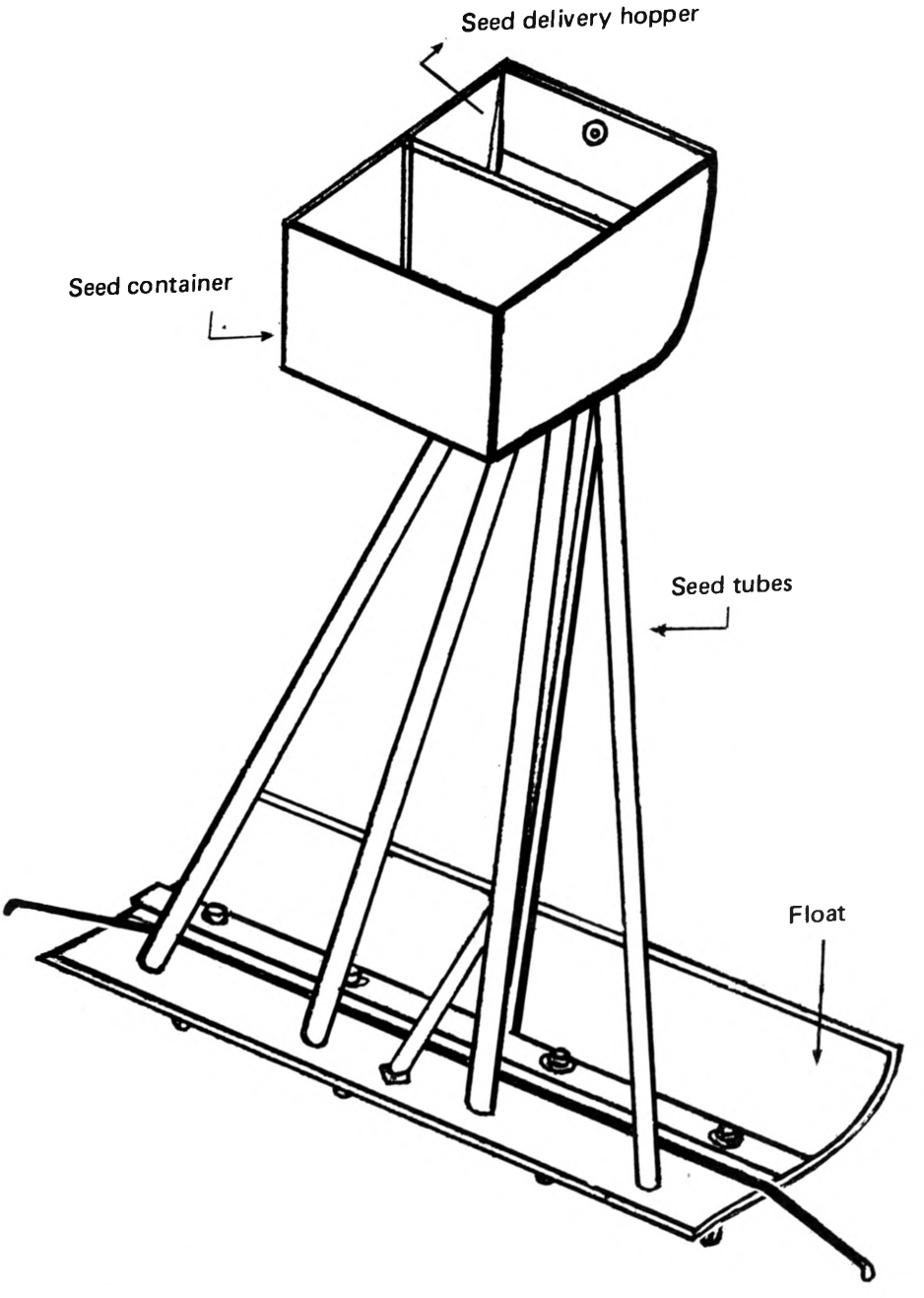




MULTI–HOPPER SEEDER

JOHNPULLE SEEDER

1.	Function	Planting pregerminated seeds on mudland
2.	Specifications	
	Make	John Pulle
	Type	Manual – pull type
	Power	one man
	Length	300 mm
	Width	750 mm
	Height	900 mm
	Weight	5 kg
	Width of sowing	900 mm
	Depth of sowing	50 mm
3.	Developed by	John Pulle
4.	Test Results	
	Suitable for	Pregerminated paddy and puddled soil
	Work capacity	0.05 ha/hour
	Draft	4 kg
5.	Cost	
	Sale Price	Rs 90 (US$ 6)
	Operating	Rs 30/ha (US$ 2)
6.	General	The rectangular seed box opened at the top is partitioned into two sections, one is seed container and the other is delivery chamber. Seeds are drawn into the delivery department through the opening at the bottom of the partition. There are four holes at the delivery chamber connecting to four delivery tubes which are connected to four furrow openers fitted at the bottom of the float. The spacing is 225 mm. Seed rate can be adjusted by adjusting the hole opening. As the seeder is dragged backwards seeds are dropped through the perforations by manual agitation.
7.	Availability	Implements Factory Welisara, Sri Lanka



JOHNPULE SEEDER

WICKRAMASEKARA SEEDER

1. Function — Sowing pregerminated seeds

2. Specifications

Make	Wickramasekara
Type	Manual pull type
Power	One man to operate
Length	1200 mm
Width	950 mm
Height	375 mm
Weight	12 kg
Width of sowing	100 mm
Depth of sowing	50 mm

3. Developed by — Mr. Wickramasekara and modified by Farm Machinery Research Centre, Maha Illupallama, Sri Lanka

4. Test Results

Suitable for	Pregerminated seeds
Work capacity	0.1 ha/hour
Draft	4 kg

5. Cost

Sale Price	Rs 300 (US$ 20)
Operating	Rs 30 (US$ 2)

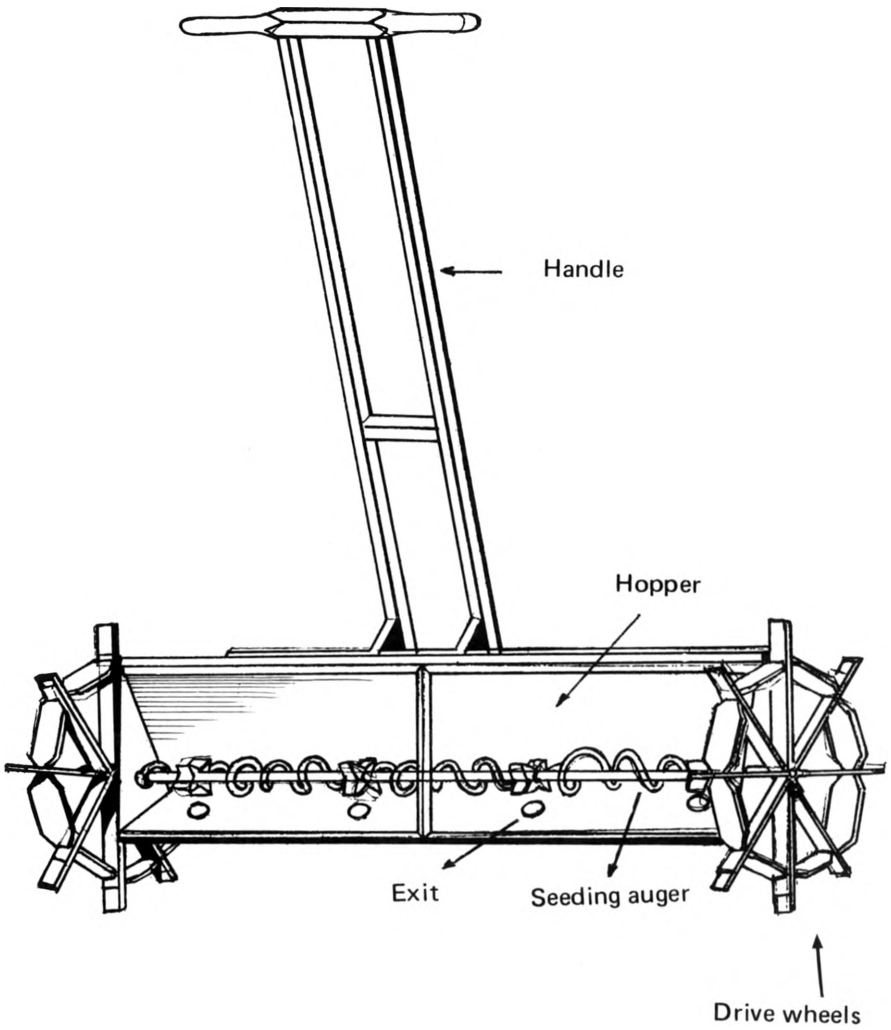
6. General

This seeder consists of a long metal box mounted on an axle. It is supported at the ends by two lugged wheels of 375 mm diameter. On the front of the box there are four seed delivery exit spaced at 225 mm intervals. The metal brush and the auger fitted on the axle enables the seeds to push towards the delivery exits during operation. A float is provided at the near side of the seeder for easy floatation. The operator drags the seeder backwards. As the lugged wheels rotate the seeds are pushed through the seed delivery exits into the furrows opened by wooden pegs at the bottom of the float.

7. Availability

i) Implements Factory
Welisara, Sri Lanka

ii) Colombo Agencies
Colombo, Sri Lanka



WICKRAMASEKARA SEEDER

SEED AND FERTILIZER BROADCASTER

1. Function — Broadcasting of seed and fertilizer

2. Specifications

Make	GBPUAT
Type	Manually-operated, centrifugal
Power	Manual – one person for seed broadcasting and two persons for fertilizer broadcasting
Length	410 mm
Width	385 mm
Height	410 mm
Weight	4 kg
Width of coverage	4000 mm

3. Developed at — College of Technology
G.B. Pant University of Agriculture & Technology, Pantnagar, India

4. Test Results

Suitable for	Rice, wheat, mustard and granular fertilizers
Work capacity	1.0 ha /hour

5. Cost

Sale Price	Rs 160 (US$ 20)
Operating	Rs 1/ha (US$ 0.15)

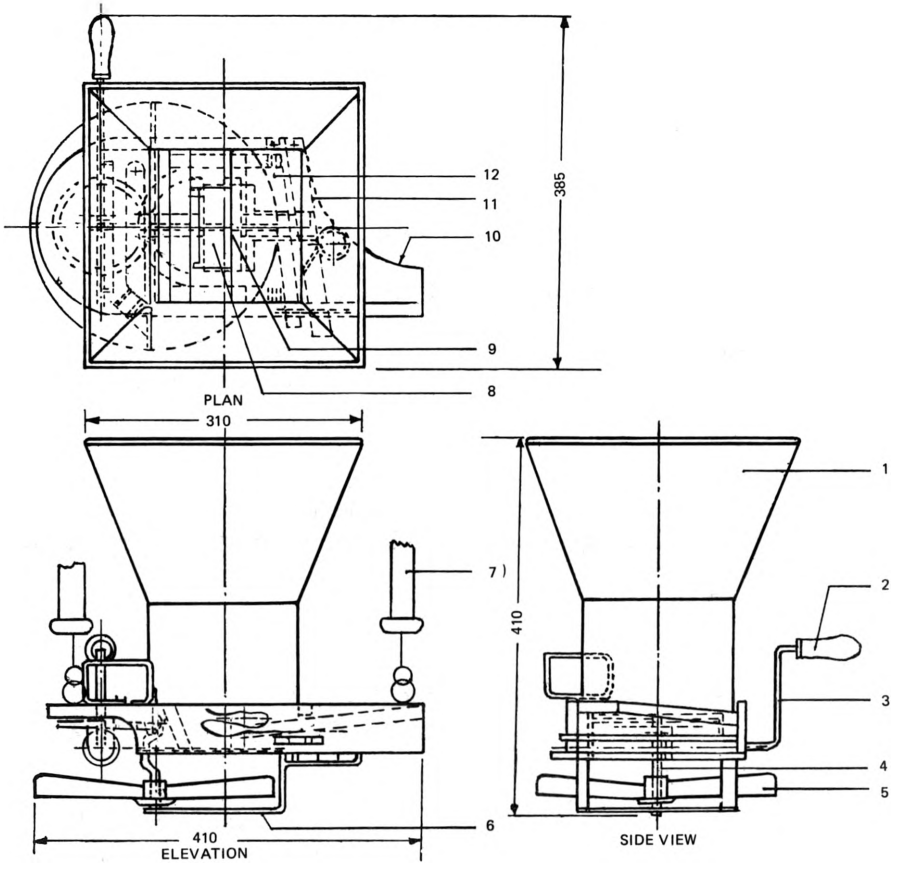
6. General

The broadcaster consists of a disc (270 mm) and four radial blades at 90^{o} pitch. It rotates at a speed of 400 rpm while the normal cranking speed is 360 rpm. The higher rpm of the broadcasting disc is obtained through a gear drive mechanism. Hopper is made up of an 18 gauge aluminum sheet. A quick shut off plate is provided to stop the flow of material from the hopper to the disc. Application rate is controlled through a plate which adjusts the opening. The distribution is quite uniform and it covers a width of 4 metres in one pass. As such the output and uniformity of application of the broadcaster is much better than the manual broadcasting.

7. Availability

i) College of Technology
G.B. Pant University of Agriculture & Technology
Pantnagar, India

ii) M/s Small Scale Industries
Rudrapur, (U.P.) India



ELEVATION
(1) HOPPER
(2) HANDLE
(3) HANDLE DRIVE SHAFT
(4) DISC SHAFT
(5) DISC
(6) DISC SUPPORT BASE

SIDE VIEW
(7) BELT
(8) QUICK SHUTOFF PLATE
(9) RATE CONTROL PLATE
(10) BASE FRAME
(11) QUICK SHUTOFF LEVER
(12) RATE CONTROL LEVER

SEED AND FERTILIZER BROADCASTER

SINGLE-ROW SEED DRILL

1. Function — Sowing of cereals and fodder crops

2. Specifications

Make	IGFRI
Type	Animal-drawn, adjustable depth
Power	Animal – A pair of bullocks and a man
Length	750 mm (without pole shaft)
Width	400 mm
Height	900 mm
Weight	13 kg
Depth of sowing	100 mm (Maximum)

3. Developed at — Division of Agricultural Engineering
Indian Grassland and Fodder Research Institute, Jhansi, India

4. Test Results

Suitable for	Cereals and fodder
Work capacity	0.075 ha/hour for maize with row spacing of 500 mm
Draft	70 kg

5. Cost

Sale Price	Rs 140 (US$ 18)
Operating	Rs 26/ha (US$ 3.25)

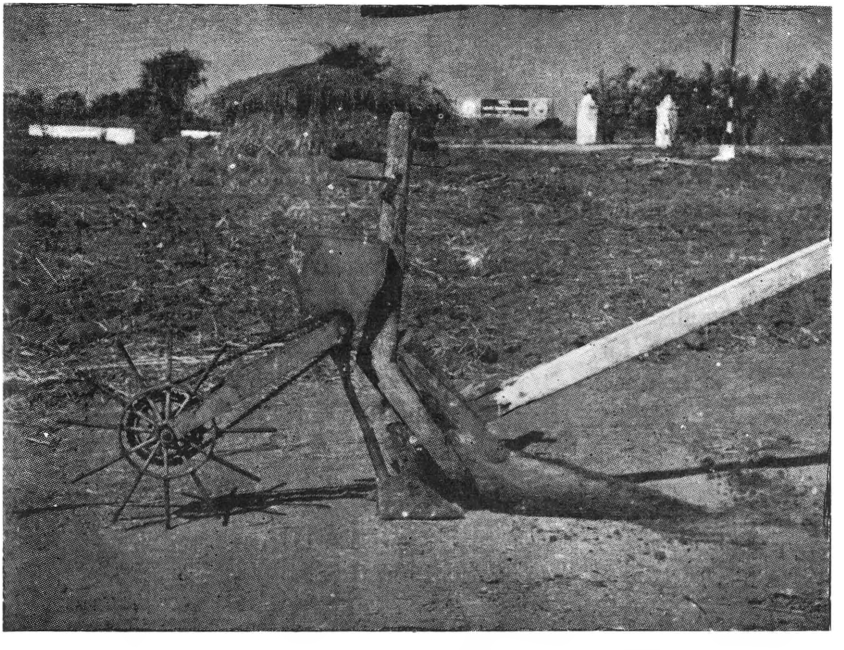
6. General

The seed drill consists of a shoe type furrow opener attached to a country plough, seed tube, agitating type seed metering device, chain and sprocket power transmission mechanism, frame, land wheel and a seedbox. The furrow opener fixed behind the country plough bottom helps in placing the seeds in the moist zone of the soil in dryland areas. Seeds can be sown by the side of ridges as well as on flat seedbed. The seeding attachment is very simple in fabrication and operation.

7. Availability

i) Division of Agricultural Engineering
Indian Grassland and Fodder Research
Institute, Jhansi, India

ii) M/s M.P. State Agro-Industries Corp. Ltd.
T. T. Nagar, Bhopal, India



SINGLE – ROW SEED DRILL

CUP–FEED SEED DRILL

1. Function — Sowing and planting different kinds of seeds

2. Specifications

Make	TNAU
Type	Animal-drawn, three-row, adjustable spacing and depth
Power	A pair of bullocks and one person to operate
Length	1120 mm (without pole shaft)
Width	850 mm
Weight	90 kg
Row spacing (Max.)	300 mm
Width of sowing	900 mm
Depth of sowing	100 mm

3. Developed at — Tamil Nadu Agricultural University Coimbatore, India

4. Test Results

Suitable for	Jowar, maize, pulses, groundnut, and cotton
Work capacity	0.1 – 0.15 ha/hr (depending upon row spacing)
Draft	50 kg

5. Cost

Sale Price	Rs 825 (US$105)
Operating	Rs 28/ha (US$3.50)

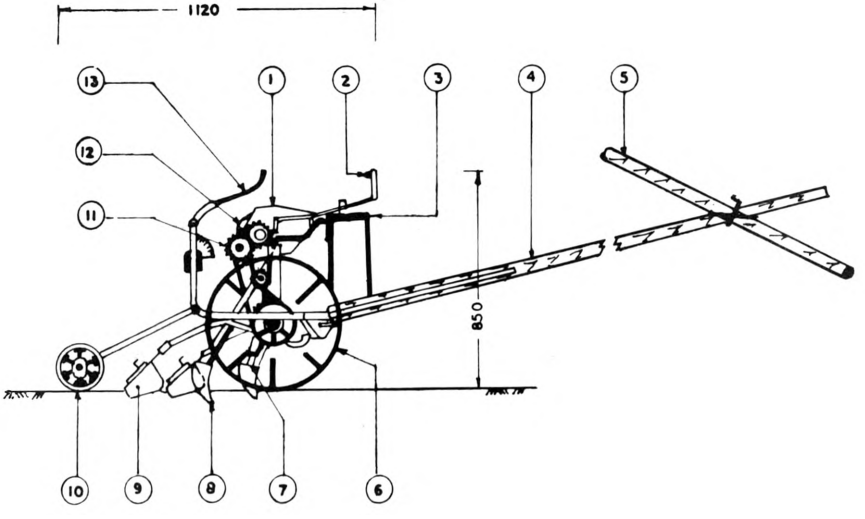
6. General

The 3-row seed drill with cup-feed metering device has shoe-type furrow openers. The power for metering assembly is supplied through ground wheels whose diameter, rim width and rim thickness are 600, 75 and 90 mm respectively. Hood-type furrow covering device is used. Depth of furrow is adjusted by increasing or decreasing the dead weight at the end of each tyne. With this machine seeds can be sown in lines at desired row (spacing of 150, 225 or 300 mm) and plant to plant spacings. Operator can sit on the drill.

7. Availability

i) College of Agricultural Engineering, Tamil Nadu Agricultural University, Coimbatore, India

ii) M/s Hema Engineering Industries, 26, R.K. Nagar Koundanpalayan, Coimbatore, India



(1) SEED BOX
(2) SEED CUT OFF LEVER
(3) OPERATOR'S SEAT
(4) POLE SHAFT
(5) YOKE
(6) GROUND WHEEL
(7) SEED TUBE
(8) FURROW OPENER
(9) FURROW CLOSER
(10) COMPACTION WHEEL
(11) GEAR
(12) SEED DISC
(13) TYNE LIFTING HANDLE

CUP – FEED SEED DRILL

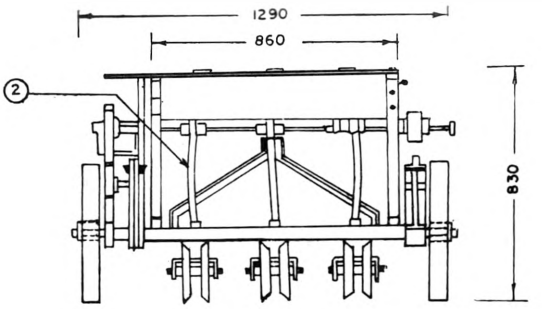
MULTICROP SEED DRILL

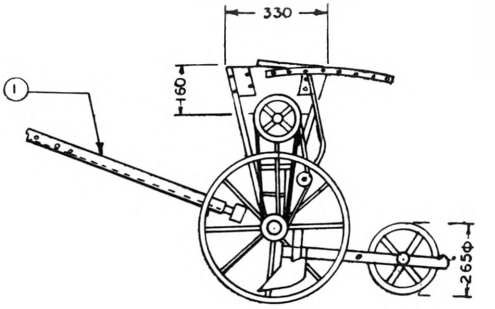
1.	Function	Sowing different crops
2.	Specifications	
	Make	HAU
	Type	Animal-drawn, three-row, adjustable spacing and depth
	Power	A pair of bullocks and one person to to operate
	Length	1480 mm
	Width	1290 mm
	Height	830 mm
	Weight	105 kg
	Width of sowing (max)	900 mm
	Row spacing (Max)	300 mm
3.	Developed at	Haryana Agricultural University, Hissar, India
4.	Test Results	
	Suitable for	Cotton, wheat, mustard and gram
	Work capacity	0.05-0.125 ha/hr (depending upon the crop)
	Draft	50 kg
5.	Cost	
	Sale Price	Rs 500 (US$60)
	Operating	Rs 20 to 50/ha (US$2.50 to 6) depending upon the crop

6. General

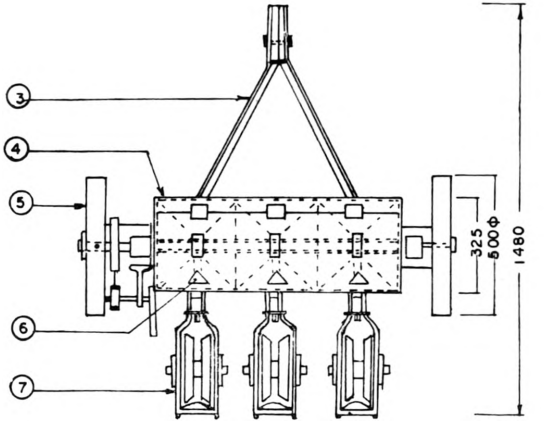
The machine consists of a frame with hitching mechanism, seed metering device (fluted roller), shoe-type furrow opener, ground wheel, power transmission mechanism and furrow covering and compacting cast iron wheels. Seeds from fluted rollers are conveyed through plastic tubes to the seed boot. The bottom furrow opener is made up of two 3-mm MS sheet welded at an angle of 25^{o}. A screw jack type depth control mechanism has been provided on both the ground wheels of the seed drill which can be adjusted with the help of hand wheels fitted on them. The depth of ground wheels is adjusted individually. The cast iron wheels fitted 25 mm apart on a common shaft are attached behind the furrow opener for compacting the furrow.

7.	Availability	As in (3) above





SIDE VIEW



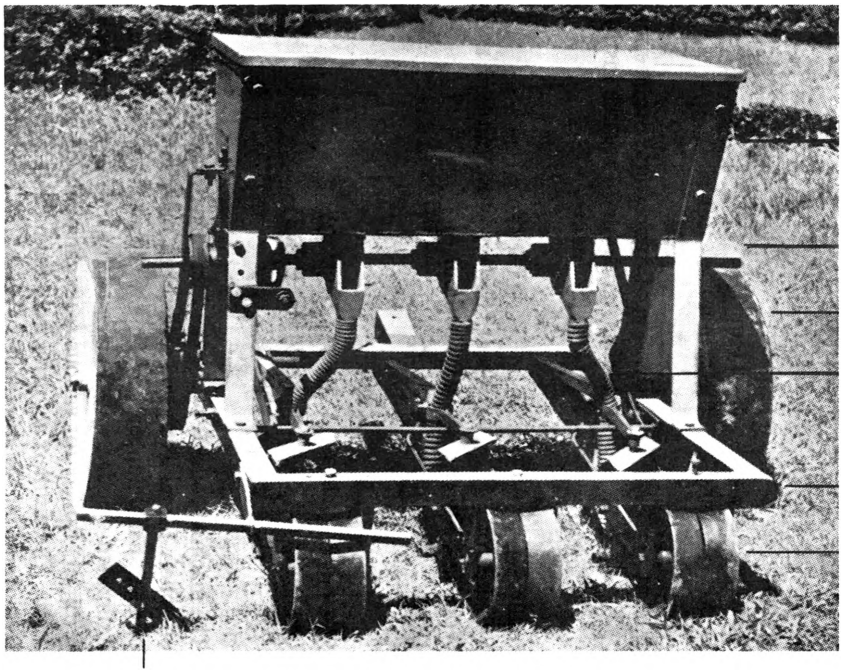
ELEVATION (above) PLAN (below)

(1) POLE SHAFT
(2) SEED TUBE
(3) FRAME
(4) SEED BOX
(5) GROUND WHEEL
(6) FURROW OPENER
(7) PACKING WHEEL

MULTICROP SEED DRILL

MULTIROW JUTE SEED DRILL

1.	Function	Sowing small grains
2.	Specifications	
	Make	JARI
	Type	Animal-drawn, 3-row
	Power	Animal – a pair of bullocks and one person to operate
	Length	1100 mm
	Width	1100 mm
	Height	850 mm
	Weight	100 kg
	Width of sowing	810 mm (max.)
	Depth of sowing	70 mm
	Row spacing	270 mm (max.)
3.	Developed at	Jute Agricultural Research Institute Barrackpore, India
4.	Test Results	
	Suitable for	Jute
	Work capacity	0.15 ha/hour
5.	Cost	
	Sale Price	Rs 750 (US$ 9)
	Operating	Rs 12/ha (US$ 1.50)
6.	General	The seed drill consists of a seed hopper, a metering device (serrated disc type), shoe type furrow openers, seed covering and compacting units, supporting structures and ground wheels. Power is transmitted from the left side wheel to the metering device through "V" belt drive. The drill has provision of lifting the furrow openers at the time of transport and idling the metering shaft and when required. This seed drill can also be used for sowing other crops such as rice and wheat by using the fluted rollers attached to the metering device. It is adjustable for row spacing and depth.
7.	Availability	Jute Agricultural Research Institute Barrackpore, India



MULTIROW JUTE SEED DRILL

GANGA SEED-CUM-FERTILIZER DRILL

1. Function — Sowing and fertilizer application

2. Specifications

Make	IARI
Type	Animal-drawn single row
Power	Animal – a pair of bullocks and one person to operate
Length	2850 mm
Width	300 mm
Height	790 mm
Weight	39 kg
Width of furrow	40 mm
Depth of sowing	100 mm

3. Developed at — Division of Agricultural Engineering
Indian Agricultural Research Institute
New Delhi, India

4. Test Results

Suitable for	Wheat, barley, peas, mustard and sorghum
Work capacity	0.06 ha/hour
Draft	50 kg

5. Cost

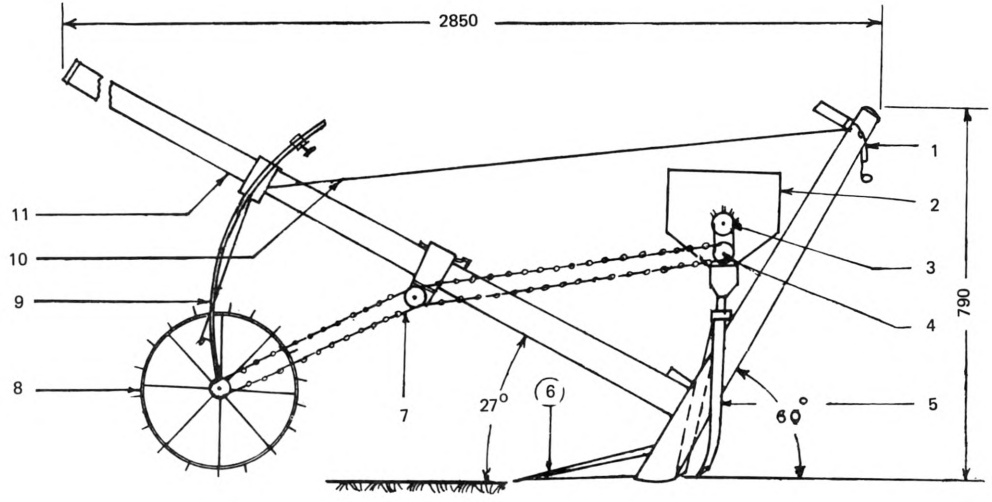
Sale Price	Rs 315 (US$ 40)
Operating	Rs 24/ha (US$ 3)

6. General

The machine consists of seed and fertilizer hoppers, calibrated wooden rollers for metering and seed tubes. All are mounted on a wooden plough. Each hopper can hold 2 kg each of seed and fertilizer. Calibrated wooden rollers are used for sowing seeds and metering of fertilizer. Rollers for various seeds can easily be replaced within 2 to 3 min. These rollers get drive from the moving ground wheel through chain-sprocket arrangement. Furrow is opened by the country plough. Standard granular fertilizer is placed by the side and at a depth of 25 mm below the seeds simultaneously in the same furrow. Depth of furrow and quantity of seed rate can be adjusted. Machine is simple in construction and can be manufactured and repaired by the village artisan.

7. Availability

As in (3) above

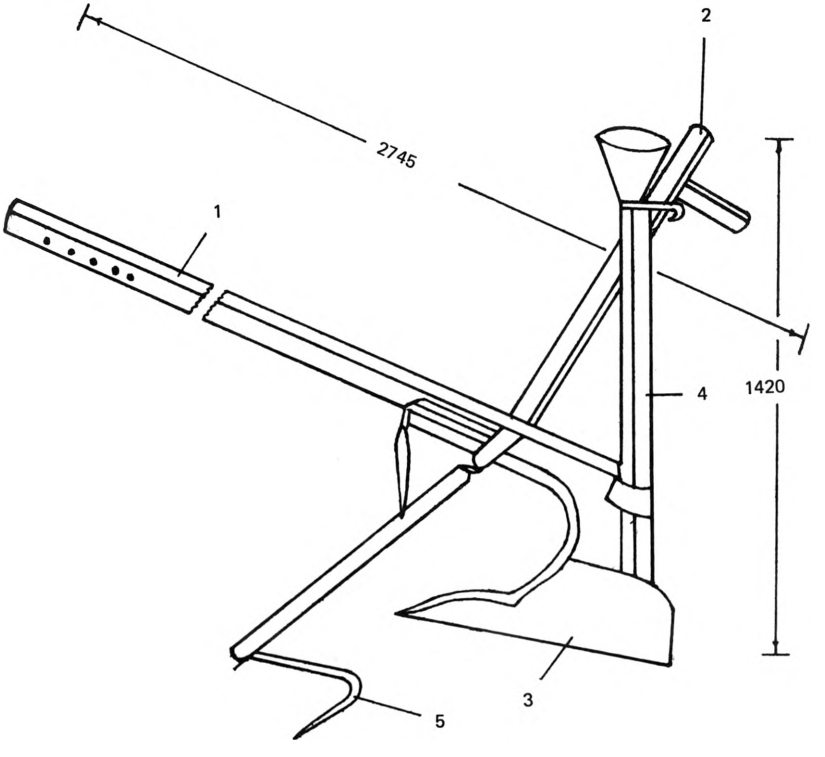


(1) HANDLE
(2) HOPPER
(3) AGITATOR
(4) SPROCKET
(5) SEED AND FERTILIZER TUBES
(6) FURROW OPENER
(7) CYCLE CHAIN
(8) DRIVE WHEEL
(9) WHEEL SUPPORT
(10) CLUTCH ROPE
(11) WOODEN BEAM

GANGA SEED CUM FERTILIZE DRILL

SINGLE-ROW COTTON DRILL

1.	Function	For sowing of cotton in lines
	Specifications	
	Make	KAZ
	Type	Bullock-drawn
	Power	A pair of bullocks and a man to operate
	Length (with beam)	2745 mm
	Width	100 mm
	Height	1420 mm
	Depth of sowing	60 mm
3.	Developed at	Agricultural Engineering Workshop Punjab Agricultural College Lyallpur, Pakistan
4.	Test Results	
	Suitable for	sowing of cotton and maize in rows
	Work capacity	0.15 ha/hour
	Draft	21 kg
5.	Cost	
	Sale Price	Rs 140 (US$ 14)
	Operating	Rs 21/ha (US$ 1.90)
6.	General	Single-row cotton drill is very popular implement for sowing of cotton and maize in lines. Seed is dropped at uniform depth. Row space marker has a pointer with adjustable positions of 600, 750 and 900 mm.
7.	Availability	Karkhana Aalat-e-Zari Bawahalpur, Pakistan



(1) BEAM
(2) HANDLE
(3) PHALA
(4) PORE
(5) MARKER

SINGLE ROW COTTON DRILL

ANIMAL-DRAWN CORN PLANTER

1. Function — Sowing and compacting soil

2. Specifications

Make	BPI
Type	Row crop
Power	Animal – one carabao and a man
Length	2410 mm
Width	190 mm
Height	970 mm
Weight	–

3. Developed at — Agricultural Engineering Division
Bureau of Plant Industry
San Andres St., Malate, Metro Manila
Philippines

4. Test Results

Suitable for	Crop-corn and all types of soil
Work capacity	0.03 ha/hour

5. Cost

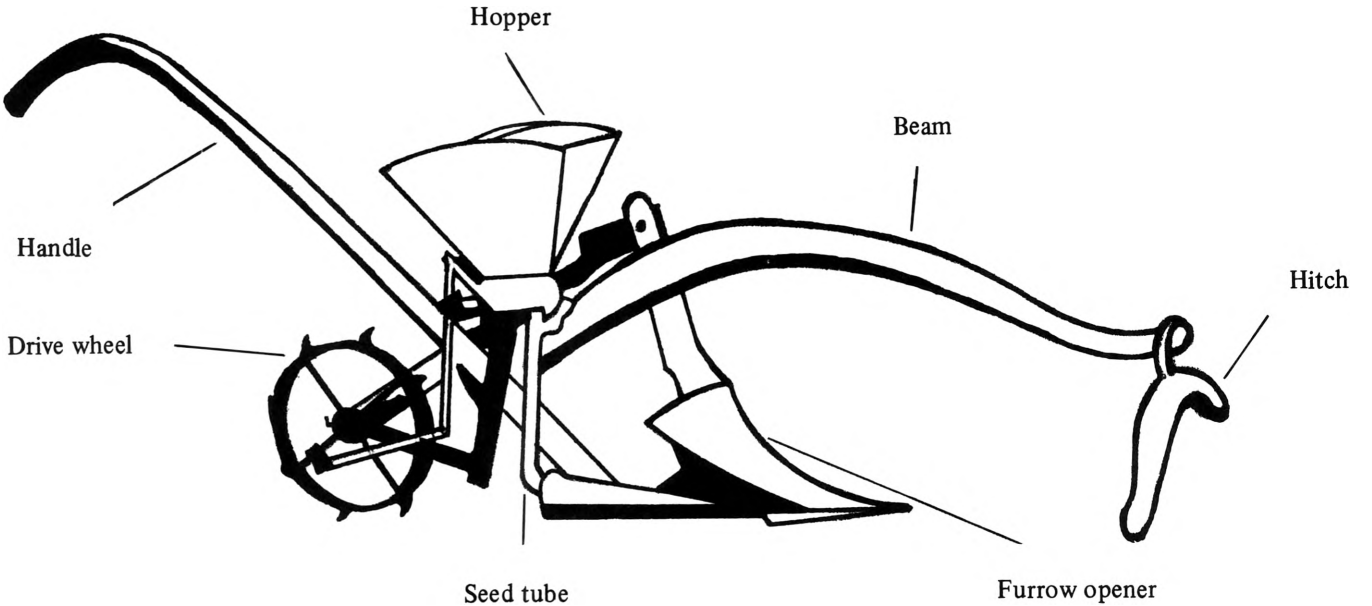
Sale Price	P550 (US$ 75)
Operating	P15/day (US$ 2)

6. General

This is a machine that could help save labour cost in corn production. It is attached to the ordinary native moldboard plough and it drops two to three kernels per hill at a desired distance. This machine is designed to perform all the following mechanical functions – open the seed furrow to the proper depth, meter the seed, deposit the seed, cover the seed and compact the soil around.

7. Availability

As in (3) above



ANIMAL-DRAWN CORN PLANTER

JYOTI PLANTER

1. Function — Planting of seeds and fertilizer application

2. Specifications

Make	Jyoti
Type	Animal-drawn, three-row
Power	Animal – a pair of bullocks and one person to operate
Length	3600 mm
Width	1620 mm
Height	700 mm
Weight	80 kg
Row spacing (max.)	450 mm
Depth of sowing	60 mm
Depth of fertilizer application	80 mm

3. Developed at — College of Agriculture
Mahatma Phule Krishi Vidyapeeth
Pune, India

4. Test Results

Suitable for	Groundnut, maize, sorghum and cotton
Work capacity	0.12 ha/hour
Draft	120 kg to 140 kg

5. Cost

Sale Price	Rs 720 (US$ 90)
Operating	Rs 32/ha (US$ 4)

6. General

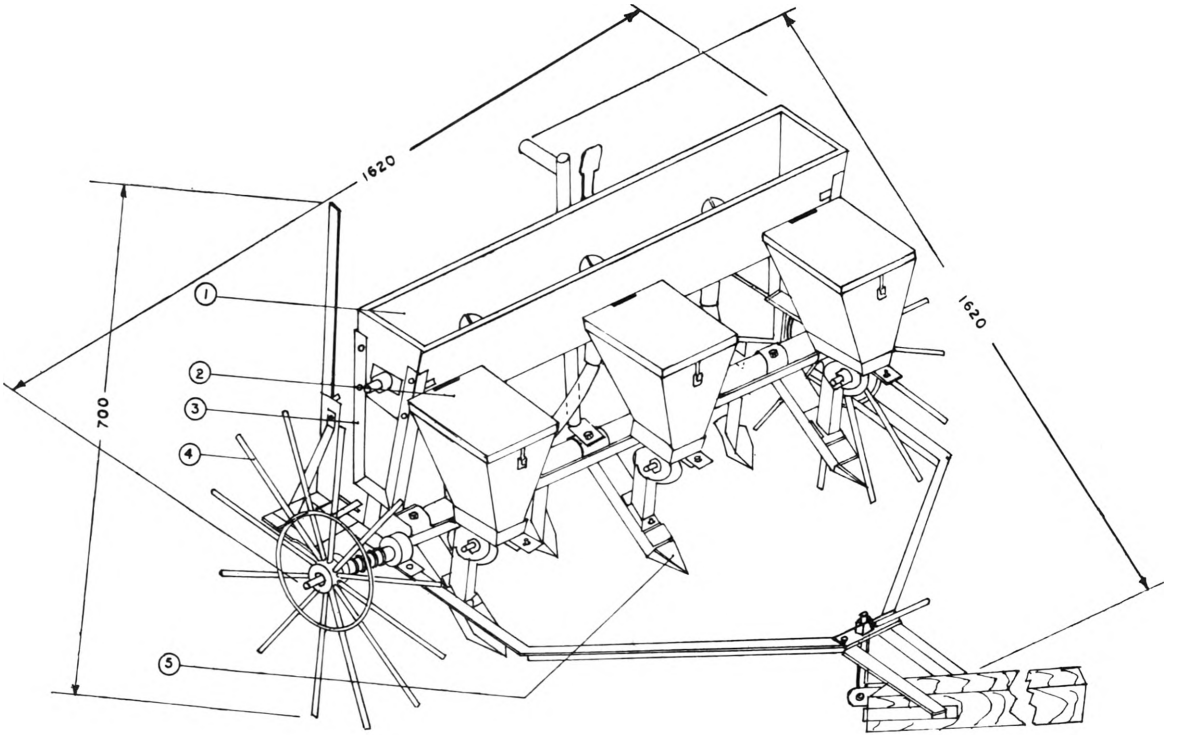
The Jyoti planter consists of a seed hopper, a fertilizer box, metering devices for seed and fertilizer, furrow openers and ground wheels. Both the seed hopper and fertilizer boxes are made up of sheet metal. Wooden rollers with notches at the edge are used for seed placement in the soil. Power is transmitted to the metering device from the ground wheel by chain and sprocket arrangement. It places fertilizer approximately 50 mm below the seed layer. The planter can also be used for drilling wheat, rice, gram and black gram. It is adjustable in row spacing and depth of planting.

7. Availability

i) College of Agriculture
Mahatma Phule Krishi Vidyapeeth
Pune, India

ii) M/s Diwane Industries
718 Guruwar Peth, Pune, India

iii) M/s Sanmitra Fabricators, Phaltan, India



(1) FERTILIZER BOX (2) SEED HOPPER (3) FRAME (4) GROUND WHEEL (5) FURROW OPENER

JYOTI PLANTER

SUGARCANE PLANTER

1. Function — Planting of sugarcane setts

2. Specifications

Make	IISR
Type	Animal-drawn, single row
Power	A pair of bullocks and 3 persons – one for the bullocks, another to feed the setts and third to guide the implement
Length	2150 mm
Width	1345 mm
Height	765 mm
Weight	140 kg
Depth of planting	150 mm

3. Developed at — Agricultural Engineering Division
Indian Institute of Sugarcane Research
Lucknow, India

4. Test Results

Suitable for	Sugarcane, light soil
Work capacity	0.2 ha/hour (at 900 mm row spacing)
Draft	100 kg

5. Cost

Sale Price	Rs 700 (US$ 88)
Operating	Rs 50/ha (US$ 6)

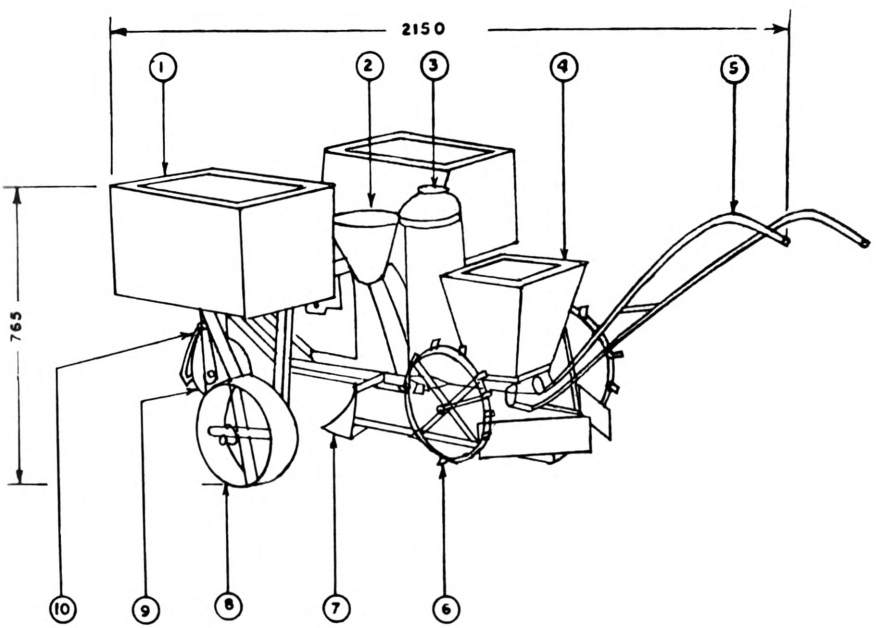
6. General

The implement consists of 3-wheeled forecarriage drawn by a pair of bullocks and a trailed implement attached behind it. The forecarriage carries a seat for one operator and two wooden seed boxes on either side of the seat. The unit consists of a rectangular metal box, a funnel shaped chute behind which are provided a gama BHC tank and a fertilizer distributor mounted on springs and driven by two land wheels. As the implement moves forward the share point opens out a furrow and the operator riding on the forecarriage picks up setts from the seed boxes and drops them down the chute one after the other Gama BHC is sprinkled over the planted setts and soil surface by gravity feeding. Fertilizer from the distributor is dropped in two bands and the covering device covers the planted setts with a blanket of soil.

7. Availability

i) Agricultural Engineering Division
Indian Institute of Sugarcane Research Lucknow, India

ii) M/s Steel Engineering Corporation
Lohari Marg. Saharanpur, India



(1) Seed box
(2) Seed chute
(3) Insecticide tank
(4) Fertilizer container
(5) Handle
(6) Fertilizer agitator drive wheel
(7) Share point
(8) Rear wheel
(9) Castor wheel
(10) Tow hook

SUGARCANE PLANTER

BULLOCK-DRAWN RIDGER-CUM COTTON PLANTER

1. Function — Makes low bed ridges for cotton planting

2. Specifications

Make	AMRI-BDCP-1
Type	Bullock-drawn
Power	A pair of bullocks
Length	3530 mm
Width	510 mm
Height	1065 mm
Weight	35 kg
No. of discs	2
Diameter of disc	305 mm

3. Developed at — Agricultural Mechanization Research Institute, Multan, Pakistan

4. Test Results

Suitable for	Planting cotton on ridge slopes
Work capacity	0.2 ha/hour
Draft	50 kg

5. Cost

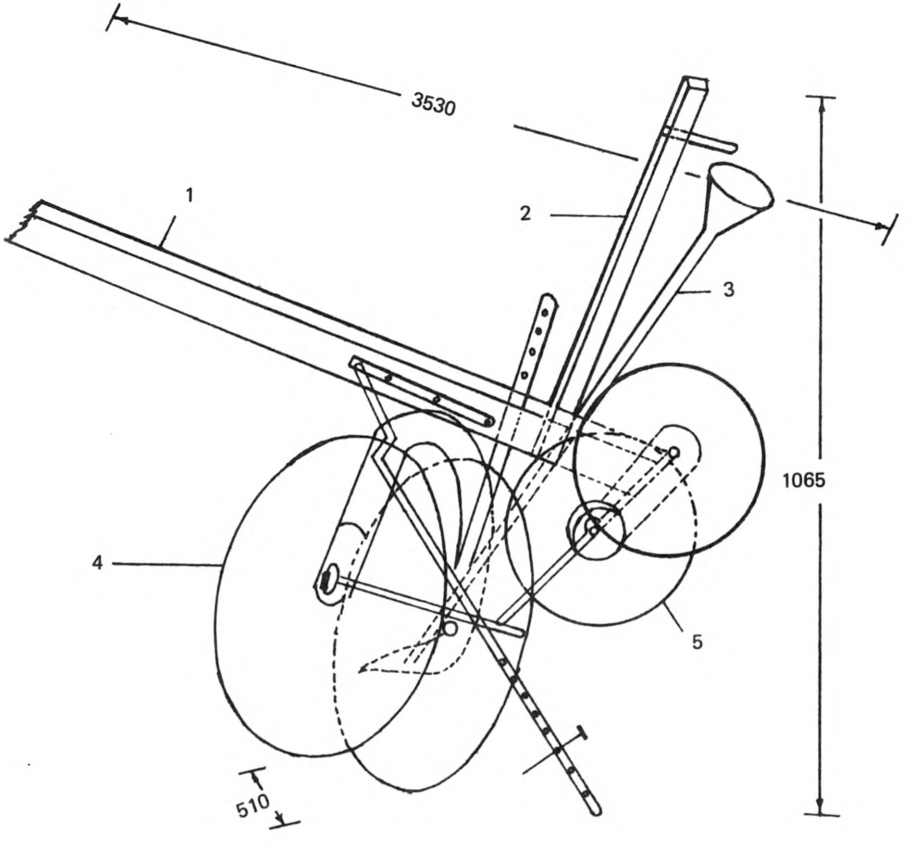
Sale Price	Rs 400 (US$ 40)
Operating	Rs 28/ha (US$ 2.80)

6. General

Bullock-drawn ridger-cum-cotton planter is suitable for sowing cotton seed on ridges in order to protect damage caused by rains when the crop is in early stages. Two high carbon steel discs curved and inclined make ridges of about 75 mm top width, 305 mm bottom width and 125 mm high. A furrow opener helps dropping the seed at a desired depth while the roller compacter following the ridge compacts the ridge after seed has been dropped. This compaction helps to check soil moisture loss which is obvious otherwise and seed is also compacted for proper germination.

7. Availability

As in (3) above

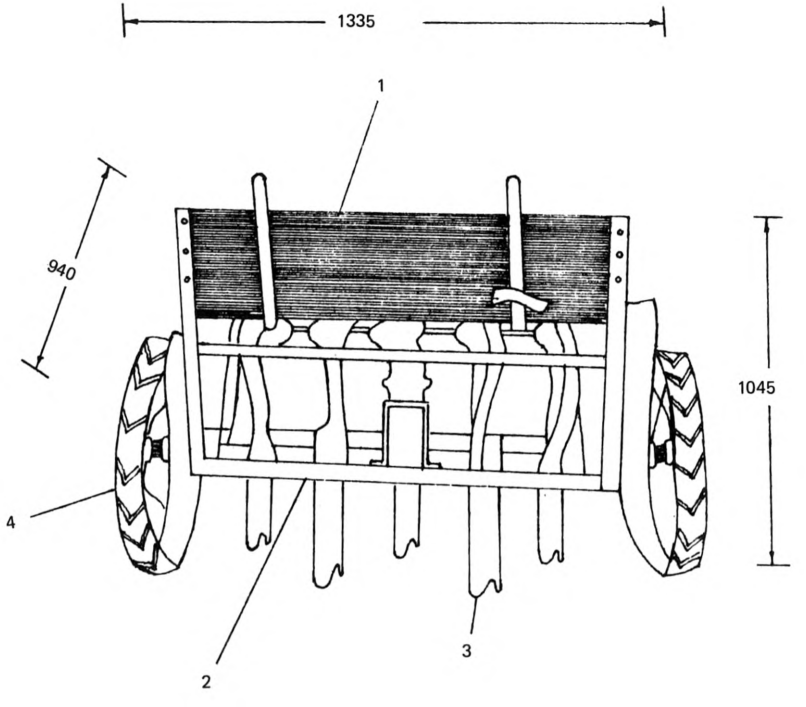


(1) BEAM
(2) HANDLE
(3) PORE
(4) DISC
(5) COMPACTER

BULLOCK-DRAWN RIDGER CUM COTTON PLANTER

BULLOCK-DRAWN AUTOMATIC WHEAT DRILL

1.	Function	Sowing of wheat and other cereal crops
2.	Specifications	
	Make	CARVAN
	Type	Bullock-drawn
	Power	A pair of bullocks and a man to operate
	Length	940 mm
	Width	1335 mm
	Height	1045 mm
	Weight	75 kg
	Depth of sowing	50 mm
3.	Developed at	Agricultural Engineering Workshop Punjab Agricultural College Lyallpur, Pakistan
4.	Test Results	
	Suitable for	Sowing of wheat and other cereal crops
	Work capacity	0.26 ha/hour
	Draft	100 kg
5.	Cost	
	Sale Price	Rs 1500 (US$ 150)
	Operating	Rs 12/ha (US$ 1.50)
6.	General	The automatic bullock-drawn five-row drill is a multi-purpose drill to sow wheat, barley, gram, maize and oil seed crops. Seeding depth and seed rate are both adjustable. Seeding mechanism is wheel gear operated.
7.	Availability	Carvan Engineering Works Okara, Sahiwal, Pakistan

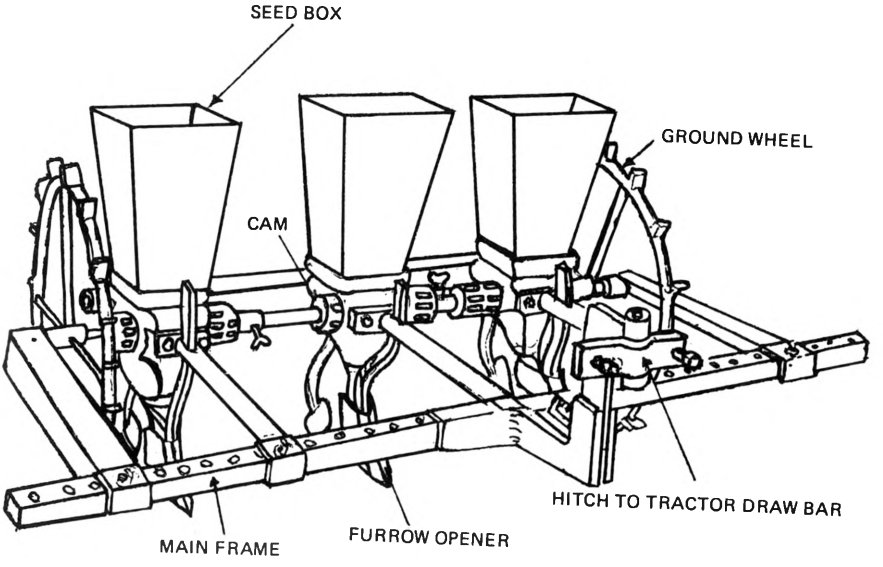


(1) SEED BOX
(2) FRAME
(3) DELIVERY TUBE
(4) WHEEL

BULLOCK-DRAWN AUTOMATIC WHEAT DRILL

THREE-ROW SEEDER FOR WALKING TRACTOR

1.	Function	For sowing seeds
2.	Specifications	
	Make	FMRC
	Type	Suitable for walking tractors,
	Power	5 to 8 HP.
	Length	900 mm
	Width	1200 mm
	Height	750 mm
	Weight	25 kg
3.	Developed by	M.G. Pillainayagam Farm Machinery Research Centre, Sri Lanka
4.	Test Results	
	Suitable for	Groundnut, gingely, pulses, soybean
	Work capacity	0.25 ha/hour
	Draft	65 kg
5.	Cost	
	Sale Price	Rs 2500 (US$ 14)
	Operating	Rs 180/ha (US$ 90)
6.	General	As the ground wheel rotates, the rotor delivers the seeds through the delivery tube into the furrows opened. A shovel provided behind covers the seeds with soil. The spacing of the rows could be adjusted from 225 to 600 mm.
7.	Availability	i) Farm Machinery Research Centre Maha Illupallama ii) Agro-technical Ltd. Colombo, Sri Lanka iii) Promotion Engineering Co. Ltd. Jaffna, Sri Lanka



THREE - ROW SEEDER FOR WALKING TRACTOR

POTATO PLANTER

1. Function — Planting of potatoes

2. Specifications

Make	IARI
Type	Tractor-mounted, two-row, adjustable
Power	Tractor – 20 HP and two persons
Length	900 mm
Width	1500 mm
Height	1370 mm
Weight	500 kg
Width of sowing	900 mm
Seed spacing	200-450 mm
Row spacing	600 mm

3. Developed at — Division of Agricultural Engineering
Indian Agricultural Research Institute
New Delhi, India

4. Test Results

Suitable for	Potato
Work capacity	0.5 ha/hour
Draft	200 kg

5. Cost

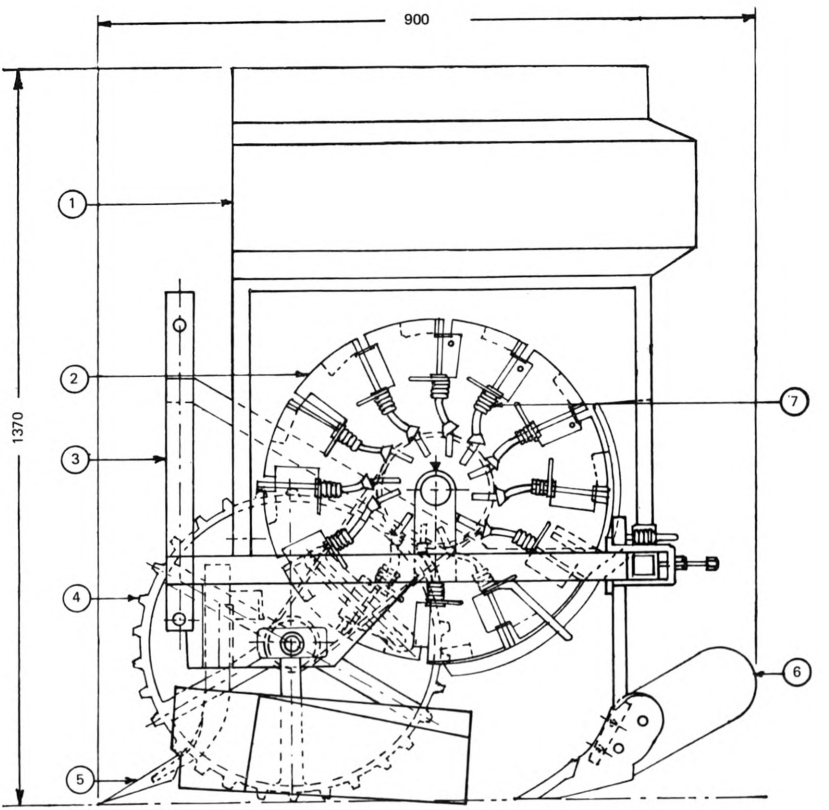
Sale Price	Rs 5000 (US$ 625)
Operating	Rs 75/ha (US$ 9.25)

6. General

The machine consists of a frame with 3 point hitch mechanism, one hopper and picking chamber, seed feed mechanism (notched wheel type) runner type furrow openers, butterfly type ridgers, lugged ground wheels and power transmission mechanism (sprocket-chain type). In the present design the row to row distance is fixed at 600 mm where as plant to plant distance can be varied from 200 to 450 mm by changing the size of sprocket in the power transmission system. The machine could easily be converted into an intercultivator by removing furrow openers and disconnecting seed dropping mechanism from ground wheel for earthing operations. Depth is adjustable.

7. Availability

As in (3) above



(1) HOPPER
(2) PICKER WHEEL
(3) MAIN FRAME
(4) GROUND WHEEL
(5) FURROW OPENER
(6) RIDGER
(7) PICKER ARM

POTATO PLANTER

SEMI-AUTOMATIC SUGARCANE PLANTER

1. Function — Planting of sugarcane setts

2. Specifications

Make	IISR
Type	Tractor-mounted, semi-automatic two-row
Power	Tractor – 35 HP and two persons for feeding setts
Length	1540 mm
Width	2185 mm
Height	1130 mm
Weight	270 kg
Row spacing (Max.)	1200 mm
Depth of planting	150 mm

3. Developed at — Agricultural Engineering Division, Indian Institute of Sugarcane Research, Lucknow, India

4. Test Results

Suitable for	Sugarcane
Work capacity	0.4 ha/hour

5. Cost

Sale Price	Rs 2250 (US$ 280)
Operating	Rs 65/ha (US$ 8)

6. General

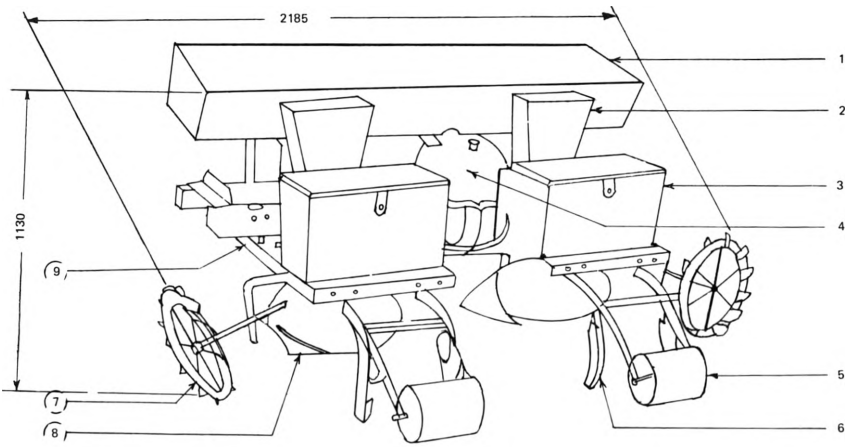
The planter is a drop planter attachment to a hydraulically operated tractor tool frame. It consists of a hydraulically operated ridger frame with attachments for seed dropping, gamma BHC and fertilizer application, covering and tamping of soil cover. As the implement is run, the ridger unit opens a furrow of desired depth, the operator drops the setts in the furrow, gamma BHC is sprinkled over the planted setts and on the soil by gravity feed, fertilizer is applied on either side of the planted setts in two bands, the setts are covered with soil which is lightly pressed by the tamping roller, all in one operation. An automatic tractor-drawn sugarcane planter has also been developed at the Institute.

7. Availability

i) Agricultural Engineering Division
Indian Institute of Sugarcane Research
Lucknow, India

ii) M/s U.P. Agro Industrial Corporation
22, Vidhan Sabha Marg. Lucknow, India

iii) M/s Farm Implements Industries
Meal Ground, Lakhimpur Kheri, India



(1) SEED TROUGH
(2) SEED CHUTE
(3) FERTILIZER BOX CUM SEAT
(4) GAMA BHC TANK
(5) TAMPING ROLLER
(6) CULTIVATOR TINE
(7) LUGGED LAND WHEEL
(8) RIDGER BODY
(9) FRAME

SEMI-AUTOMATIC SUGARCANE PLANTER

SEED DRILL-CUM-PLANTER WITH FERTILIZER ATTACHMENT

1. Function — Sowing, planting and fertilizer application

2. Specifications

Make	PAU
Type	Tractor-mounted – 9-row
Power	Tractor – 30 HP with 2 persons
Length	950 mm
Width	2180 mm
Height	1100 mm
Weight	185 kg
Row spacing (max.)	1044 mm

3. Developed at — College of Agricultural Engineering
Punjab Agricultural University
Ludhiana, India

4. Test Results

Suitable for	Wheat, barley, sorghum, groundnut, maize, cotton and soybean
Work capacity	0.45 ha/hour (at 200 mm row spacing)

5. Cost

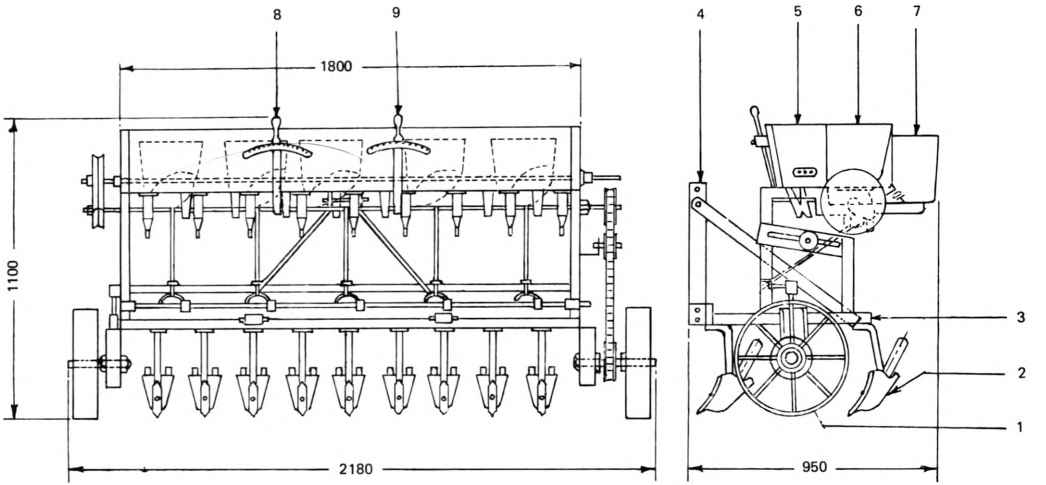
Sale Price	Rs 3500 (US$ 440)
Operating	Rs 50/ha (US$6) Actual cost depends on the type of crop

6. General

Multicrop seed drill-cum-planter with fertilizer attachment is provided with features of both, the conventional seed drill and the planter. It consists of a fertilizer hopper, a seed box for small seeds, a separate seed hopper with seed plates for planting large seeds like maize, cotton, groundnut, etc., shovel type furrow openers, lugged ground wheels of 480 mm diameter, chain and sprocket drive and frame. The seed metering devices for the drill and planter are separately housed in their respective boxes. The metering mechanism for small seeds consists of fluted feed rollers and that for planting large seed comprises the inclined seed plates with cells. The ground wheel provides drive to the metering shafts. It sows 9 rows of wheat or 6 rows of groundnut or 3 rows of cotton at a time, apart from placing the fertilizers in the desired manner. Planting unit can be got fitted on existing seed drill to make it multi-purpose.

7. Availability

As in (3) above



(1) DRIVE WHEEL
(2) FURROW OPENER
(3) MAIN FRAME
(4) HITCH
(5) FERTILIZER BOX
(6) SEED BOX FOR DRILL
(7) SEED HOPPER FOR PLANTER
(8) FERTILIZER CONTROL LEVER
(9) SEED CONTROL LEVER

SEED DRILL – CUM-PLANTER WITH FERTILIZER ATTACHMENT

TRACTOR-DRAWN 3-ROW PLANTER

1. Function — Sowing of cotton and maize and fertilizing

2. Specifications

Make	CARVAN
Type	Tractor-drawn
Power	Tractor – 8 HP with two persons
Length	940 mm
Width	2665 mm
Height	1990 mm
Weight	230 kg
Depth of sowing	55 mm

3. Developed at — Carvan Engineering Works Regd.
Factory Area, Okara, Sahiwal, Pakistan

4. Test Results

Suitable for	Cotton and maize
Work capacity	0.85 ha/hour
Draft	375 kg

5. Cost

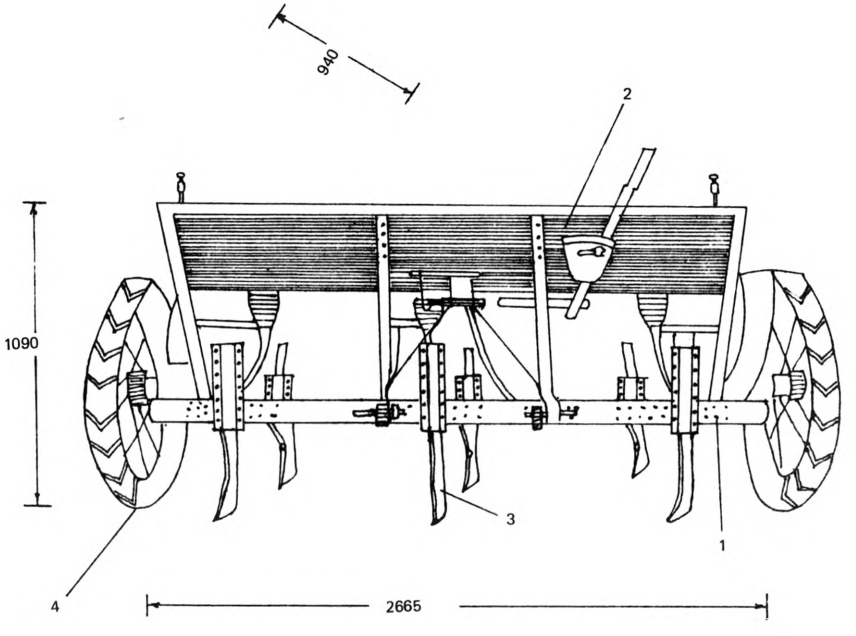
Sale Price	Rs 3800 (US$ 380)
Operating	Rs 42/ha (US$ 4)

6. General

Two, three and four row cotton-cum-maize planters with and without fertilizer device are available from local market. Seed germination is uniform and crop production is increased. Seeding depth can be adjusted by lowering and raising the furrow openers. Row spacing and seeding rate are adjustable. Seed metering mechanism is operated by gears.

7. Availability

Carvan Engineering Works
Okara, Sahiwal, Pakistan



(1) FRAME
(2) SEED CUM FERTILIZER BOX
(3) DELIVERY TUBE
(4) WHEEL

TRACTOR-DRAWN 3-ROW PLANTER

TRACTOR-DRAWN WHEAT AND FERTILIZER DRILL

1. Function — Sowing of wheat and other cereal crops with fertilizer application

2. Specifications

Make	GHAZI
Type	Tractor-drawn
Power	Tractor – 11 HP with a driver and a helper
Length	510 mm
Width	1880 mm
Height	990 mm
Weight	300 kg
No. of rows	9
Depth of seeding	60 mm

3. Developed at — Agricultural Engineering Research Division Faisalabad, Pakistan

4. Test Results

Suitable for	Sowing of wheat and other cereal crops with provision of fertilizer application simultaneously
Work capacity	0.85 ha/hour
Draft	500 kg

5. Cost

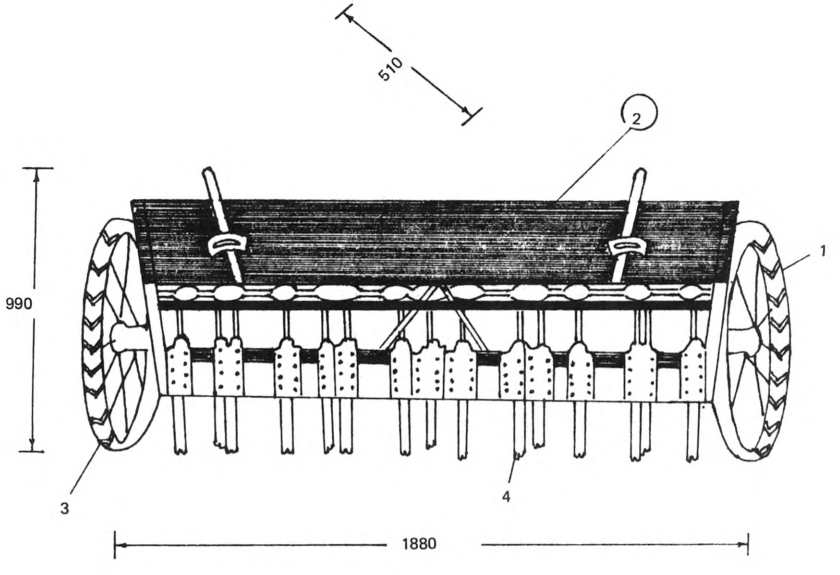
Sale Price	Rs 4500 (US$ 450)
Operating	Rs 42/ha (US$4)

6. General

Seed-cum-fertilizer drills are available with 7, 9, 11 and 13 rows sowing capacity. Width of rows is adjustable. Seed metering mechanism is operated through wheels. Seed rate calibration scale is provided with a seed rate ranging from 50 to 100 kg/ha. Seeding depth is adjustable through wheel gear provided with off-on handle.

7. Availability

Ghazi Industries Ltd.
G.T. Road, Mian Channu
Multan, Pakistan



(1) FRAME
(2) SEED BOX
(3) WHEEL
(4) DELIVERY TUBE

TRACTOR-DRAWN WHEAT AND FERTILIZER DRILL

ROTARY SEEDER

1. Function — Planting cereals

2. Specifications

Make	11 Dong Precision Machinery Ind. Co., Ltd.
Type	Power-tiller-drawn
Power	Attachment to 10 HP power tiller
Length	1070 mm
Width	1080 mm
Height	1190 mm
Weight	96 kg

3. Developed at — Institute of Agricultural Engineering and Utilization, Suweon, Republic of Korea

4. Test Results

Suitable for	Barley and wheat
Work capacity	1.2 ha/8 hr.

5. Cost

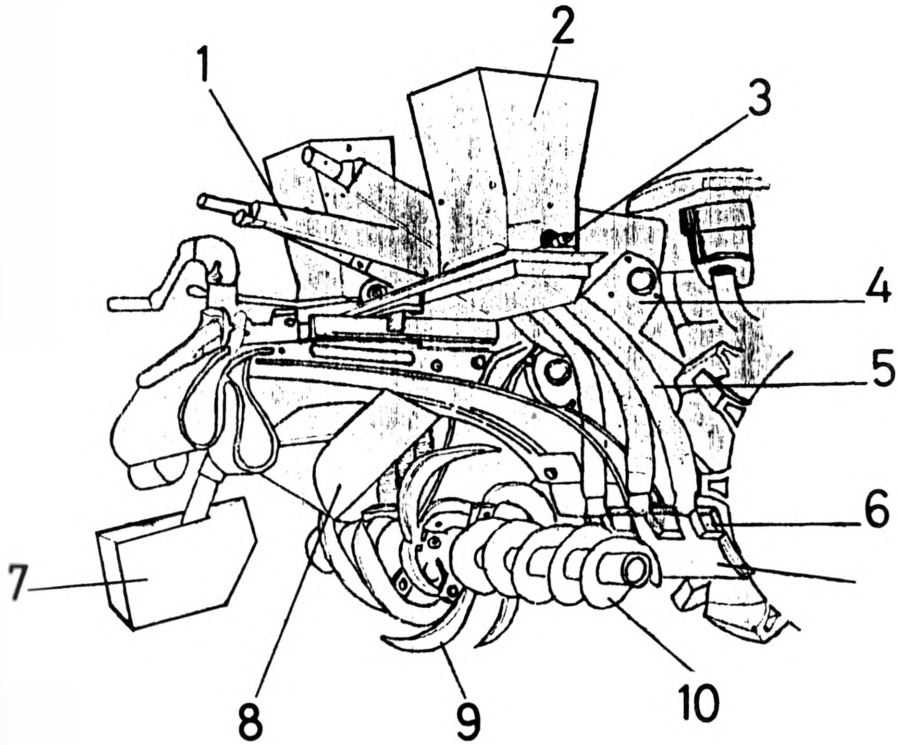
Sale Price	169,300 Won (US$353)
Operating	568 Won/ha (US$12)

6. General

This machine can be used for seeding, without ploughing or rotary tilling of the harvested land. It can till and sow as a single operation.

7. Availability

As in (3) above



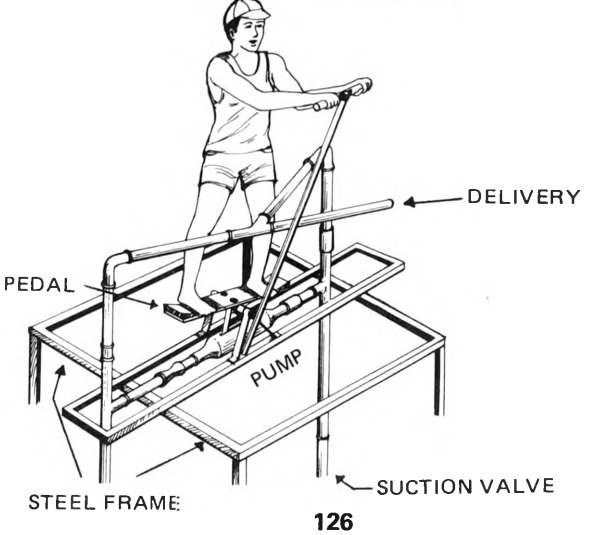
1. Power tiller handle
2. Seed hopper
3. Metering device
4. Chain case
5. Seed delivery tube
6. Seed outlet
7. Drainage finishing
8. Protector
9. Rotary blade
10. Soil covering screw

ROTARY SEEDER

D. IRRIGATION DEVICES

PEDAL PUMP

1.	Function	For lifting water by applying man's weight
2.	Specifications	
	Make	Ulpotha pump
	Type	Pedal-operated double piston
	Power	Manual – two persons (each can operate 20 minutes continuously)
	Length	600 mm
	Width	200 mm
	Height	150 mm (Suction hose)
	Weight	15 kg
3.	Developed at	Agricultural Implements Factory Welisara, Colombo, Sri Lanka
4.	Test Results	
	Suitable for	Lifting water from levels not exceeding 5 meters, using weight of the operator
	Work capacity	4000-6000 li/hr at 3-5 metre head
5.	Cost	
	Sale Price	Rs 800 (US$ 55)
	Operating	Rs 30/hour (US$ 2)
6.	General	The operator stands on the pedal and swings sideways applying his weight alternately on the pedal ends which move up and down. Water is pumped by the plunger alternately. Each man can work continuously for 20 minutes and so at least 2 operators would be required for continuous operation.
7.	Availability	As in (3) above



IRRI PORTABLE AXIAL FLOW PUMP

1. Function — For irrigation and drainage purposes

2. Specifications

Make	IRRI
Type	Axial-flow
Power	7 HP engine or 5 kw motor
Length	3700 mm
Width	580 mm
Weight	45 kg (without engine)
Discharge tube	150 mm (Dia.)

3. Developed at — Agricultural Engineering Department
The International Rice Research Institute
Los Baños, Philippines

4. Test Results

Suitable for	Irrigation and drainage
Work capacity	upto 3,000 li/min
Operating speed (Max.)	3000 rpm
Max. pump field eff.	70%
Fuel consumption	1.5 li/hr

5. Cost

Sale Price	P700 (US$ 95) without engine

6. General

This pump was developed to provide the farmers with a low-cost, low-head, high capacity irrigation pump. It can be direct coupled to an engine or belt-driven by power tiller. It is simple in design and can be fabricated by small machine shops with standard forming tools. Radial bearings are made out of local hardwood. It is portable and can be carried by two men. It is self-priming as pump impeller is always submerged in water during operation, thereby eliminating expensive footvalves.

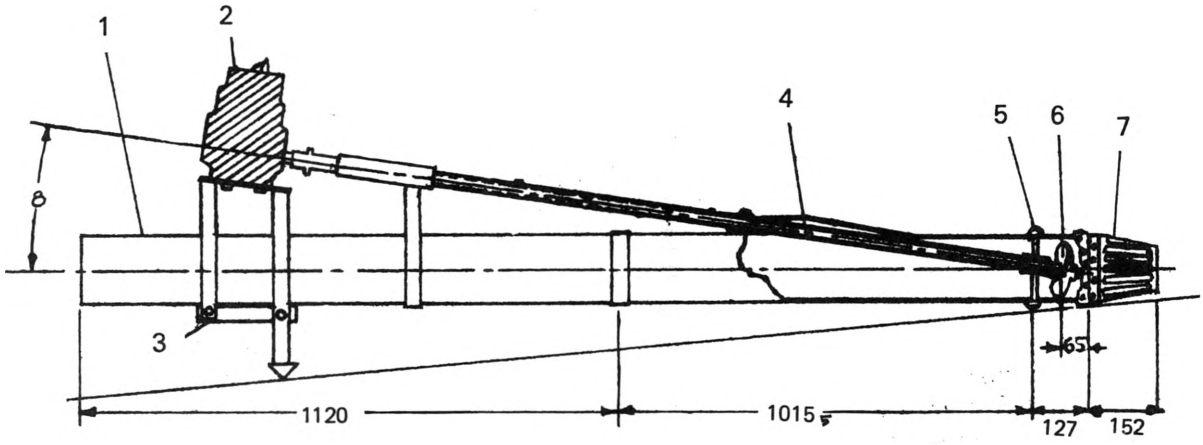
7. Availability

As in (3) above

IRRI PORTABLE AXIAL FLOW PUMP

PROPELLER PUMP

1.	Function	Pumping water from low heads from channels
2.	Specifications	
	Make	Local manufacturers
	Type	Power-driven, 7 HP
	Power	Engine – 7 HP Gasoline – one person to operate, two persons to transfer the pump
	Length	4415 mm
	Pipe Diameter	155 mm
	Weight	38 kg
3.	Developed at	Agricultural Engineering Division Department of Agriculture Bangkok, Thailand
4.	Test Results	
	Suitable for	Pumping water at low heads
	Discharge	2700 li. pm at 3 m. headlift and shaft speed at 2800 rpm
5.	Cost	
	Sale Price	Baht 1100 (US$ 55)
	Operating	Baht 15/hr (US$ 0.75)
6.	General	The propeller pump consists of a propeller which is rotated by the long shaft transmission power from the engine. The water flows by the action of the propeller through the pipe. The propeller must be submerged in the water during pumping.
7.	Availability	Manufacturers, Thailand (who may be contacted through (3) above



(1) 153 DIA.GALVANIZED IRON PIPE (GAUGE 18)
(2) GASOLINE ENGINE 7 HP
(3) ENGINE MOUNT
(4) 15 DIA. STEEL SHAFT 1780 LONG
(5) PROPELLER CENTER ADJUSTING BOLT
(6) 150 DIA. PROPELLER
(7) PROPELLER GUARD

PROPELLER PUMP

E. PROTECTION APPLIANCES

POWER DUST AND MIST BLOWER

1. Function — Dusting and misting of insecticides

2. Specifications

Make	There are a number of makes
Type	Gasoline engine driven
Power	1.2 PS/7500 rpm
Length	–

3. Developed at — Several manufacturers

4. Test Results

Suitable for — All crops

Work capacity

i) Spraying: Spraying volume: 3.53 liter/min.
Spraying distance: 7.0 m.

ii) Dusting: Dusting volume: 5.32 m^3/min.
Dusting distance: 10 m

5. Cost

Sale Price	125,800 Won (US$ 262)
Operating	230 Won/hr (US$ 0.05) (excluding labor cost)

6. General

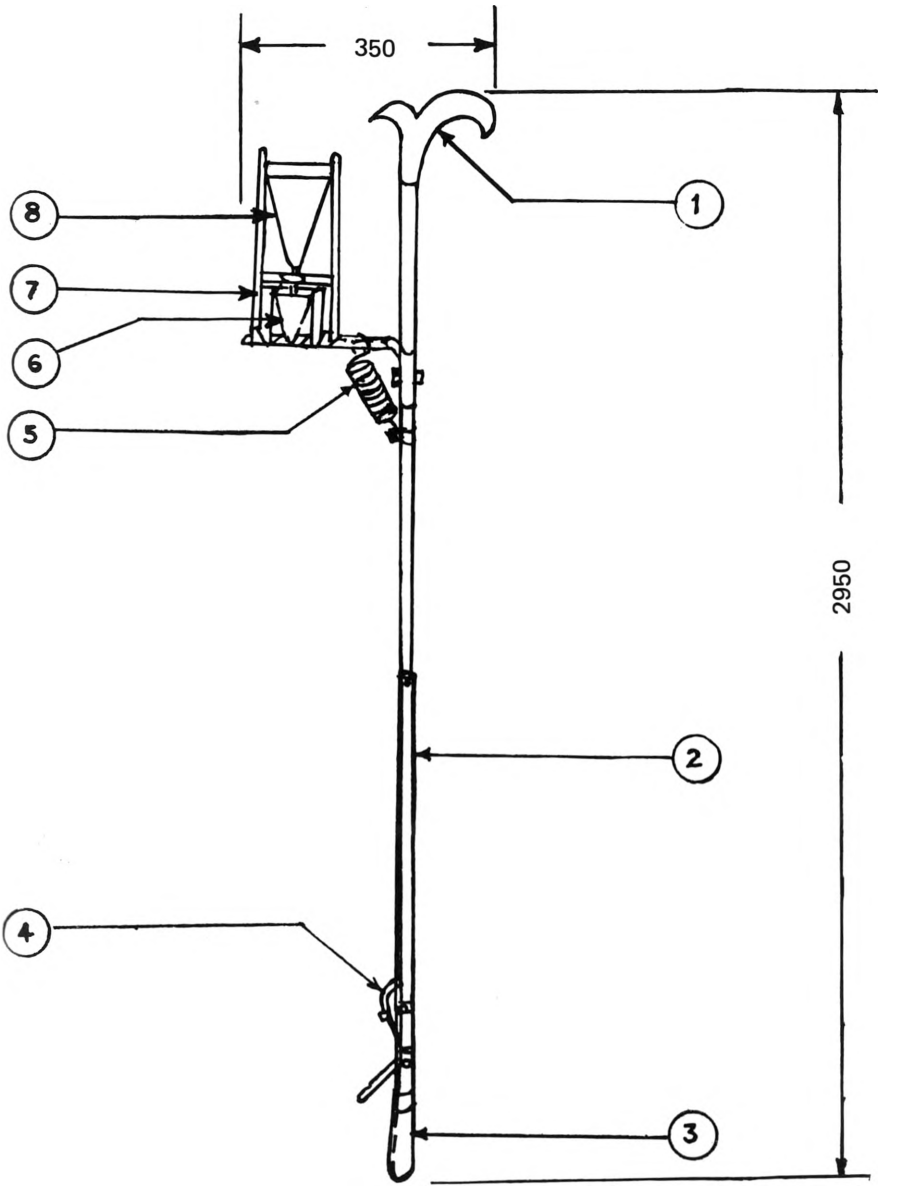
The power required is provided by a two-stroke petrol engine. It is back-mounted and can be carried about easily.

7. Availability

With several manufacturers. Addresses can be obtained from Director, Institute of Agricultural Engineering and Utilization, Suweon, Republic of Korea

GRANULE APPLICATOR

1.	Function	Filling of granular insecticide in the leaf axil of areca palm
2.	Specifications	
	Make	CPCRI
	Type	Manually-operated, gravity filling, remotely triggered
	Power	Manual – one person
	Length	350 mm
	Width	250 mm
	Height	2950 mm
	Weight	1.40 kg
3.	Developed at	Central Plantation Crops Research Institute Kasaragod, India
4.	Test Results	
	Suitable for	Areca palm
	Work capacity	5 palms/hour
5.	Cost	
	Sale Price	Rs 150 (US$19)
	Operating	Rs 0.40/palm (US$ 0.05)
6.	General	It works on the principle of gravity flow. A man holding the applicator climbs up the palm tree and cuts the leaf with the help of a steel blade provided on the top of the applicator. After that insecticide container is brought over the axil of the cut leaf and then trigger is operated which opens the hopper outlet and the insecticide is allowed to flow down in the leaf axil. Once desired quantity of insecticide has gone into the leaf axil the trigger is released. The applicator is then taken to the next leaf and the operation is repeated.
7.	Availability	As in (3) above



(1) STEEL BLADE
(2) ALUMINIUM LANCE
(3) HANDLE
(4) TRIGGER
(5) SPRING
(6) HOPPER
(7) SLIDING ASSEMBLY
(8) CONTAINER

GRANULE APPLICATOR

TALL CROP SPRAYER

1. Function — Application of chemicals on tall standing crops

2. Specifications

Make	GBPUAT
Type	Hand-operated, knap-sack
Power	Manual – two persons
Length	1450 mm
Width	300 mm
Height	2180 mm
Height of spraying	3000 mm
Length of boom	1450 mm
Number of nozzles	4
Weight	8 kg

3. Developed at — University of Agriculture and Technology Pantnagar, India

4. Test Results

Suitable for	Sugarcane, maize, sorghum and other tall crops
Work capacity	0.4 to 0.8 ha/hour

5. Cost

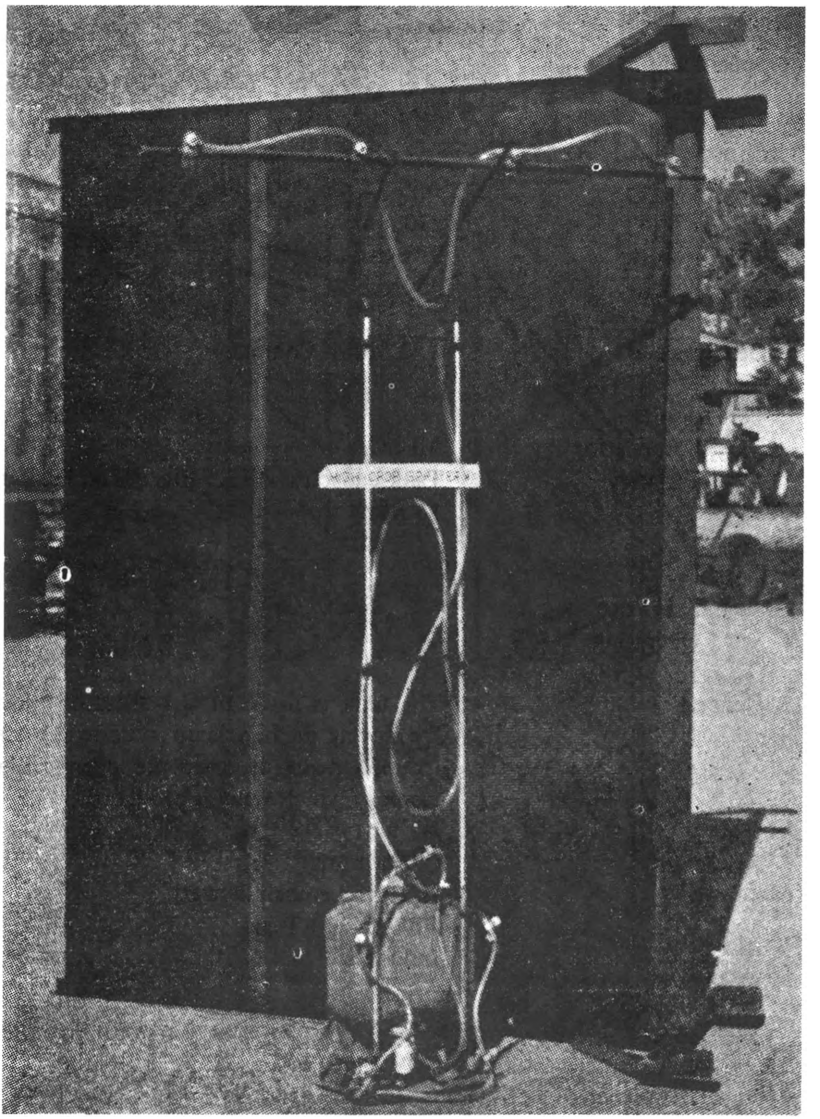
Sale Price	Rs 600 (US$ 75)
Operating	Rs 17.50 to 35/ha (US$ 2 to 4)

6. General

The hand-operated knap-sack sprayer available in the market has been modified to meet the requirement of tall crop spraying. It has a vertical light weight pipe structure with telescopic arrangement to adjust the height of spray. Horizontal and vertical booms are provided on it for mounting four spray nozzles in each case. A hand operated pump generates necessary pressure in the liquid tank to pump the chemicals to the nozzles. It can be used for overleaf and/or underleaf spraying in one operation as per requirement of the crop.

7. Availability

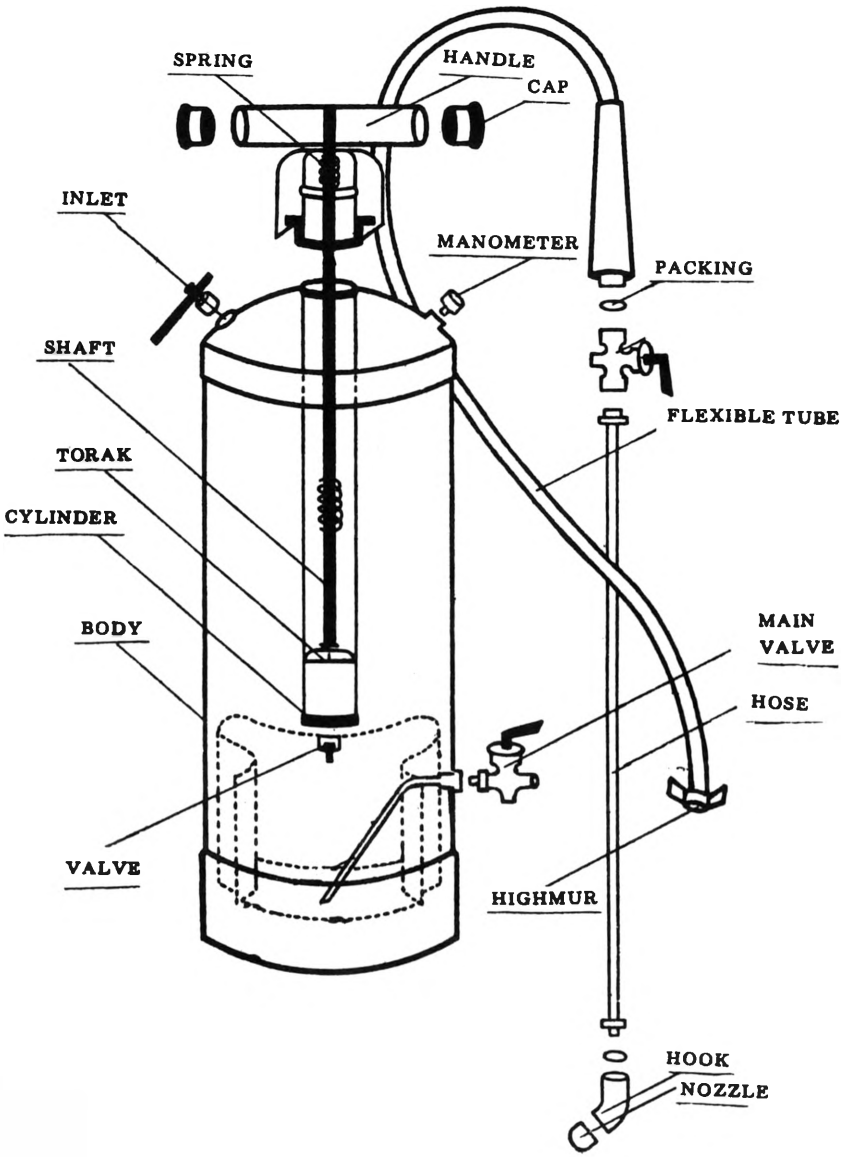
As in (3) above



TALL CROP SPRAYER

SPRAYER

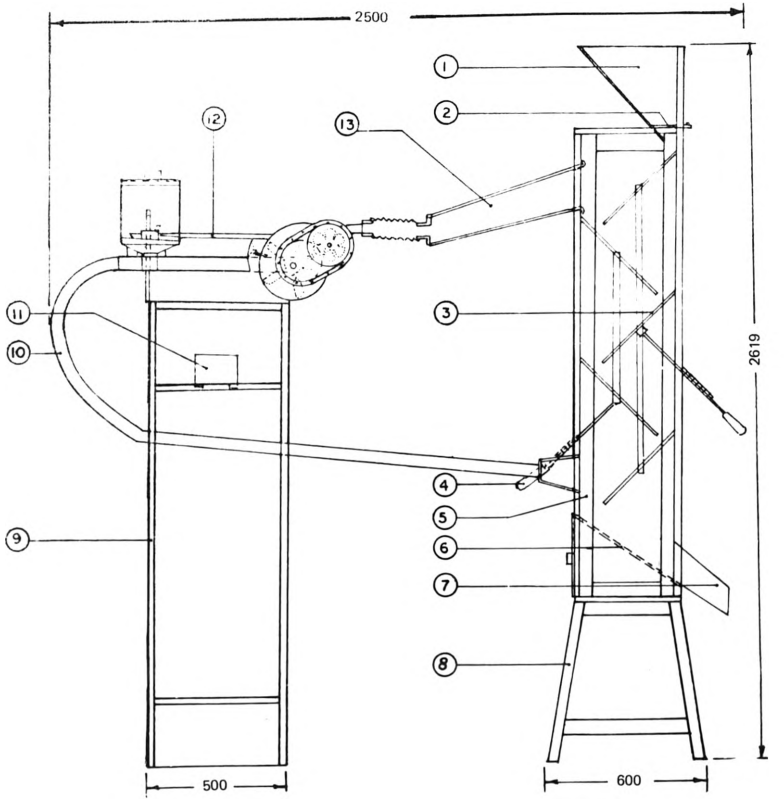
1.	Function	Spraying insecticide
2.	Specifications	
	Make	C. V. Mutof
	Type	99 Mutof – B-3
	Power	Manual – one person
	Length	–
	Width	220 mm
	Height	610 mm
	Weight	65 kg
3.	Developed at	C.V. Mutof Company
4.	Test Results	
	Suitable for	All crops
	Capacity	Tank capacity – 13.5 liters/Max. Pressure – 15 Atm.
5.	Cost	
	Sale Price	–
	Operating	–
6.	General	The tank is made of G.I. sheet of 0.8 mm. By moving the handle up and down, pressure is applied inside over the chemical as a result of which spray is produced.
7.	Availability	C.V. Mutof Jl. Raya Lembah Duwar Adiwenna – Tegal Indonesia


SPRING
HANDLE
CAP
INLET
MANOMETER
PACKING
SHAFT
FLEXIBLE TUBE
TORAK
CYLINDER
BODY
MAIN
VALVE
HOSE
VALVE
HIGHMUR
HOOK
NOZZLE

SPRAYER

SOYBEAN SEED TREATER

1.	Function	Chemical treatment of seed
2.	Specifications	
	Make	GBPUAT
	Type	Continuous gravity, feed, stationary
	Power	Electricity – Two persons for loading and unloading and 1 HP (0.746 kw)
	Length	2500 mm
	Width	600 mm
	Height	2620 mm
3.	Developed at	College of Technology G.B. Pant University of Agriculture and Technology, Pantnagar, India
4.	Test Results	
	Suitable for	Soybean seed
	Work capacity	1000 kg/hour
5.	Cost	
	Sale Price	Rs 1250 (US$156)
	Operating	Rs 1.60/100 kg (US$ 0.25)
6.	General	The seed treater consists of a seed hopper, mixing chamber, baffle plate assembly, duster and connected ducting system. Mixing chamber is provided with cushion to avoid impact damage to the seeds. The chemical dust is fed through a duct at the top with the help of a small duster. The optimum output of 3000 kg/hour is obtained at a baffle angle of 45^{o} from vertical. The machine has been successfully used to treat soybean seeds with prescribed chemicals.
7.	Availability	As in (3) above



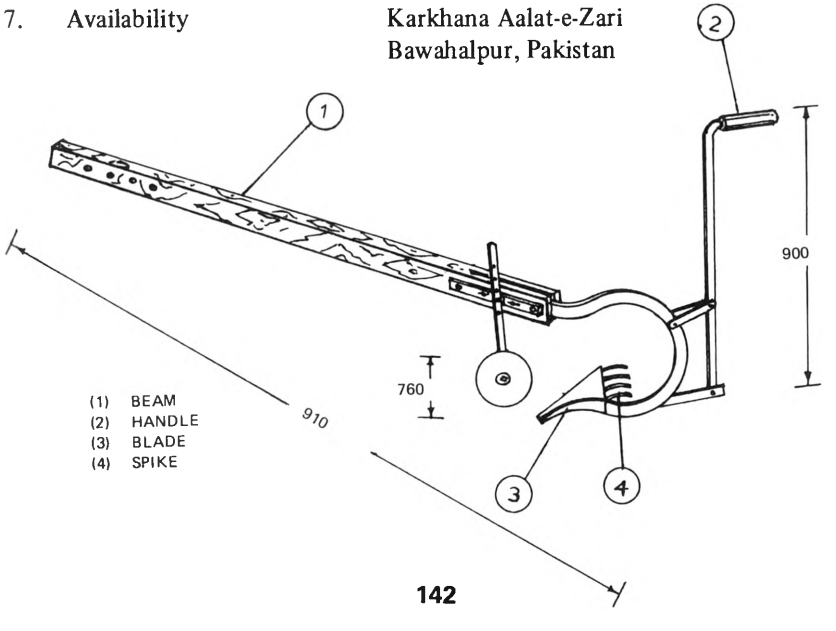
(1) FEED HOPPER
(2) SLIDING PLATE
(3) BAFFLE PLATE
(4) ANGLE ADJUSTING LEVER
(5) MIXING CHAMBER
(6) METAL SCREEN
(7) OUTLET FOR SEED
(8) WOODEN FRAME
(9) IRON FRAME
(10) RECIRCULATING DUCT
(11) MOTOR
(12) DUSTER
(13) CHEMICAL FEEDING DUCT

SOYBEAN SEED TREATER

F. HARVESTING DEVICES

BULLOCK-DRAWN GROUNDNUT DIGGER

1.	Function	To dig and lift the groundnut crop
2.	Specifications	
	Make	KAZ
	Type	Bullock-drawn
	Power	A pair of bullocks and two persons
	Length	915 mm
	Width	760 mm
	Height	900 mm
	Weight	50 kg
	Width of cut	900 mm
3.	Developed at	Agricultural Engineering Research Division Faisalabad, Pakistan
4.	Test Results	
	Suitable for	Groundnut digging
	Work capacity	0.08 ha/hour
	Draft	120 kg
5.	Cost	
	Sale Price	Rs 300 (US$ 30)
	Operating	Rs 39 ha (US$ 3.90)
6.	General	Bullock-drawn groundnut digger is suitable for the farmers having small holding. It can be made in villages by rural artisans. While digging the crop it does not break the pods. It is also used to eliminate weeds and grasses.
7.	Availability	Karkhana Aalat-e-Zari Bawahalpur, Pakistan



REAPER

1.	Function	Harvesting cereals, mainly wheat
2.	Specifications	
	Make	PAU
	Type	Animal-drawn
	Power	Animal – One pair and six persons for collection
	Length	2725 mm
	Width	3725 mm
	Height	1225 mm
	Weight	330 kg
	Width of cut	1065 mm
	Speed of knife-bar	60 (number of strokes of knife-bar per revolution of the wheel)
3.	Developed at	College of Agricultural Engineering Punjab Agricultural University Ludhiana, India
4.	Test Results	
	Suitable for	Wheat, rice and barley
	Work capacity	0.15 ha/hour
	Draft	130 kg on plain ground (180 kg on terrace)
5.	Cost	
	Sale Price	Rs 2500 (US$ 310)
	Operating	Rs 50/ha (US$ 6.25)

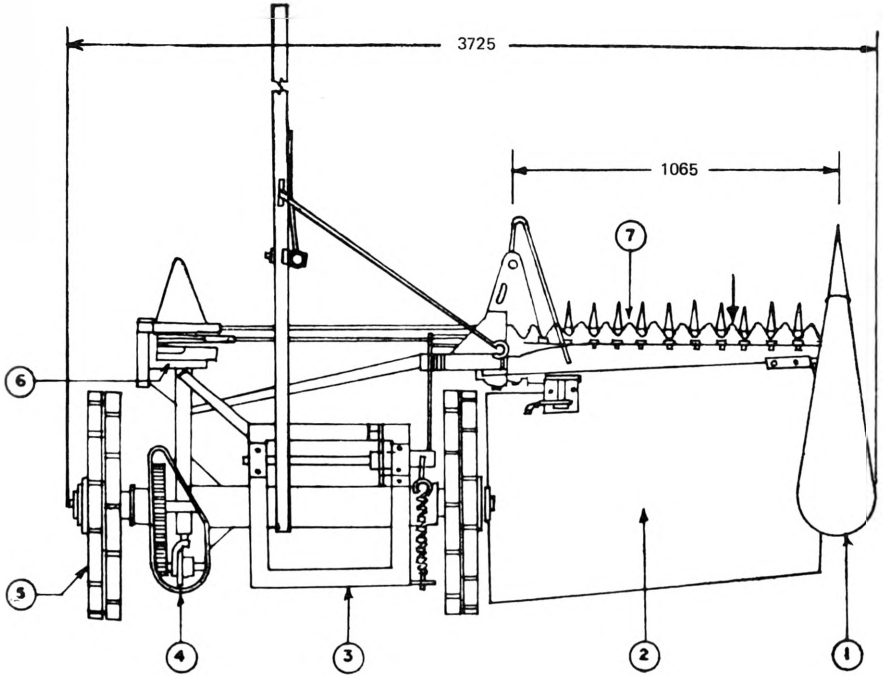
6. General

The animal-drawn reaper consists of one reciprocating type cutter bar for cutting the crop, swath divider, platform for holding the harvested crop, gear box, pitman wheel and land wheel. The power to drive the knife bar is got from the ground wheel by means of a gear box and a crank and connecting rod mechanism. The machine cuts the crop and places it on the platform behind the cutter bar with the help of a manually operated rake. Crop bunches of approximately 10 kg weight are formed. The bunches are dropped on the ground with the help of a rake and shifted to the side manually to clear the passage for next run of the reaper. This reaper has also been modified by providing a 24 HP engine to operate cutter bar. Cost of the machine is US$ 400. It has an output of 0.2 – 0.4 ha per hour.

7. Availability

i) College of Agricultural Engineering
Punjab Agricultural University
Ludhiana, India

ii) M/S ASB Precision Tools
10-A Industrial Estate, Ludhiana
Punjab, India



(1) SWATH DIVIDER
(2) PLATFORM
(3) FRAME
(4) GEAR BOX
(5) LAND WHEEL
(6) PITMAN WHEEL
(7) CUTTER BAR

REAPER

PADDY HARVESTER

1. Function — Reaps and windrows the crop

2. Specifications

Make	TNAU
Type	Front mounted, two-wheel tractor-operated
Power	Two-wheel tractor – 10 HP and three persons
Length	1600 mm
Width	1350 mm
Height	1300 mm
Weight	140 kg
Cutter bar width	900 mm
Number of stroke/min.	600 mm
Length of stroke	80 mm

3. Developed at — Tamil Nadu Agricultural University, Coimbatore, India

4. Test Results

Suitable for	Paddy
Work capacity	0.08 ha/hour

5. Cost

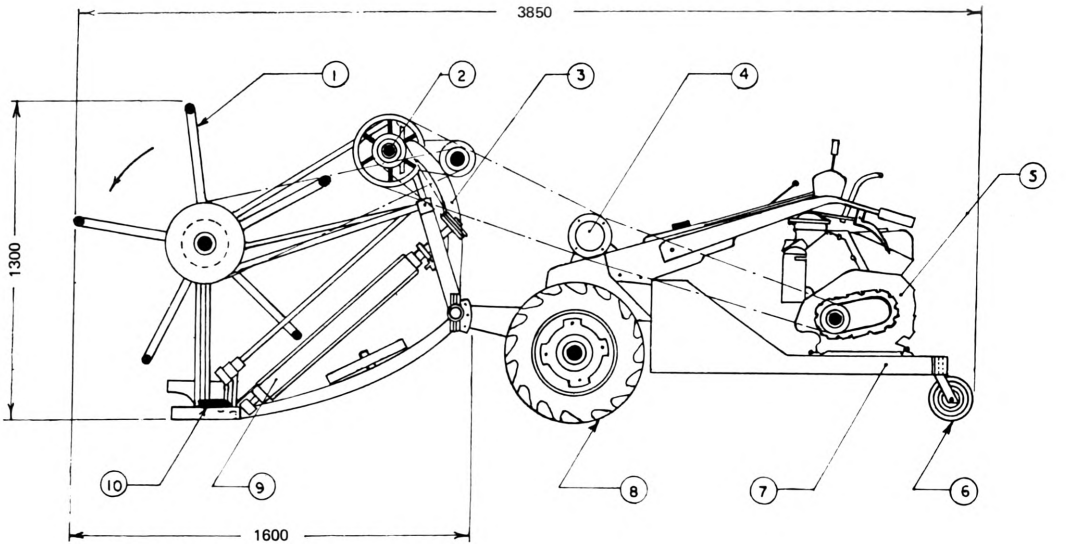
Sale Price	Rs 4,200 (US$ 525) excluding power tiller
Operating	Rs 105 /ha (US$ 13.25)

6. General

It is operated by a two-wheel walking type tractor whose engine is shifted at the rear for balancing the unit. It consists of a cutter bar, a reel and canvas conveyor. It cuts the crop at a height of 80 mm from ground level and drops it in the field to one side in a windrow with the help of the canvas conveyor 900 mm wide. Power to the main three components is taken from the clutch pulley of tractor to counter shaft and from there to various parts by V-belt and pulley drive arrangement. The machine should be operated at a speed of 1.6 kph. The field loss in yield at this speed is 1.0 per cent. Crop height should not be more than 700 mm and field should be a levelled one.

7. Availability

As in (3) above



(1) REEL ASSEMBLY
(2) MAIN SHAFT
(3) MAIN FRAME
(4) CLUTCH PULLEY
(5) ENGINE
(6) TAIL WHEEL
(7) ENGINE CHASSIS
(8) GROUND WHEEL
(9) CONVEYER
(10) CUTTER BAR

PADDY HARVESTER

REAPER-WINDROWER

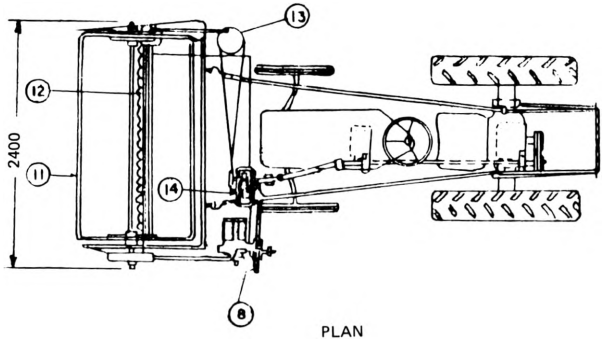
1.	Function	Harvesting of cereals
2.	Specifications	
	Make	PAU
	Type	Tractor front mounted, hydraulically supported
	Power	Tractor – A 30 HP tractor, three persons
	Length	2600 mm
	Width	2400 mm
	Height	1900 mm
	Weight	300 kg
	Width of cut	1500 mm
	Length of conveyor apron	1950 mm
	Maximum cutting speed	100 m/min
	Speed of conveyor apron	51 m/min
3.	Developed at	College of Agricultural Engineering Punjab Agricultural University Ludhiana, India
4.	Test Results	
	Suitable for	Wheat, barley and rice
	Work capacity	0.3 ha/hour
5.	Cost	
	Sale Price	Rs 7000 (US$ 875)
	Operating	Rs 90/ha (US$ 12)

6. General

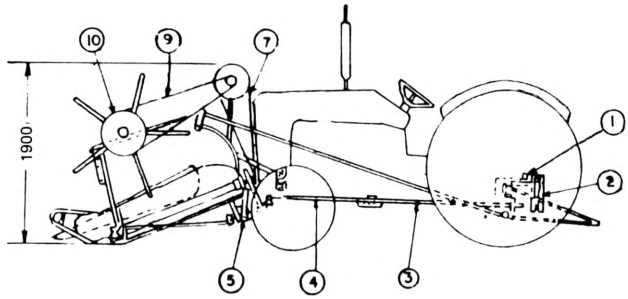
Main components of the tractor front mounted reaper-windrower are cutter bar, reel, pitman, wheel, gear box, propeller shaft and power transmission mechanism. Power to drive the apron conveyor, reel and cutter bar is provided from the pto shaft of the tractor by means of a telescopic drive shaft and gear box. The height of cut is controlled by means of hydraulic lift of the tractor. The machine cuts the crop and simultaneously carries it in the form of a windrow. It has many advantages such as better visibility of the crop and field conditions, better stability of the tractor, improved control and maneuverability of the unit as well as elimination of the necessity to cut the first swath of the crop by hand.

7. Availability

As in (3) above



PLAN



SIDE VIEW

(1) TRACTOR PTO
(2) BELT DRIVE
(3) PROPELLER SHAFT
(4) TELESCOPIC DRIVE SHAFT
(5) GEAR BOX
(6) DRIVE BELT FOR APPRON DRIVING PULLEY
(7) DRIVE BELT FOR REEL DRIVING PULLEY
(8) APPRON DRIVING PULLEY
(9) DRIVE BELT FOR REEL
(10) REEL DRIVING PULLEY
(11) REEL
(12) CUTTERBAR
(13) PITMAN WHEEL
(14) SPUR GEAR

REAPER – WINDROWER

REAPER-BINDER

1. Function — Harvesting and binding

2. Specifications

Make	PAU
Type	Tractor-rear mounted, pto operated
Power	Tractor – A 30 HP tractor, three persons
Length	2380 mm
Width	3270 mm
Height	2100 mm
Weight	450 kg
Width of cut	1270 mm
Speed of cutter bar	130 m/min

3. Developed at — College of Agricultural Engineering, Punjab Agricultural University, Ludhiana, India

4. Test Results

Suitable for	Wheat, barley and rice
Work capacity	0.25 ha/hour

5. Cost

Sale Price	Rs 10,000 (US$ 1250)
Operating	Rs 170/ha (US$ 22)

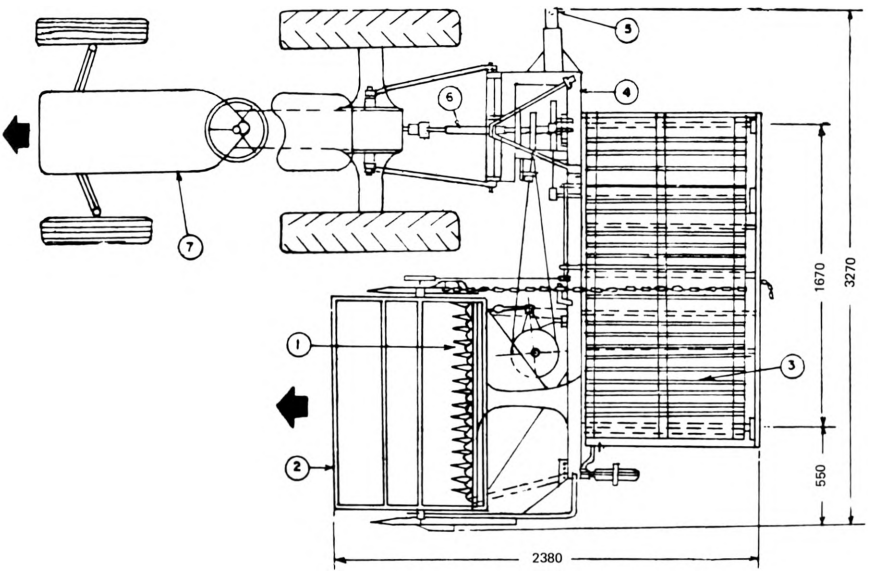
6. General

The main components of the tractor rear-mounted reaper-binder include the cutter bar, reel, conveyor, gathering fingers, shield, supports, needle and knotting mechanism apart from the main frame with three point linkage. The reaper-binder cuts the plants and simultaneously ties them into small bundles of 2 to 5 kg (depending upon the moisture content of the crop bundles) which are carried to the side and dropped behind the tractor by the conveyor. The power to different working components viz. cutter bar, pick up mechanism, knotting unit and conveyor is provided from the tractor pto shaft. The height of cut can be controlled by the tractor lift and the gauge wheel fitted in the reaper-binder.

7. Availability

i) M/s ESPI Agricultural Machineries Pvt. Ltd.
Plot No. 270, Sector 24, Faridabad, India

ii) College of Agricultural Engineering
Punjab Agricultural University
Ludhiana, India



(1) CUTTER BAR
(2) REEL
(3) CONVEYER
(4) MAIN FRAME WITH 3 POINT HITCH
(5) OFFSET SINGLE POINT HITCH
(6) PTO SHAFT
(7) TRACTOR

REAPER – BINDER

POTATO DIGGER

1. Function — Digging out potato tubers

2. Specifications

Make	PAU
Type	Animal drawn, single row
Power	Animal – A pair of bullocks and seven persons
Length	3225 mm
Width	540 mm
Height	1350 mm
Weight	24 kg

3. Developed at — College of Agricultural Engineering, Punjab Agricultural University, Ludhiana, India

4. Test Results

Suitable for	Potato
Work capacity	0.10 ha/hour
Draft	75-90 kg

5. Cost

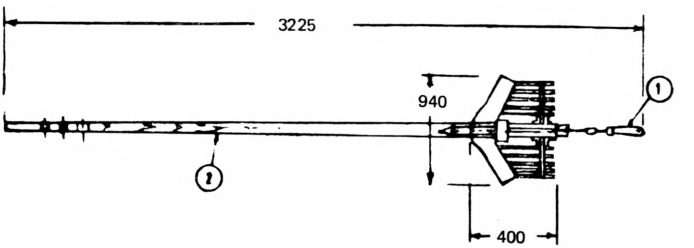
Sale Price	Rs 75 (US$ 9)
Operating	Rs 150/ha (US$ 18)

6. General

Animal-drawn potato diger comprises of 540 mm wide curved blade with lifter rods attached to it at the rear. It loosens the soil. The loose material passes over the lifter rods leaving potatoes on the field.

7. Availability

As in (3) above



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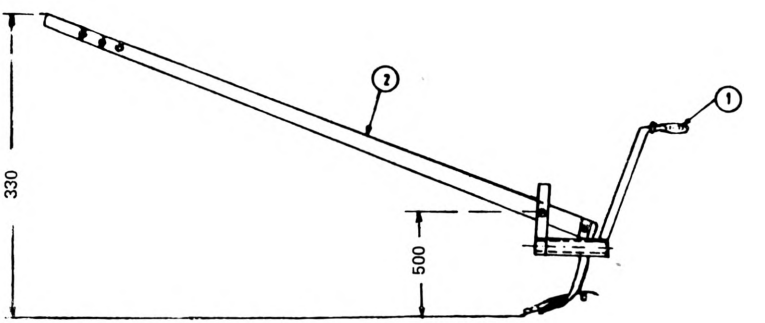
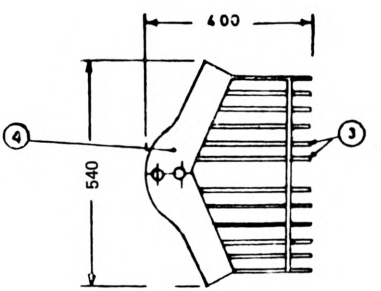




SIDE VIEW (above) DETAILS OF A BLADE (below)

(1) HANDLE
(2) WOODEN BEAM
(3) LIFTER RODS
(4) BLADE

POTATO DIGGER

GROUNDNUT-CUM-POTATO DIGGER

1. Function — Digging out groundnut and potato crops

2. Specifications

Make	TNAU
Type	Animal-drawn, single row, adjustable depth
Power	Animal – A pair and two persons
Length	3300 mm
Width	750 mm
Height	1090 mm
Weight	120 kg
Width of digging	575 mm (Maximum)
Depth of digging	200 mm (do)

3. Developed at — Tamil Nadu Agricultural University
Coimbatore, India

4. Test Results

Suitable for	Groundnut and potato
Work capacity	0.10 ha/hour (groundnut)
	0.11 ha/hour (potato)
Draft	75 kg

5. Cost

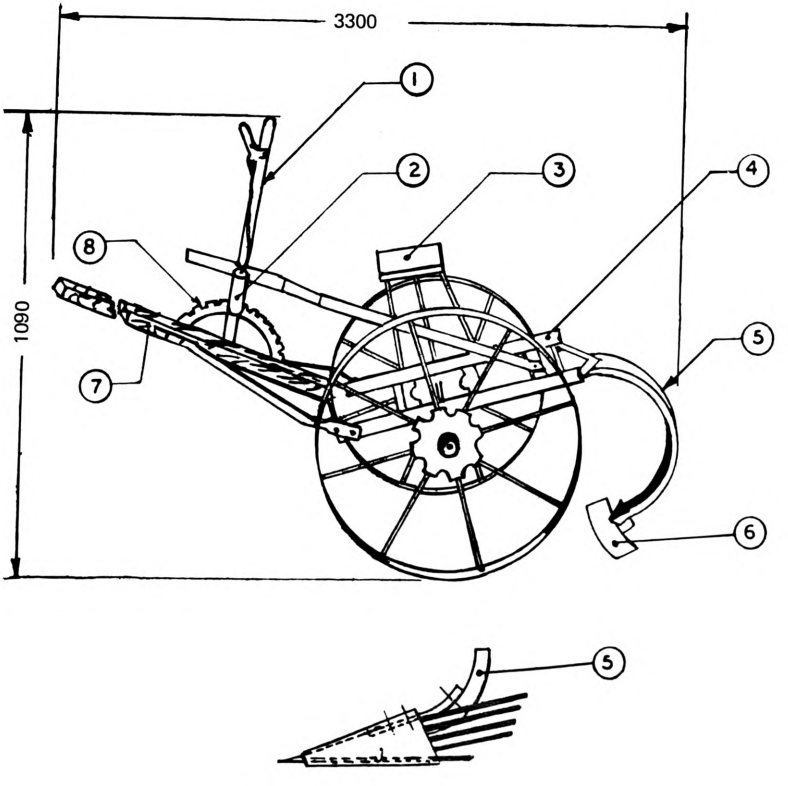
Capital	Rs 750 (US$ 94)
Operating	Rs 80/ha (US$ 10)

6. General

The machine consists of a pole shaft, a lifting handle, a shank, a digging blade, two wheels and a frame. Groundnut digging blade is crescent shaped whereas the potato digging blade is like a ridger. Both are attached to a common square shank fitted to the frame which is mounted on two steel wheels. Operator, seated on the implement can drive animals comfortably as well as adjust the depth of digging. No damage is caused to groundnut or potato. Occasional wrapping of vines around the shank occurs which clogs the shank-blade assembly and hence cleaning becomes necessary.

7. Availability

As in (3) above



POTATO DIGGER ATTACHMENT

(1)	LIFTING HANDLE	(5)	SHANK
(2)	PAWL	(6)	GROUNDNUT DIGGING BLADE
(3)	DRIVER SEAT	(7)	POLE SHAFT
(4)	FRAME	(8)	TOOTHED SEGMENT

GROUNDNUT–CUM–POTATO DIGGER

POTATO DIGGER

1. Function — Digging potato

2. Specifications

Make	GBPUAT
Type	Tractor mounted, two bottom, adjustable row spacing
Power	Tractor – 35 HP and fifteen persons to collect
Length	1160 mm
Width	530 mm
Height	900 mm
Weight	46 kg
Width of digging	1200 mm
Depth of digging	120 mm (Max.)
Row spacing	600 mm

3. Developed at — College of Technology
G.B. Pant University of Agriculture and Technology, Pantnagar, India

4. Test Results

Suitable for	Potato
Work capacity	0.4 ha/hour
Recovery of tubers	84 per cent
Damage of tubers	0.11 per cent

5. Cost

Sale Price	Rs 500 (US$ 62.5)
Operating	Rs 90/ha (US$ 11.25)

6. General

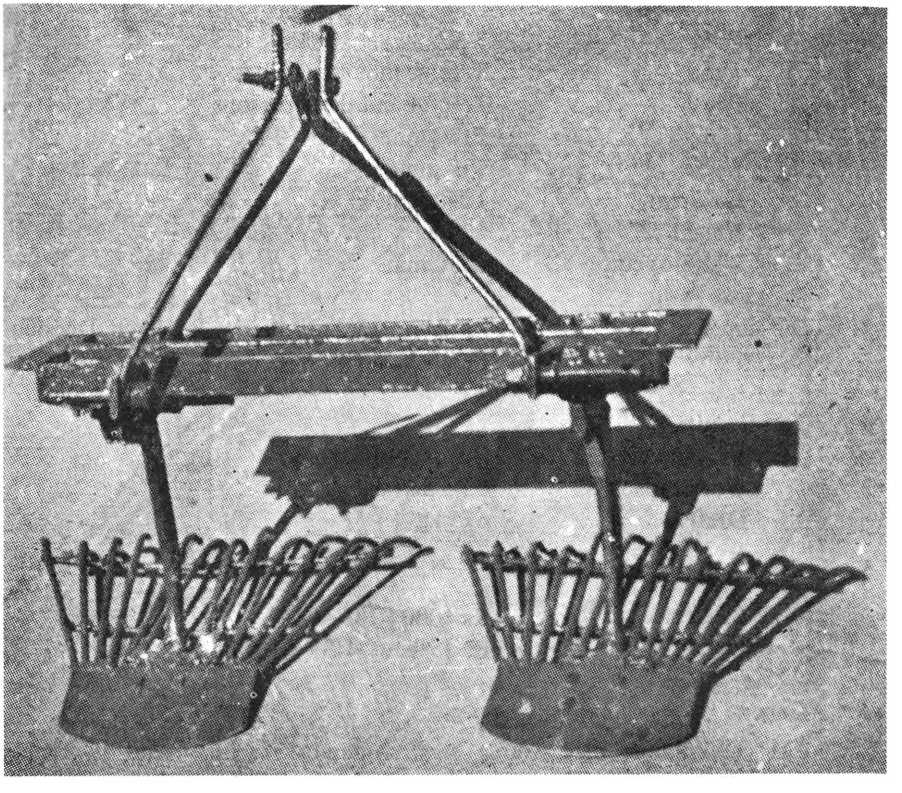
The potato digger consists of a blade with a number of round bars extending from the blade. These form a screen to separate the potato from the soil. Two bottom digging devices have been fitted with the tractor. The dug mass of soil and potato pass over the perforated structure where soil is separated from potato. Exposed tubers are then hand picked.

7. Availability

i) College of Technology
G.B. Pant University of Agriculture and Technology
Pantnagar, India

ii) M/s Agnihotri Engineering Works
Rudrapur, Nainital, India

iii) M/s Hans Engineering Works
Suraj Kund Road, Meerut, India



POTATO DIGGER

TRACTOR DRAWN GROUNDNUT DIGGER

1. Function — To dig the groundnut

2. Specifications

Make	KAZ
Type	Tractor-mounted
Power	Tractor and three persons
Length	2130 mm
Width	914 mm
Height	1090 mm
Weight	200 kg
Width of cut	1830 mm

3. Developed at — Agricultural Engineering Research Division Faisalabad, Pakistan

4. Test Results

Suitable for	Groundnut digging
Work capacity	0.25 ha/hour
Draft	615 kg

5. Cost

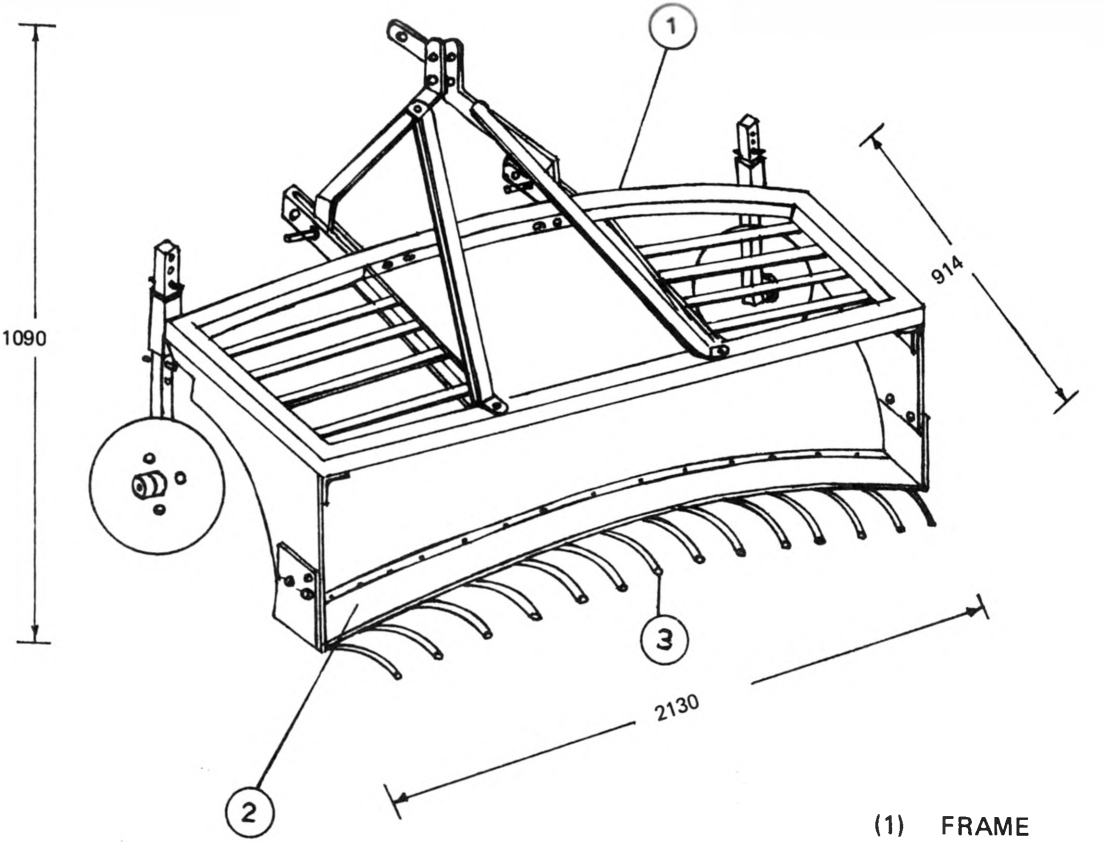
Sale Price	Rs 4000 (US$ 400)
Operating	Rs 45/hour (US$ 4.50/hour)

6. General

Groundnut digger is a tractor-operated machine with hydraulic deep control. The blade of the digger goes just under the pods and the soil rolls over the blade and spike fitted at the rear of the blade. It pulverizes the soil and enables collection of pods alongwith the plants by hand.

7. Availability

Karkhana Aalat-e-Zari
Bawahalpur, Pakistan



TRACTOR DRAWN GROUNDNUT DIGGER

(1) FRAME
(2) BLADE
(3) SPIKE

POTATO DIGGER-CUM-ELEVATOR

1. Function — Potato harvesting and elevating
2. Specifications

Make	PAU
Type	Tractor-mounted, single row, rod-chain conveyor
Power	Tractor – 25 HP and twenty persons
Length	2000 mm
Width	2210 mm
Height	970 mm
Weight	326 kg
Width of blade	550 mm
Width of elevator conveyor	650 mm
Angle of elevator	20^{o}

3. Developed at — College of Agricultural Engineering
   Punjab Agricultural University
   Ludhiana, Punjab, India
4. Test Results

Suitable for	Potato
Actual field capacity	0.20 ha/hour
Tubers exposed	95-98%
Damage	2-3%

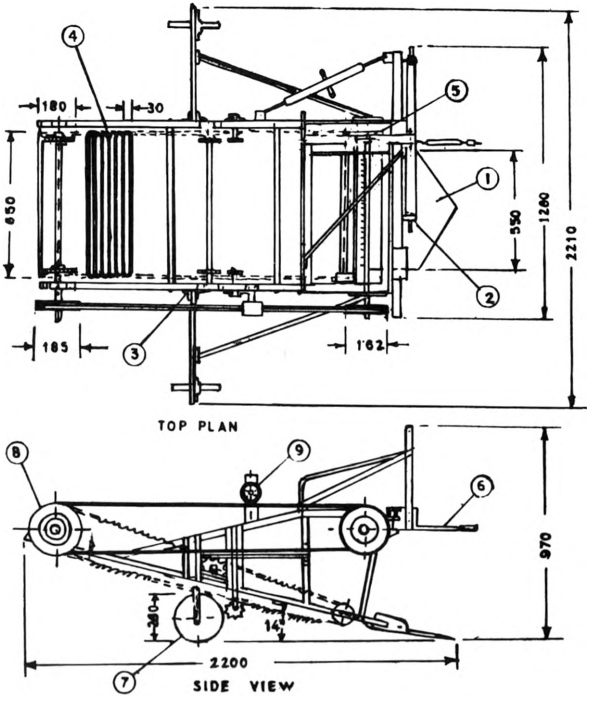
5. Cost

Sale Price	Rs 3,000 (US$ 375)
Operating	Rs 120/ha (US$ 15)

6. General

   Potato digger elevator comprises a digging blade, a rod-chain conveyor, a gear box, idler, agitator and driving sprockets, gauge wheels and frame. The machine digs one ridge of the crop at a time and picks up the soil-potato mass by a rod-chain conveyor. Agitator sprockets oscillate the conveyor chain and sift out the loose soil. The clean tubers drop behind the digger on the ground facilitating speedy picking up of tubers manually.

7. Availability
   i) College of Agricultural Engineering
      Punjab Agricultural University
      Ludhiana, India
   ii) M/s Union Forgings
      G.T. Road, Sherpur, Ludhiana, India
   iii) M/s Universal Farm Machine Corporation
      Patiala Road, Narwana (JIND), India
   iv) M/s Agro Electrical Industry
      Nehru Garden Road, Jullundur, India
   v) M/s Avtar Agro Industry
      Dashmesh Nagar, Ludhiana, India
   vi) M/s Punjab Agricultural Syndicate
      Kashmir Road, Batala, India



(1) DIGGING SHOVEL
(2) TRACTOR HITCH POINT
(3) AGITATING SPROCKETS
(4) ROD CHAIN CONVEYER
(5) GEAR BOX
(6) PTO SHAFT
(7) GAUGE WHEEL
(8) ROD CHAIN CONVEYOR DRIVE PULLEY
(9) BELT TIGHTNER

POTATO DIGGER – CUM – ELEVATOR

GROUNDNUT DIGGER-SHAKER-WINDROWER

1.	Function	Harvesting
2.	Specifications	
	Make	PAU
	Type	Tractor rear mounted, single row
	Power	Tractor – 30 HP and three persons
	Length	2260 mm
	Width	2000 mm
	Height	1420 mm
	Weight	475 kg
	Width of blade	1220 mm
	Width of shaker conveyer	1580 mm
	Length of shaker conveyer	1270 mm
3.	Developed at	College of Agricultural Engineering Punjab Agricultural University Ludhiana, India
4.	Test Results	
	Suitable for	Groundnut
	Work capacity	0.25 ha/hour
5.	Cost	
	Sale Price	Rs 3,000 (US$ 375)
	Operating	Rs 50/ha (US$ 6)

6. General

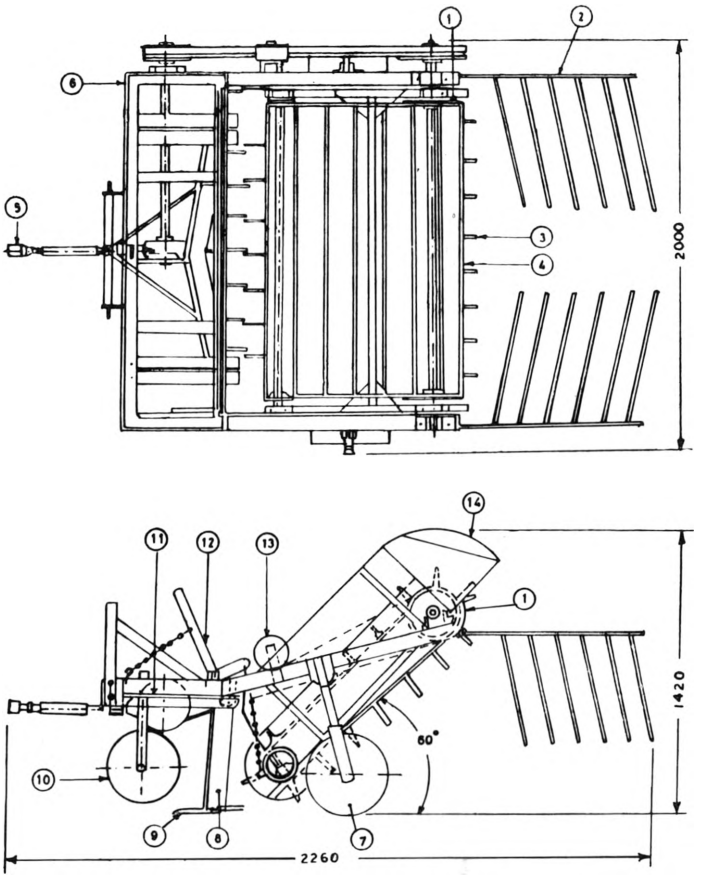
The unit consists of a curved blade, a shaker-conveyor, gear box, standard disc coulters, windrow-deflector rods, fender, ground wheel, frame, rake and power transmission mechanism. It digs the groundnut vines and lifts them, shakes off the soil and delivers them behind in the form of a fluffy windrow. The pods get exposed to the sun for quick drying while leaving a clear passage for the tractor movement for next run. Harvesting of groundnut should be done at proper soil moisture and at right stage of maturity to minimize pod detachment losses. By detaching the shaker conveyor the machine can function as a simple digger. The field efficiency is 80%; recovery of pods is 90-95% (depending upon variety of crop) and detachment of pods is 5-8%.

7. Availability

i) College of Agricultural Engineering
Punjab Agricultural University
Ludhiana, India

ii) M/s Universal Farm Machinery Corp.
Patiala Road, Narwana (JIND), India

iii) M/s Union Forgings
G.T. Road, Sherpur, Ludhiana, India



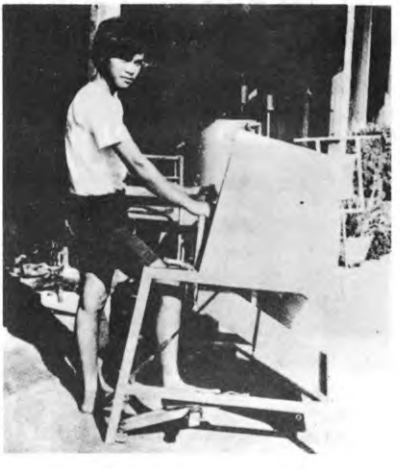
(1) DRIVING SPROCKET
(2) RAKE
(3) SPIKE
(4) REEL
(5) TELESCOPIC SHAFT
(6) FRAME
(7) GAUGE WHEEL
(8) STANDARD
(9) BLADE
(10) COULTER
(11) GEAR BOX
(12) LEVER TO ADJUST FRONT END OF CONVEYER
(13) BELT TIGHTNER
(15) FENDER

GROUNDNUT DIGGER – SHAKER WINDROWER

G. THRESHERS

PEDAL THRESHER

1.	Function	Threshing of paddy
2.	Specifications	
	Make	Biro Teknik Djupri
	Type	Pedal
	Power	Manual – two persons
	Length	800 mm
	Width	600 mm
	Height	115 mm
	Weight	15 kg
3.	Developed at	Biro Teknik Djupri J1. Ronowarsito Solo, Indonesia
4.	Test Results	
	Suitable for	Paddy
	Work capacity	100 kg/hour
5.	Cost	
	Sale Price	–
	Operating	–
6.	General	
	Manually-operated with foot pedal	
7.	Availabity	
	As in (3) above	



DRUM THRESHER

1. Function — Threshing of paddy

2. Specifications

Make	C.V. MUSUHAMA
Type	Drum
Power	Manual – one person
Length	650 mm
Width	500 mm
Height	800 mm
Weight	160 kg

3. Developed at — IRRI – C.V. Musuhama
J1. Raya Majen No. 248
Tala, Java, Indonesia

4. Test Results

Suitable for	Paddy
Work capacity	60 kg/hour

5. Cost

Sale Price	–
Operating	–

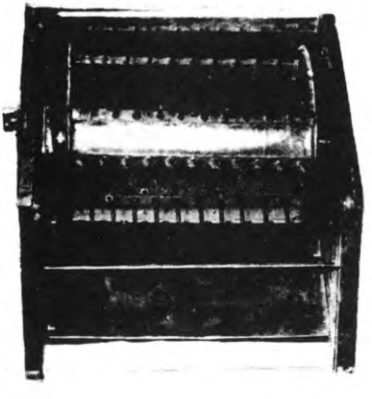
6. General

Manually-operated. The material used in its construction are steel sheet, angle, cast iron.

7. Availability

As in (3) above

DRUM THRESHER



BICYCLE PEDAL THRESHER

1. Function — For threshing grains

2. Specifications

Make	M.I.D.C.
Type	Manually-operated
Power	Manual – three persons are required
Length	1150 mm
Width	1150 mm
Height	850 mm
Weight	38 kg

3. Developed at — Metal Industry Development Centre
J1 Sangkariang
Bandung, Indonesia

4. Test Results

Suitable for	Rice and other cereals
Work capacity	80 kg/hour

5. Cost

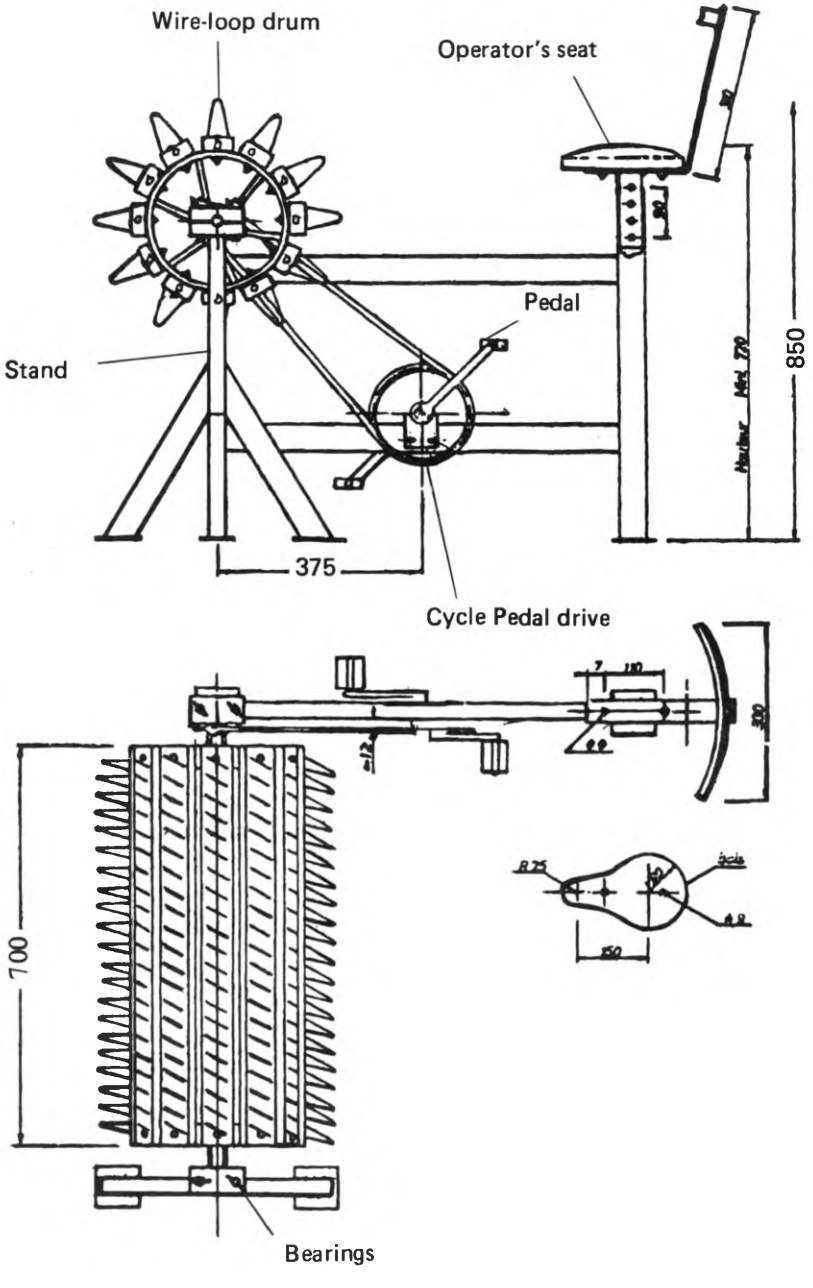
Sale Price	–
Operating	–

6. General

The pedal operates as in bicycle at a speed of about 65 RPM and drives the drum. The components are made of wood and steel.

7. Availability

As in (3) above



BICYCLE PEDAL THRESHER

PEDAL THRESHER

1. Function — Threshing paddy

2. Specifications

Make	Japanese
Type	Manually-operated – pedal – loop drum
Power	Three men
Length	750 mm
Width	750 mm
Weight	56 lbs

3. Developed at — Japan, and now manufactured in Implements Factory, Welisara, Sri Lanka

4. Test Results

Suitable for	Paddy and sorghum
Work capacity	50 kg/hour
Threshing efficiency	98%
Grain damage	0.5%

5. Cost

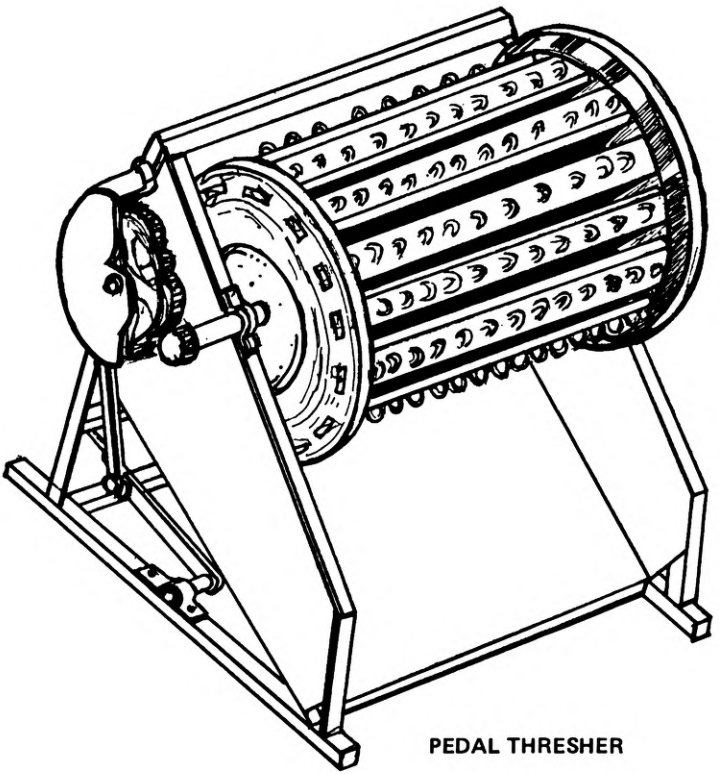
Sale Price	Rs 1000 (US$70)
Operating	Rs 5/100 kg (US$0.4)

6. General

One or two men operate the foot pedal which rotates the drum. Sheaves of paddy are held with the ear-heads against the drum. The wire loops remove the grain from the sheaves and it is then collected in a tray in front of the thresher for subsequent cleaning.

7. Availability

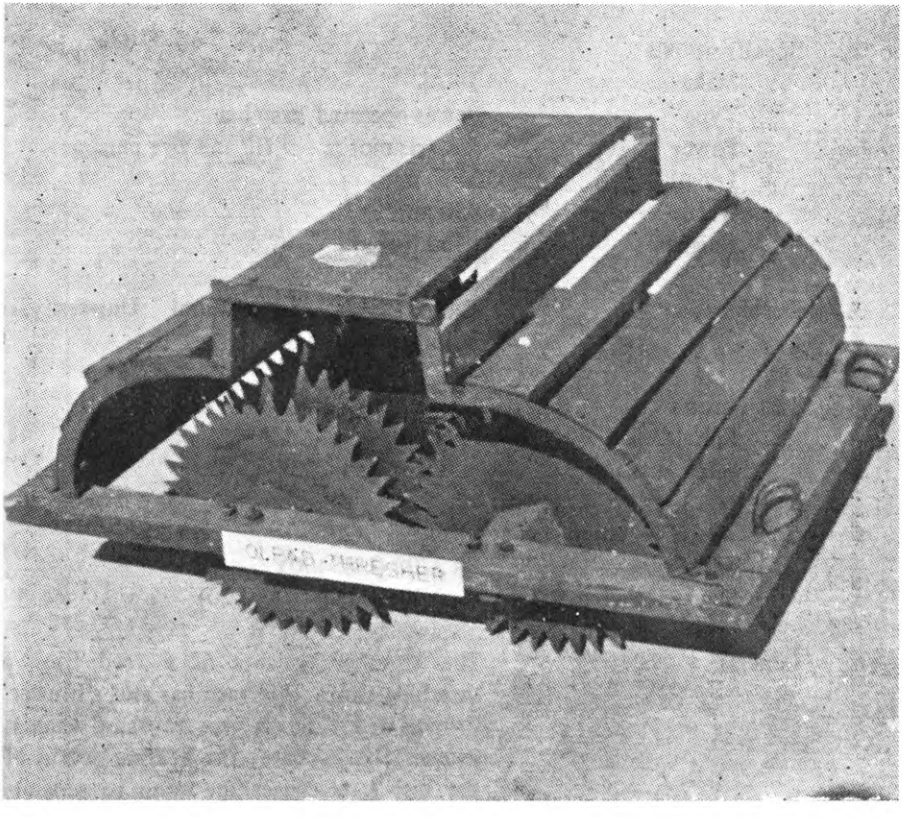
Implements Factory, Welisara, Sri Lanka



PEDAL THRESHER

MINI OLPAD THRESHER

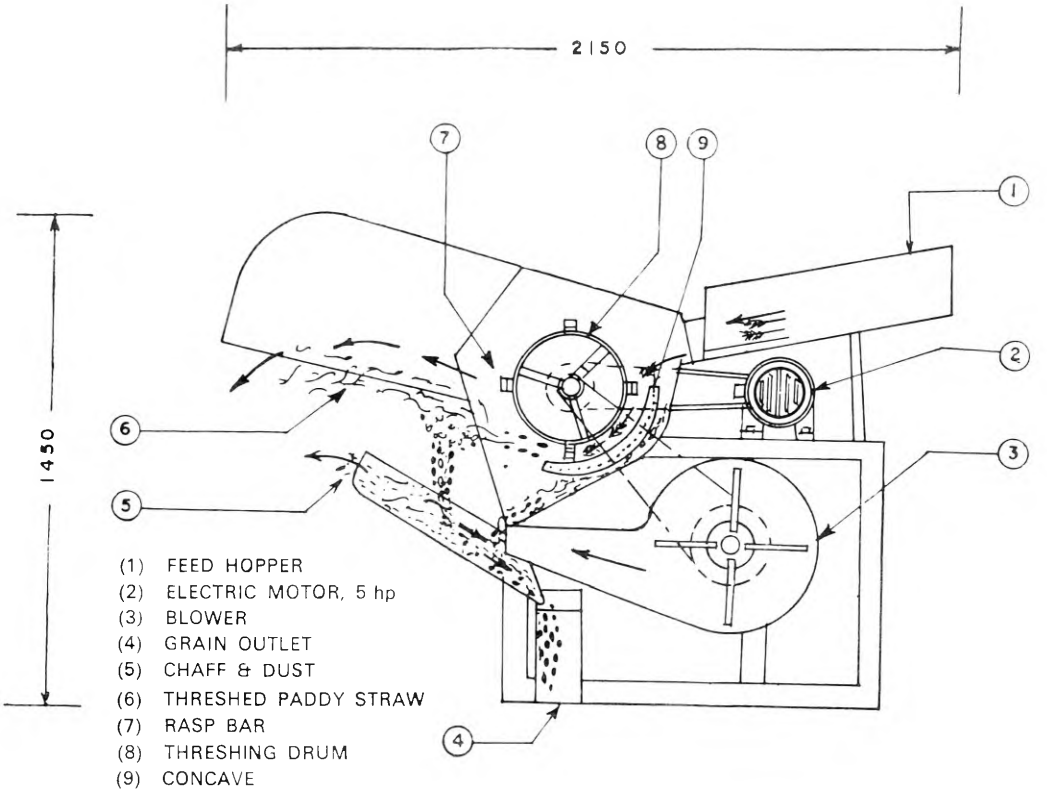
1.	Function	Threshing of cereal crops and bruising into small bits
2.	Specifications	
	Make	GBPUAT
	Type	Animal-drawn, serrated disc, treading
	Power	Animal – one pair of animals and two persons
	Length	1120 mm
	Width	830 mm
	Height	590 mm
	Weight	64 kg
3.	Developed at	College of Technology G.B. Pant University of Agriculture and Technology Pantnagar, India
4.	Test Results	
	Suitable for	Wheat in hill areas
	Work capacity	27 kg/hour
5.	Cost	
	Sale Price	Rs 300 (US$37.50)
	Operating	Rs 12/100 kg (US$1.50)
6.	General	The old design of the olpad thresher has been modified to suit small size bullocks in hill areas. It is a compact unit having 11 notched discs of 380 mm diameter which are mounted on two axles. These axles are fitted on the under-side of a wooden frame in bush bearings. On the upper side, a protective slotted wooden cover and a seat are provided. The crop is spread over the threshing floor and the thresher is pulled over it by means of a pair of bullocks. The capacity of thresher is almost double as compared to ordinary bullock treading. A good quality straw is made without any damage to grains by using this thresher.
7.	Availability	As in (3) above



MINI OLPAD THRESHER

PADDY THRESHER

1.	Function	Threshing of paddy
2.	Specification s	
	Make	TNAU
	Type	Power-operated, rasp bar
	Power	Electric motor – 5 HP and five persons
	Length	2150 mm
	Width	850 mm
	Height	1450 mm
3.	Developed at	Tamil Nadu Agricultural University, Coimbatore, India
4.	Test Results	
	Suitable for	Paddy
	Work capacity	600 kg/hour
5.	Cost	
	Sale Price	Rs 3200 (US$400)
	Operating	Rs 0.70/100 kg (US$0.20)
6.	General	The thresher consists of a feed tray, a threshing drum with rasp bar and a blower. Crop is fed through the tray and when it reaches the concave, the beating action of the rasp bars causes the grain to separate from straw. The mixture of paddy and straw falls below on a sieve and the blower sends a blast of air which separates straw from paddy. Straw is thrown out and cleaned paddy is collected at the bottom. The threshing and winnowing efficiencies of the machine are 99% and 95% respectively.
7.	Availability	As in (3) above



PADDY THRESHER

SOYBEAN THRESHER

1. Function — Threshing and cleaning

2. Specifications

Make	GBPUAT
Type	Power-operated, rasp bar cylinder
Power	Electricity – 15 HP Motor and five persons
Length	5600 mm
Width	1800 mm
Height	2100 mm
Weight	1800 mm

3. Developed at — College of Technology
G.B. Pant University of Agriculture and Technology, Pantnagar, India

4. Test Results

Suitable for	Soybean
Work capacity	800 kg/hour

5. Cost

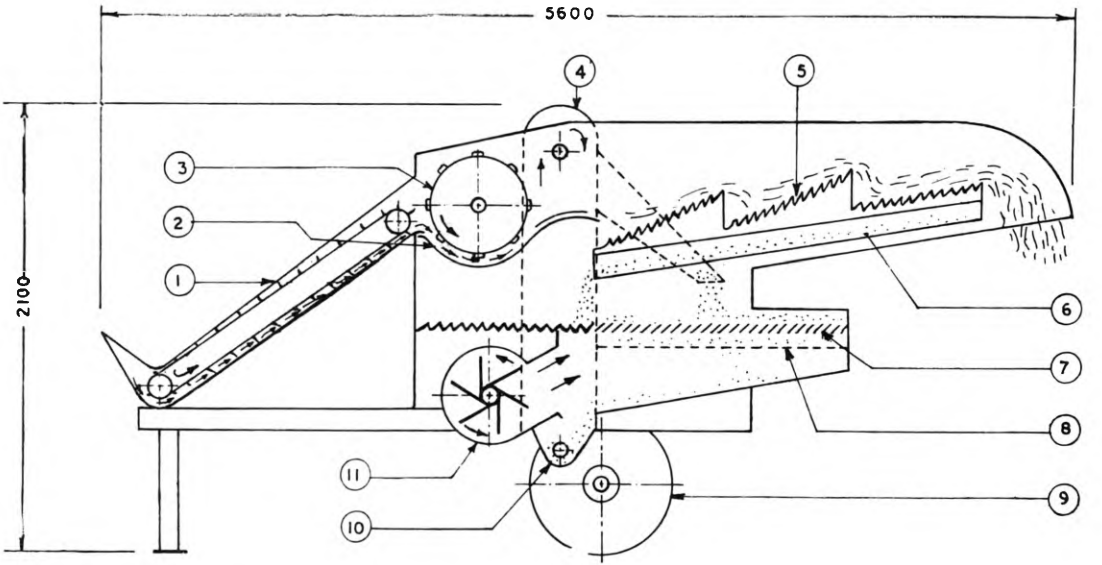
Sale Price	Rs 9000 (US$1125)
Operating	Rs 4/100 kg (US$0.50)

6. General

The thresher consists of a feed conveyor, rasp bar cylinder, open concave, straw walker, sieves, blower and grain elevator. Variable speed pulleys have been provided to adjust the cylinder speed as and when required. A clutch has been provided to engage or disengage the power from motor. The crops, fed on the feed conveyer manually at a uniform rate, is conveyed to the cylinder and concave assembly, where it is threshed. Most of the grains are dropped on the grain sieve assembly through open concave while some grains pass under cover of broken trash on to the straw walker. Threshed grains are separated from the chaff by means of two sieves and air blast from the blower. The elevator lifts the grain from the grain pan and delivers it to the bag, attached with the outlet of the elevator at an appropriate height.

7. Availability

As in (3) above



(1) FEEDER CONVEYER
(2) CONCAVE
(3) CYLINDER
(4) CLEAN GRAIN ELEVATOR
(5) STRAW WALKER
(6) GRAIN RETURN PANS
(7) CHAFFER SIEVE
(8) CLEANING SIEVE
(9) WHEEL
(10) CLEAN GRAIN AUGER
(11) BLOWER

SOYBEAN THRESHER

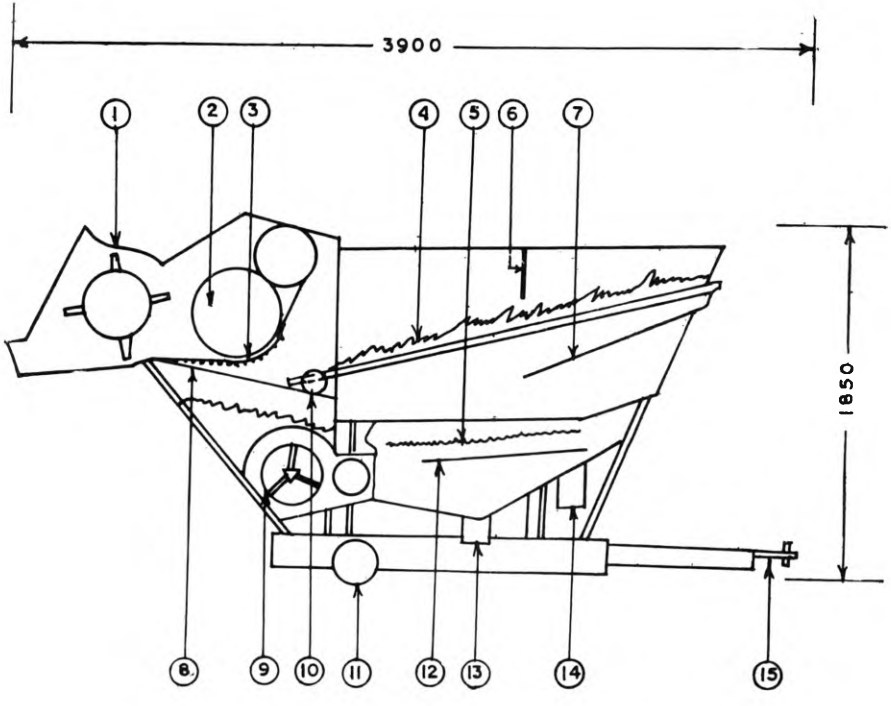
MULTI CROP THRESHER

1.	Function	Threshing, separation and cleaning
2.	Specifications	
	Make	PAU
	Type	Tractor-operated, rasp bar cylinder
	Power	Tractor – 13 kw (with straw bruising attachment) 5 kw (without straw bruising attachment and six persons)
	Length	3900 mm
	Width	1225 mm
	Height	1850 mm
	Weight	750 kg
	Optimum peripheral speed	20–30 metre/sec
3.	Developed at	College of Agricultural Engineering Punjab Agricultural University, Ludhiana, India
4.	Test Results	
	Suitable for	Wheat, paddy, maize and pulses
	Work capacity	Wheat, paddy: 800 kg/hour Maize with husk: 2500 kg/hour Dehusked maize: 3000 kg/hour
5.	Cost	
	Sale Price	Rs 8,000 (US $1000) - without straw bruiser Rs 11,000 (US $1375) - with straw bruiser
	Operating	Rs 5/100kg (US$0.62)

6. General

The machine has an auger beater for feeding, rasp threshing cylinder, straw walker for separation of grain from long straw, chaff box and fan for cleaning. Wheat straw bruising attachment consists of a spike tooth cylinder with counter teeth on concave and aspirator blower for straw disposal. Straw bruising attachment is optional. The crop is fed in between the cylinder and concave assembly where most of the separation takes place through auger-beater feeding mechanism. Threshed materials then move on to straw walker where grain is separated from long straw. Blower cleans the grain which then passes through sieve box and is collected through spout meant for it.

7.	Availability	As in (3) above



(1) AUGER BEATER
(2) THRESHING DRUM OR CYLINDER
(3) CONCAVE
(4) STRAW WALKER
(5) SIEVE BOX
(6) KERNEL CANVAS
(7) RETURN PANS
(8) GRAIN PANS
(9) BLOWER
(10) CRANK SHAFT
(11) SUPPORT WHEEL
(12) CHANGEABLE FLAT SIEVE
(13) SPOUT FOR CLEAN GRAINS
(14) SPOUT FOR TAILINGS
(15) TOW BAR

MULTICROP THRESHER

DOUBLE DRUM THRESHER

1. Function — For threshing and winnowing paddy

2. Specifications

Make	YAMINDO
Type	Power-driven double drum
Power	Engine or electricity, 7 HP and two persons
Length	1665 mm
Width	1218 mm
Height	1290 mm
Weight	169 kg

3. Developed at — P.T. Yamindo, Pandamn, Timur, Indonesia

4. Test Results

Suitable for	Paddy
Work capacity	900 kg/hour

5. Cost

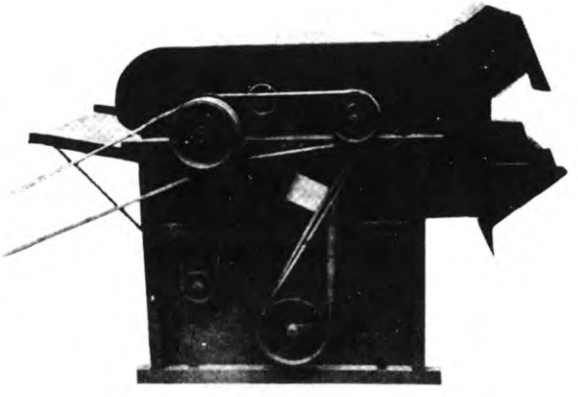
Sale Price	–
Operating	–

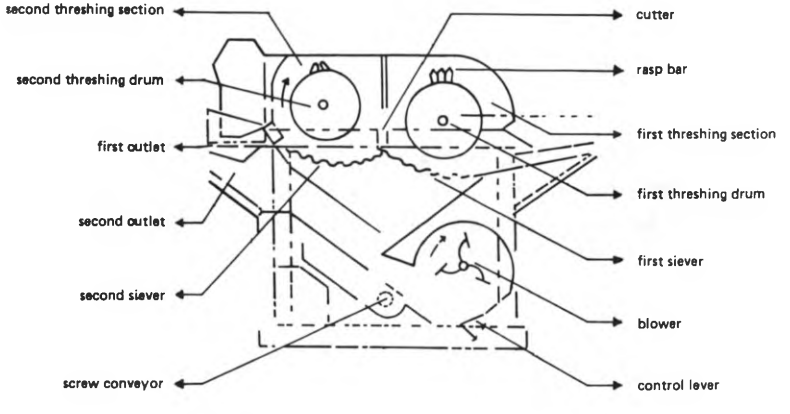
6. General

This thresher uses a rasp-bar cylinder for threshing paddy. It is provided with a blower for cleaning the grain. All the components are made of M.S. sheets and cast iron.

7. Availability

As in (3) above





DOUBLE DRUM THRESHER

POWER THRESHER

1. Function — Threshing

2. Specifications

Make	C.V.K.H. Sentosa
Type	Power-driven
Power	Engine 3–5 HP and 2 persons
Length	1510 mm
Width	880 mm
Height	870 mm
Weight	200 kg

3. Developed at — C.V. Karya Hidup Sentosa
Jl. Magelang 144
Jogjakarta, Indonesia

4. Test Results

Suitable for	paddy
Work capacity	400 kg/hour

5. Cost

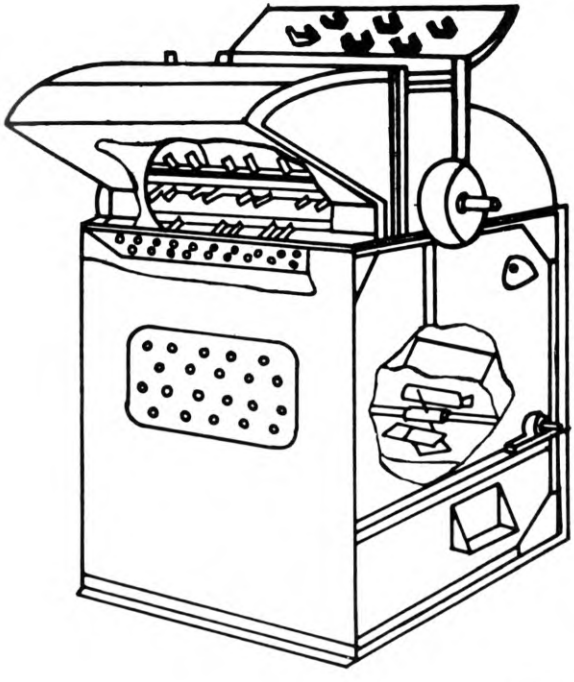
Sale Price	–
Operating	–

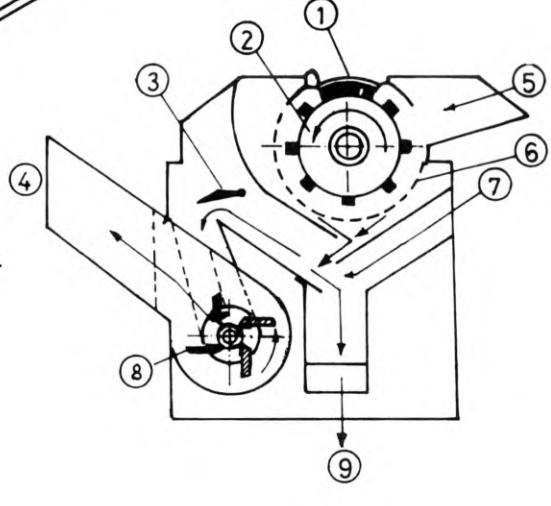
6. General

For threshing all varieties of paddy crops. The separation of paddy from the mixture of paddy is achieved by suction blower and straw is blown out and clean paddy is collected at the bottom.

7. Availability

As in (3) above



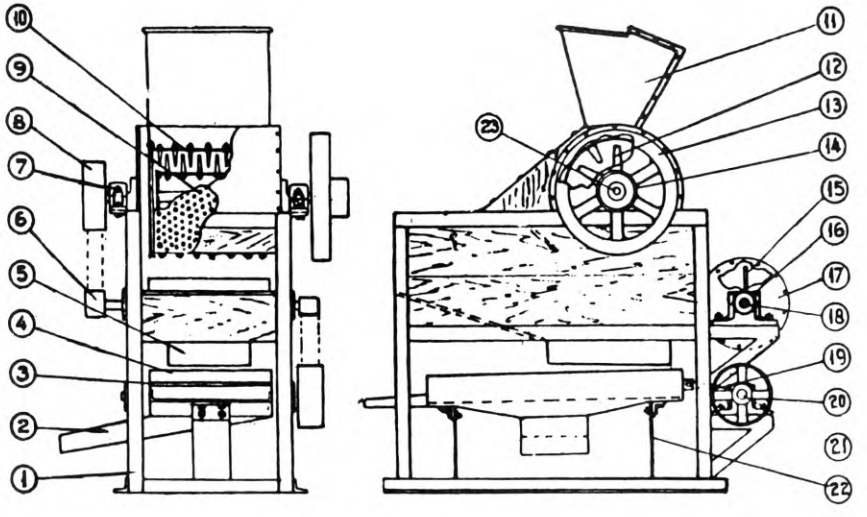


1. Cover and Fixed Raspbar.
2. Threshing Drum and Raspbar.
3. Valve
4. Straw out let.
5. Inlet hopper
6. Siever
7. Air hole
8. Blower
9. Grain outlet

POWER THRESHER

POWER THRESHER

1.	Function	Threshing paddy
2.	Specifications	
	Make	LAKSANA
	Type	Power-driven
	Power	Electric – 4 HP and two persons
	Length	3300 mm
	Width	880 mm
	Height	1470 mm
	Weight	225 kg
3.	Developed at	P.T. Kerta LAKSANA Jl. Jenderal Sudirman 504 Bandung, Indonesia
4.	Test Results	
	Suitable for	Paddy
	Work capacity	400 – 500 kg/hour
5.	Cost	
	Sale Price	–
	Operating	–
6.	General	It consists of a threshing drum with spike-tooth, a fan, a swinging sieve for separating paddy from straw. Drum speed is 700 – 800 rpm.
7.	Availability	As in (3) above



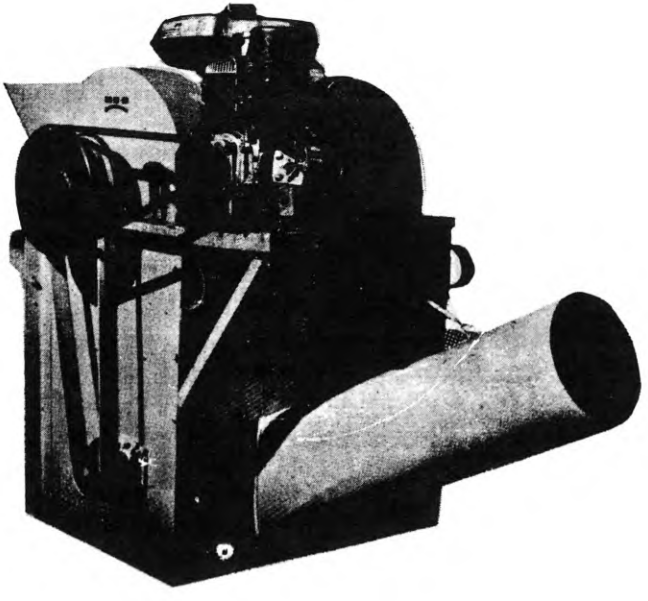
1. Frame
2. Otlet Hopper
3. Siever
4. Siever Frame
5. Drain Tube
6. Pulley
7. Ball Bearing
8. Pulley
9. Sifter
10. Stator Spike Tooth
11. Feed Hopper.
12. Rotor Spike Tooth
13. Fly wheel
14. Pulley
15. Fan
16. Pulley
17. Fan Casing
18. Fan Shaft
19. Driven Shaft
20. Pulley
21. Shaft
22. Siever Column
23. Shaft

POWER - THRESHER

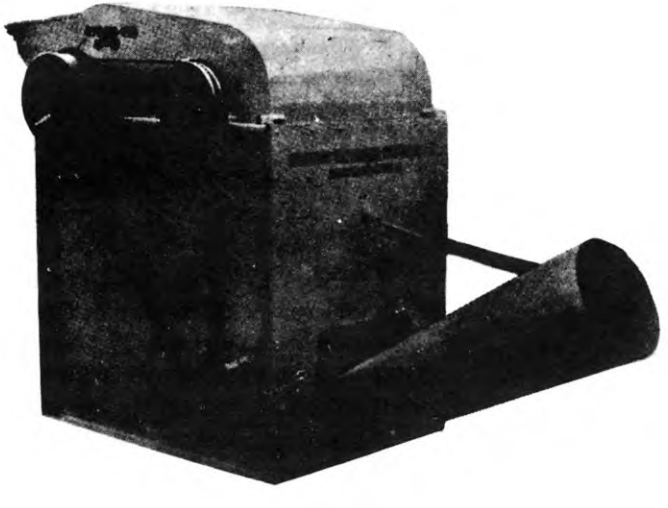
THRESHER SUPER TYPE

1.	Function	Threshing
2.	Specifications	
	Make	P.T. AGRINDO
	Type	AR1000 A/AR 500 A
	Power	Diesel Engine 8-10 HP and two persons
	Length	1865 mm/1410 mm
	Width	840 mm/840 mm
	Height	1150 mm/945 mm
	Weight	177.5 kg/113 kg
3.	Developed at	P.T. AGRINDO Desa Bambe Kab. Gresik Jawa – Timur, Indonesia
4.	Test Results	
	Suitable for	Paddy
	Work capacity	1000 kg and 500 kg/hour
5.	Cost	
	Sale Price	–
	Operating	–
6.	General	The thresher consists of two threshing drums with rasp bar, two sieve and a blower. Crop is fed through the tray and when it reaches the fixed rasps, the beating action of the first and second rasp bars cause the grains to separate from straw. The mixture of paddy and straw falls below air which separate straw from paddy.
7.	Availability	As in (3) above

MODEL: AR 1000 A



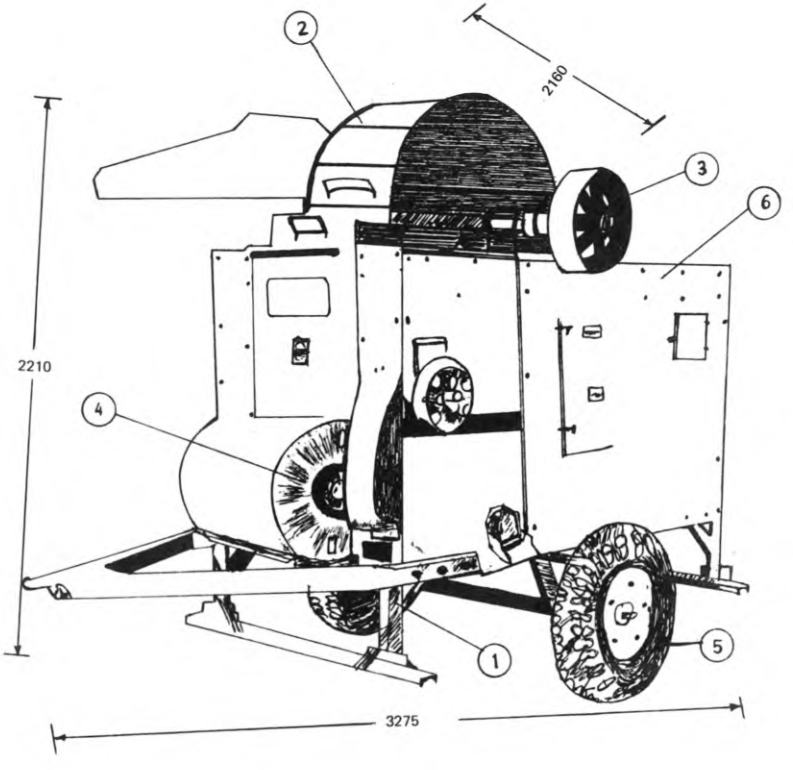
MODEL: AR 500 A



THRESHER SUPER TYPE

WHEAT THRESHER

1.	Function	To thresh and clean the wheat crop
2.	Specifications	
	Make	GHAZI
	Type	Stationary - Hammer type
	Power	Tractor, P.T.O. engine motor – 20 HP and six persons (two persons to feed, two persons to supply, two persons for replacement)
	Length	3275 mm
	Width	2160 mm
	Height	2210 mm
	Weight	1250 mm
3.	Developed at	Agricultural Engineering Workshop Punjab Agricultural College Lyallpur, Pakistan
4.	Test Results	
	Suitable for	Wheat
	Work capacity	700 kg/hour
5.	Cost	
	Sale Price	Rs 13000 (US$1300)
	Operating	Rs 60/hour (US$6/hour) (Rs 86/100 Kg.)
6.	General	The stationary hammer-type wheat threshers are commonly manufactured with 16, 20 and 24 beaters. Two fans are provided to clean wheat grains from cut straw, which is fully used as cattle feed. Feeding of harvested crop is done manually through feeder and wheat is threshed by beating and hammering action of beaters in beater drum. The operating speed is 500 to 600 rpm. Low operating rpm ensures unbroken grain.
7.	Availability	Ghazi Industries Ltd. G.T. Road, Mian Channu Multan, Pakistan

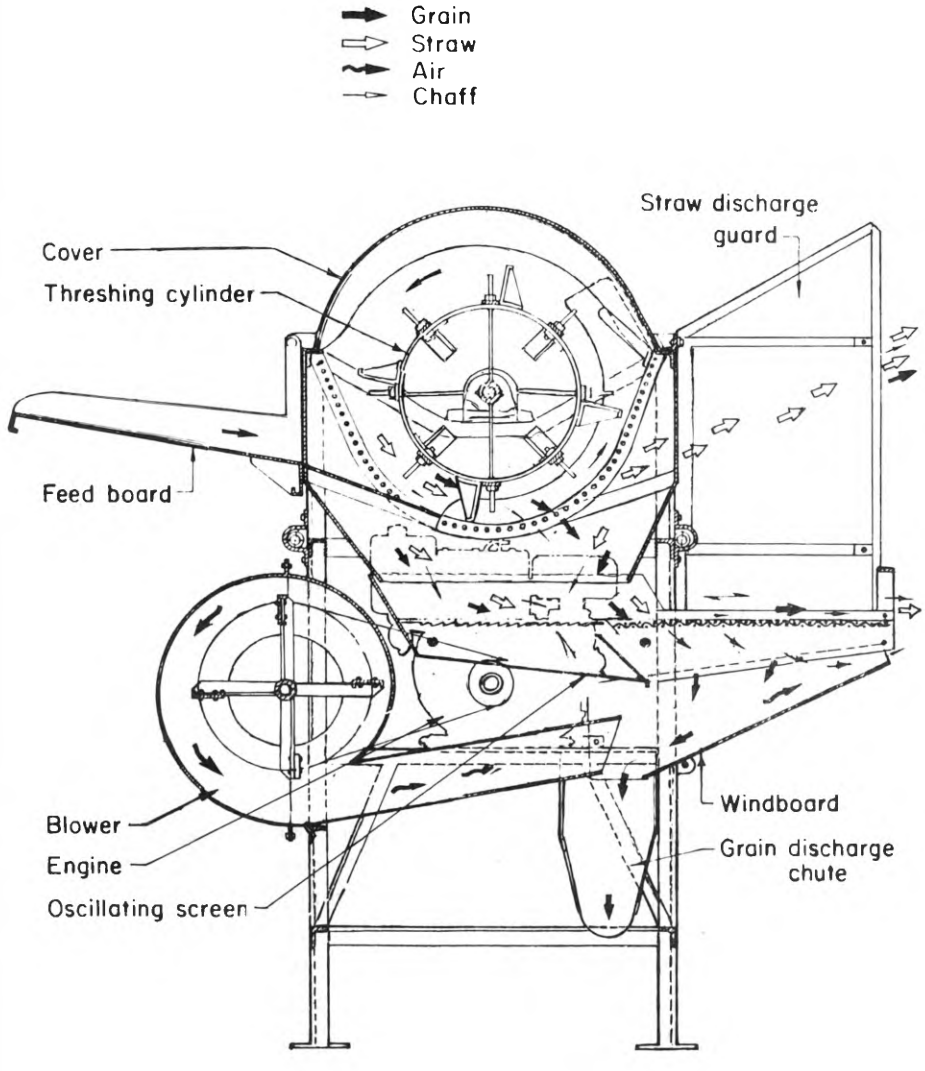


(1) FRAME
(2) COVER
(3) PULLY
(4) FAN
(5) RUBBER WHEEL
(6) BEATER DRUM

WHEAT THRESHER

PORTABLE AXIAL FLOW THRESHER WITH GRAIN CLEANER

1.	Function	Thresh paddy and sorghum
2.	Specifications	
	Make	IRRI
	Type	Throw-in axial-flow thresher with air-screen cleaning
	Power	7 hp engine and three to four men
	Length	1190 mm
	Width	1320 mm (with tray folded)
	Height	1500 mm
	Weight	190 kg (without engine)
3.	Developed at	Agricultural Engineering Department The International Rice Research Institute P.O. Box 933 Manila, Philippines
4.	Test Results	
	Suitable for	Paddy and sorghum
	Work capacity	400-500 kg/hour
5.	Cost	
	Sale Price	P7,800 (US$1,050)
	Operating	P7.50/100 kg (US$1)
6.	General	It is an all-steel construction. The optimum speeds are (i) cylinder 600-650 and fan 800 rpm. The tray is loaded with feeding material and fed into the thresher. The pegs and concave, thresh and convey the material axially until discharged by the straw thrower. The threshed grain passing through the concave is cleaned by the oscillating screen and the winnowing fan. One man feeds, one to two men load the tray and another man to bag the grain.
7.	Availability	As in (3) above



PORTABLE AXIAL FLOW THRESHER WITH GRAIN CLEANER

PORTABLE AXIAL–FLOW THRESHER

1. Function — Thresh paddy and sorghum

2. Specifications

Make	IRRI
Type	Throw-in, axial-flow thresher
Power	5 HP engine
Length	950 mm
Width	760 mm
Height	1380 mm
Weight	105 kg (without engine)

3. Developed at — Agricultural Engineering Department
The International Rice Research Institute
Los Baños, Philippines

4. Test Results

Suitable for	Rice and sorghum
Work capacity	400 kg/hour
Grain purity	85–94% depending on crop conditions
Grain breakage	less 2%

5. Cost

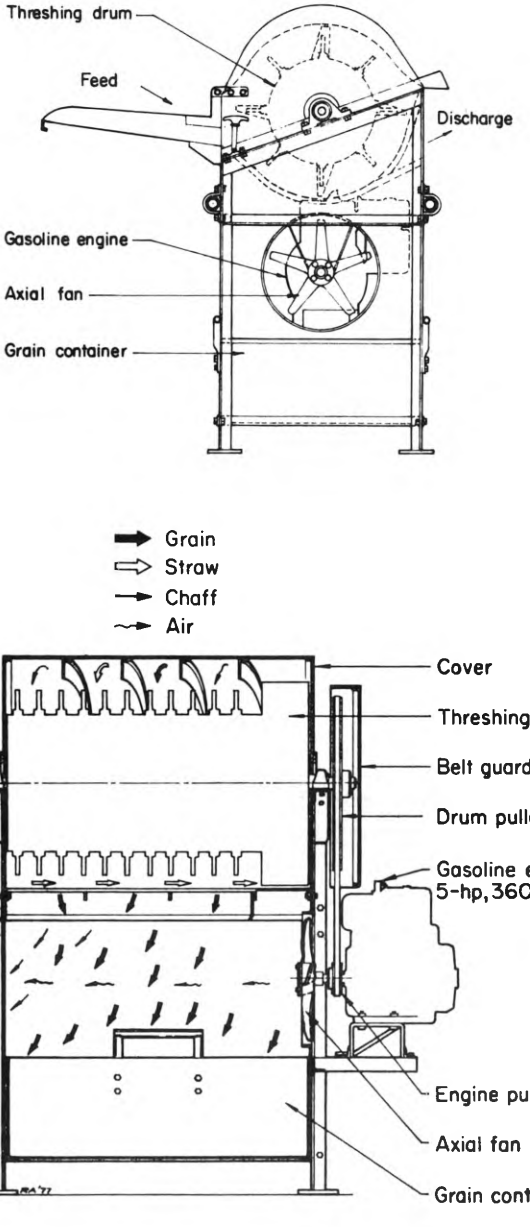
Sale Price	P4,400 (US$590)
Operating	P7.40/100 kg (US$1)

6. General

The thresher is made of steel and consists of a spiketooth cylinder enclosed in a wire mesh or round bar concave below and a cover above. The cylinder speed is 600 rpm. The threshing material is loaded into the tray, fed into the thresher where the pegs hit and thresh the grain. Threshing continues as material is moved axially by the louver and thrown out by the straw thrower. The threshed grain drops through the concave and is cleaned by the winnowing fan. One operator feeds while the other one or two load and bag the grain. When threshing sorghum, all pegs, except at the feedside end are replaced by rubber flaps and a lower layer at round bars are added to the concave.

7. Availability

As in (3) above



PORTABLE AXIAL–FLOW THRESHER

POWER THRESHER

1. Function — Threshing

2. Specifications

Make	Ashtad
Type	T25 S
Power	6 HP engine or tiller
Length	1610 mm
Width	1120 mm
Height	1105 mm
Weight	110 kg

3. Developed at — Ashtad Manufacturing Co., Tehran, Iran

4. Test Results

Suitable for	Wheat, barley, rice, and beans
Work capacity	250 kg/hr

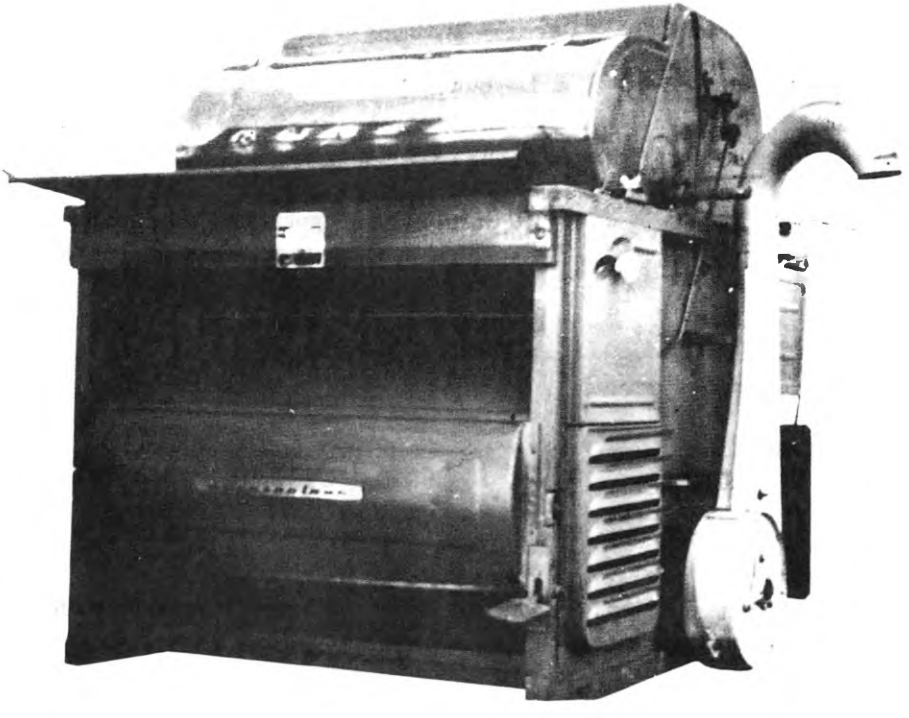
5. Cost

Sale Price	–
Operating	–

6. General

It is the second type made by Ashtad. A blower is provided for lifting grains and bagging. Parts are all made of steel.

7. Availability — As in (3) above



POWER THRESHER

AUTOMATIC THRESHER

1. Function — Threshing and cleaning

2. Specifications

Make	Hae Ryuk Machinery Ind. Co., Ltd.
Type	Horizontal feeding system with cleaner
Power	4 HP engine or power tiller
Length	1310 mm
Width	985 mm
Height	1125 mm
Weight	175 kg

3. Developed at — Institute of Agricultural Engineering and Utilization, Suweon, Republic of Korea

4. Test Results

Suitable for	Paddy and barley
Work capacity	1340 kg/hr.

5. Cost

Sale Price	181800 Won (US$ 380)
Operating	2,635 Won/hr (US$5.50)

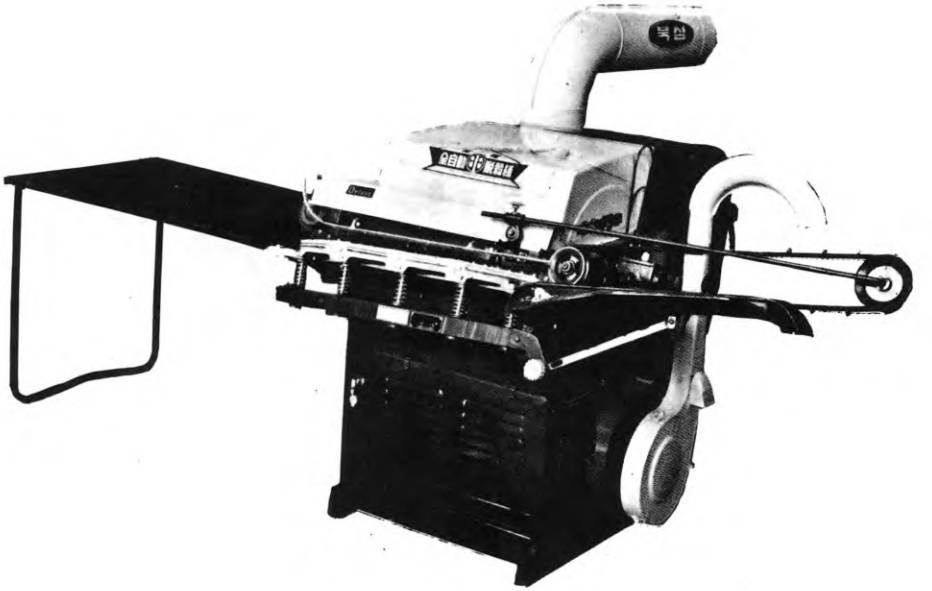
6. General

The machine is suitable for paddy and barley. It provides grain free from impurities.

7. Availability

(i) Institute of Agricultural Engineering and Utilization, Suweon, Republic of Korea.

(ii) Hae Ryuk Machinery Ind. Co., Ltd.



AUTOMATIC THRESHER

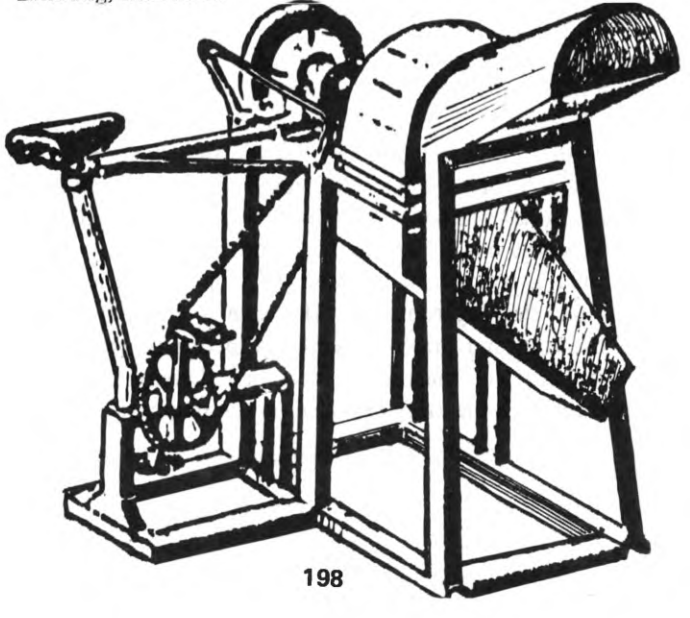
H. PROCESSING MACHINES

CASSAVA SLICER

1. Function — Slicing Cassava
2. Specifications
   - Make — Laksana
   - Type — Foot-operated
   - Power — Manual – one person
   - Length — 1000 mm
   - Width — 570 mm
   - Height — 1300 mm
   - Weight — 80 kgs
3. Developed at — PT Kerta Laksana, Indonesia
4. Test Results
   - Suitable for — Cassava
   - Work capacity — 500 kg/hr
5. Cost
   - Sale Price —
   - Operating cost —
6. General

   The machine consists of rotating sliding knife, operated by sprocket-chain and pedal mechanism as on bicycles. The hopper and slicing chamber are placed over a frame.
7. Available at

   PT Kerta Laksana
   JL Jenderal Sudirman 504
   Bandung, Indonesia



SUGARCANE STRIPPER

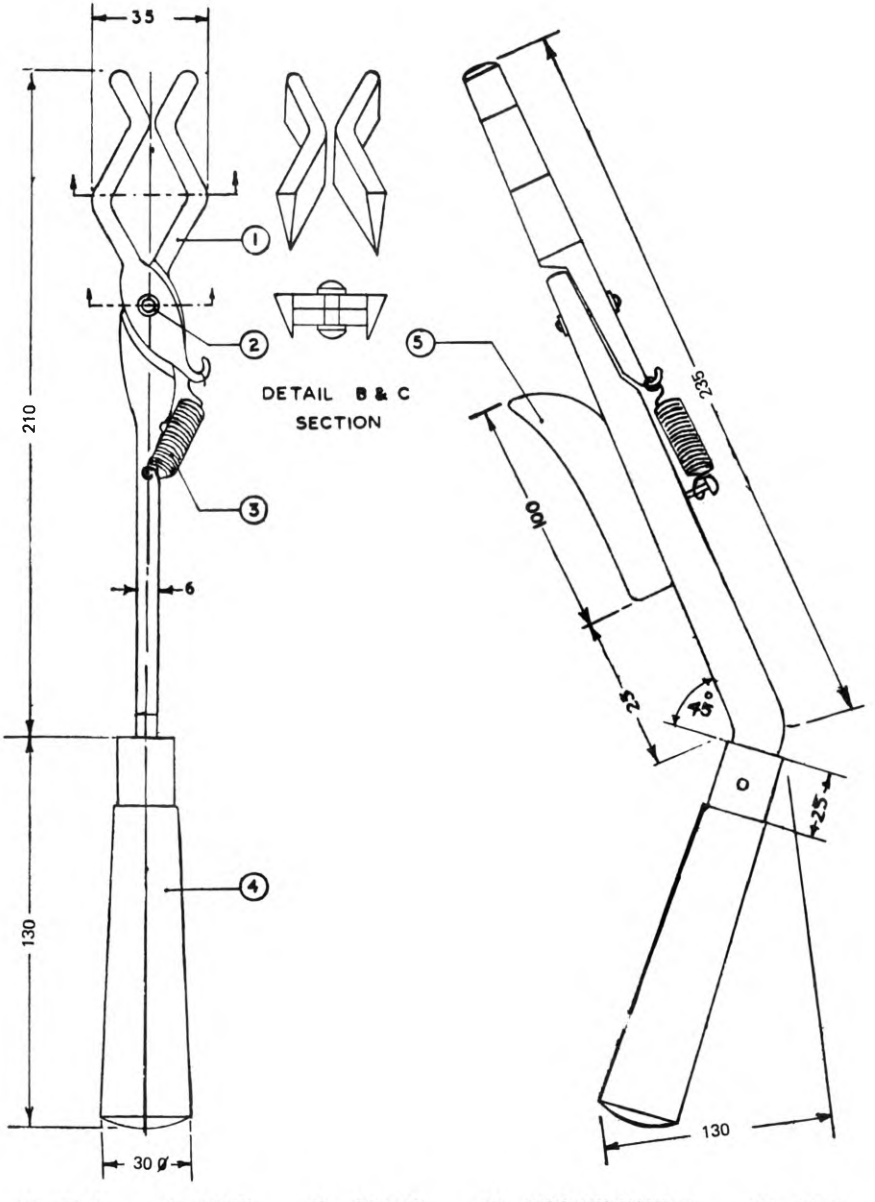
1.	Function	Stripping of dry leaves and detopping of cane after harvest
2.	Significations	
	Make	IISR
	Type	Manually-operated, stripping-cum-detopping
	Power	Manual – two persons, one to operate the stripper and other to help him in holding the cane
	Length	340 mm
	Width	130 mm
	Height	35 mm
	Weight	1 kg
3.	Developed at	Agricultural Engineering Division Indian Institute of Sugarcane Research Lucknow, India
4.	Test Results	
	Suitable for	Sugarcane
	Work capacity	500 canes/hour
5.	Cost	
	Sale Price	Rs 12.50 (US$1.50)
	Operating	Rs 1.50/1000 canes (US$0.20)

6. General

The IISR Sugarcane stripper consists of a pair of tongs, the jaws of which close to form a square and then extend beyond the square to form a "V" in front. One of the two limbs is bent down and provided with a convenient wooden grip. A light tension spring holds the jaws closed. The stripper works not by cutting through the leaf sheaths but by separating them and pushing away from stalk. A knife is welded on the stem of stripper for detopping of canes and for cleaning roots etc. The cane is gripped between the jaws of the tool and drawn downwards in one or two sweeps. All dry leaves and leaf sheaths are detached thereby. The green tops are then cut with the knife provided on the stripper.

7. Availability

As in (3) above



SUGARCANE STRIPPER

GROUNDNUT STRIPPER

1. Function — Removes groundnut pods from the plant

2. Specifications

Make	TNAU
Type	Manually-operated, portable
Power	Manual – one person to operate
Length	170 mm
Width	495 mm
Height	1830 mm
Weight	23 kg

3. Developed at — Tamil Nadu Agricultural University, Coimbatore, India

4. Test Results

Suitable for	Groundnut
Work capacity	20 kg of pods/hour

5. Cost

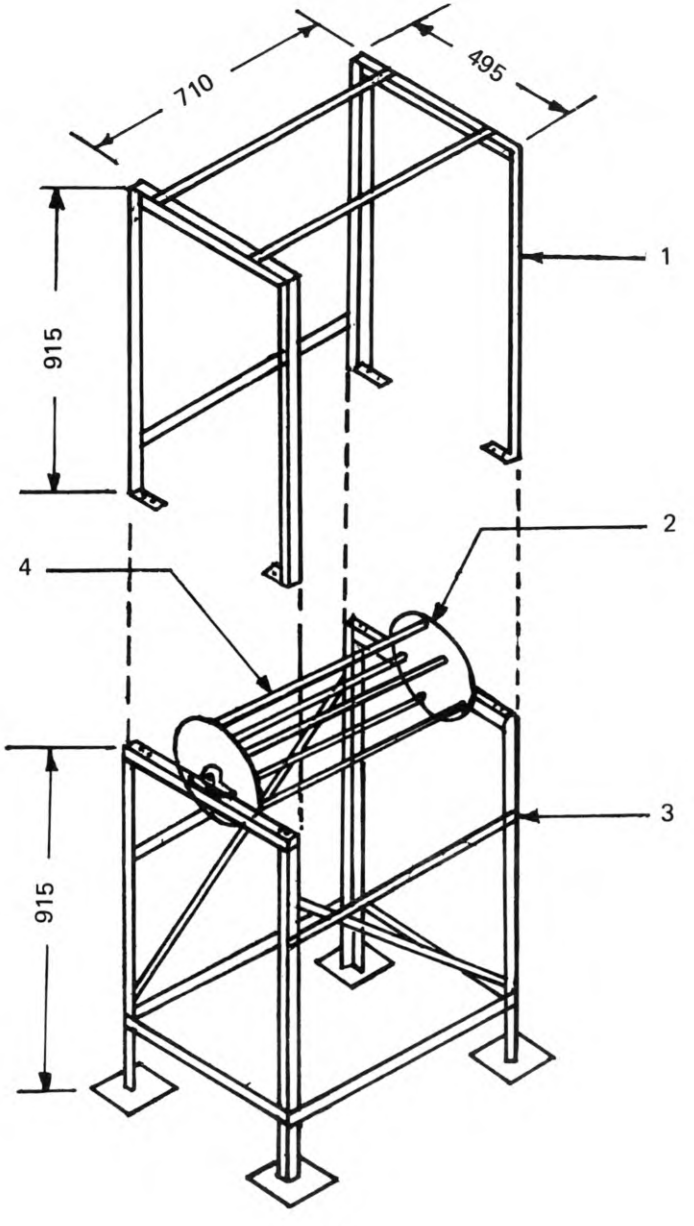
Sale Price	Rs 225 (US$28)
Operating	Rs 5/100 kg of pods (US$0.50)

6. General

It consists of a hollow drum formed by two metal discs at the ends connected on periphery by mild steel rods inserted inside and covered by thick and soft rubber tubes. The drum is mounted on a frame at a height of 915 mm so that the operator can stand and beat the root portion of the handful of plants over the rods of the revolving drum. To avoid scattering of pods, a canvas hood is provided. This unit can be carried and operated by one person.

7. Availability

As in (3) above



(1) HOOD FRAME
(2) REVOLVING DRUM
(3) FRAME
(4) HOLLOW RUBBER TUBES (MILD STEEL ROD INSIDE

GROUNDNUT STRIPPER

GRASS SEED COLLECTOR

1. Function — Collection of ripened grass seeds

2. Specifications

Make	IGFRI
Type	Manually-operated, adjustable height
Power	Manual – one person to operate
Length	1350 mm
Width	1880 mm
Height	1100 mm
Weight	54 kg
Width of coverage	600 mm

3. Developed at — Indian Grassland and Fodder Research Institute, Jhansi, India

4. Test Results

Suitable for	*Sehima nervosum* and *Dichantihium annulatum*
Work capacity	0.05 ha/hour

5. Cost

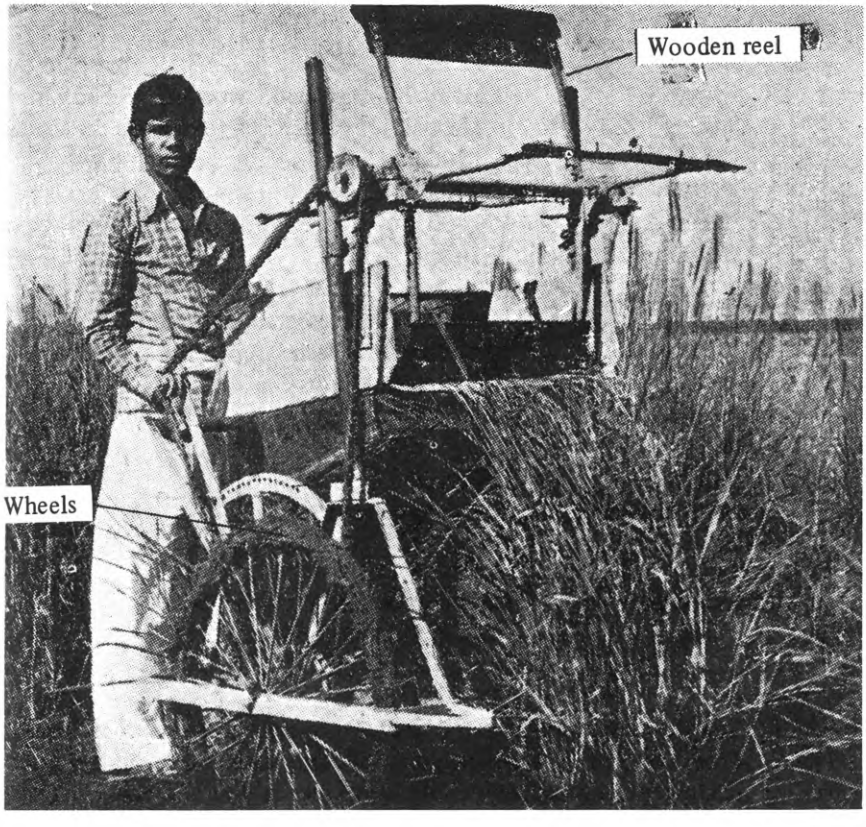
Sale Price	Rs 400 (US$50)
Operating	Rs 20 (US$2.50)

6. General

The machine mainly consists of a frame, wooden reel, ground wheels, seed collection base and handle. Operator takes the machine in the field and adjusts the reel height according to the crop height for proper seed collection. The machine is operated in the grass field and matured seeds are collected with the help of rubber padded reel blades in a box from which it is taken out and then cleaned and stored.

7. Availability

As in (3) above



GRASS SEED COLLECTOR

CASTOR SHELLER

1. Function — Shelling of castor bunches

2. Specifications

Make	APAU
Type	Manually–operated, wooden ribbed drum
Power	Manual – two persons to operate the sheller
Length	1200 mm
Width	920 mm
Height	1400 mm
Weight	70 kg

3. Developed at — Agricultural Research Institute
Andhra Pradesh Agricultural University
Hyderabad, India

4. Test Results

Suitable for	Castor
Work capacity	100 kg of seed/hour

5. Cost

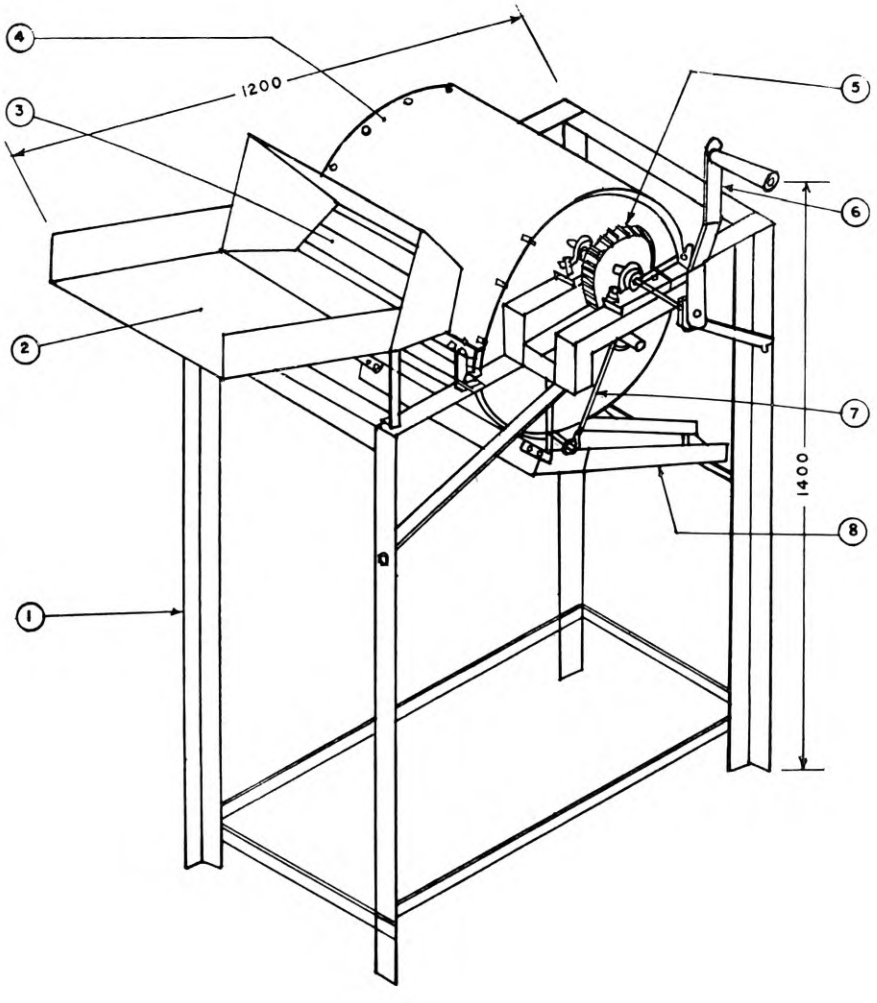
Sale Price	Rs 500 (US$63)
Operating	Rs 3/100 kg (US$0.40)

6. General

The hand operated castor sheller consists of a wooden ribbed drum of 320 mm length and 380 mm diameter cylinder cover, feeding chute, discharge chute, drive mechanism and crank. All the parts are mounted on a frame. Clearance between the drum and concave is adjustable depending upon the size of castor beans. Shelling drum (cylinder) is operated by a crank through a gear unit and its optimum speed is 240 metres per minute. Castor bunch is fed through the feeding chute into the cylinder-concave assembly where it is shelled and discharged through the discharge chute. Manual cleaning is done. A power-operated castor sheller with provisions for cleaning and separation of shelled beans from the chaff has also been developed.

7. Availability

As in (3) above



(1)	FRAME	(5)	DRIVE MECHANISM
(2)	FEEDING CHUTE	(6)	CRANK
(3)	CYLINDER	(7)	CLEARANCE ADJUSTMENT
(4)	CYLINDER COVER	(8)	DISCHARGE CHUTE

CASTOR SHELLER

COTTON DELINTER

1. Function — Delinting of cotton seed

2. Specifications

Make	HAU
Type	Manually - operated, batch type, portable
Power	Manual -two persons to operate the delinter
Length	665 mm
Width	620 mm
Height	1290 mm
Weight	40 kg

3. Developed at — Haryana Agricultural University, Hissar, India

4. Test Results

Suitable for	Cotton
Work capacity	3–6 kg/hour (fuzzy cotton seed depending upon the variety

5. Cost

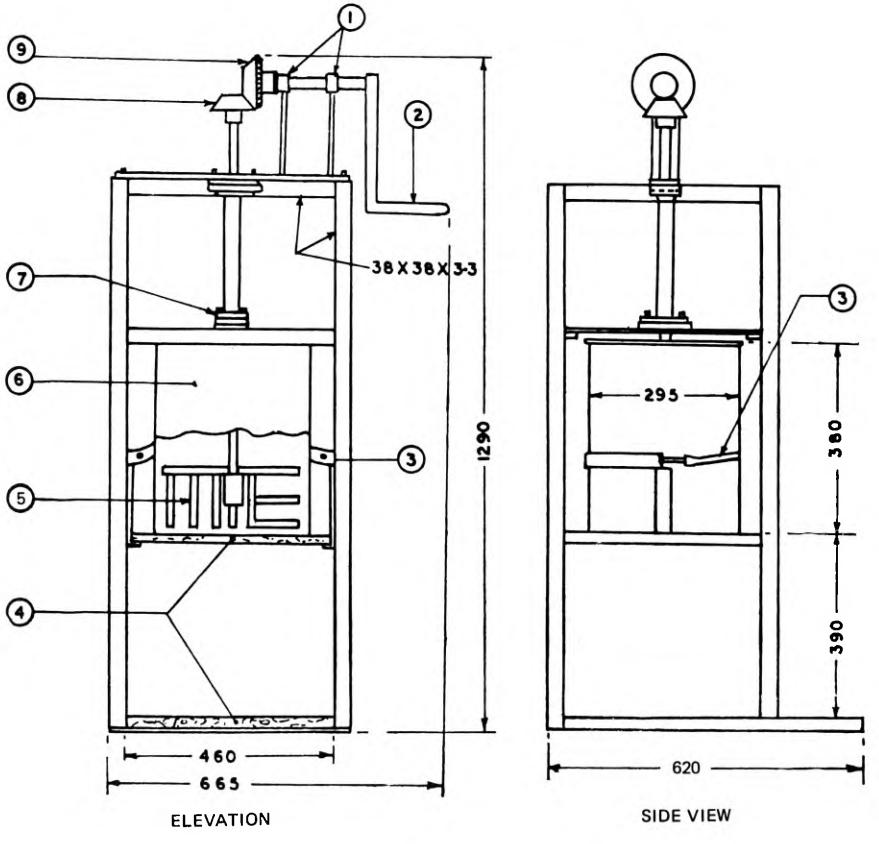
Sale Price	Rs 250 (US$31)
Operating	Rs 75 to 100/60 kg depending upon the varieties (US$9 to 13)

6. General

The unit consists of an enamelled drum (300 mm diameter and 380 mm high) for mixing seed and concentrated sulphuric acid, one agitator and a frame. The enamelled drum is clamped on a wooden platform with the help of a chain. It can be raised or lowered and pushed in or out of the frame as and when required. Agitator consists of mild steel rods fixed on a vertical mild steel shaft (25 mm diameter). The agitator shaft is supported on frame by two 20 mm bearings. A set of bevel gears is provided to operate the machine manually. Each batch of 1.5 kg fuzzy seed requires 6 to 15 min for acid treatment depending upon the variety of seed. The treated seed is thoroughly washed three or four times in clear water and subsequently rinsed in lime solution and dried in sun. A 15 kg batch type acid-delinter has also been developed.

7. Availability

As in (3) above



(1) CRANK BUSH
(2) CRANK HANDLE
(3) CHAIN GRID
(4) WOODEN BOARD
(5) AGITATOR
(6) CONTAINER
(7) BALL BEARING
(8) BEVEL PINION
(9) BEVEL GEAR

COTTON DELINTER

CHAFF CUTTER

1. Function — To cut fodder into bits

2. Specifications

Make	Made by a number of manufacturers
Type	Manually-operated – can be converted for power driven also.
Power	2 men
Length	1200 mm (Flywheel dia)
Width	550 mm
Height	1350 mm
Weight	60 kg

3. Developed at — In production

4. Test Results

Suitable for	All fodder crops, green or dry
Work capacity	30 kg (green fodder) or 15 kg dry/hour

5. Cost

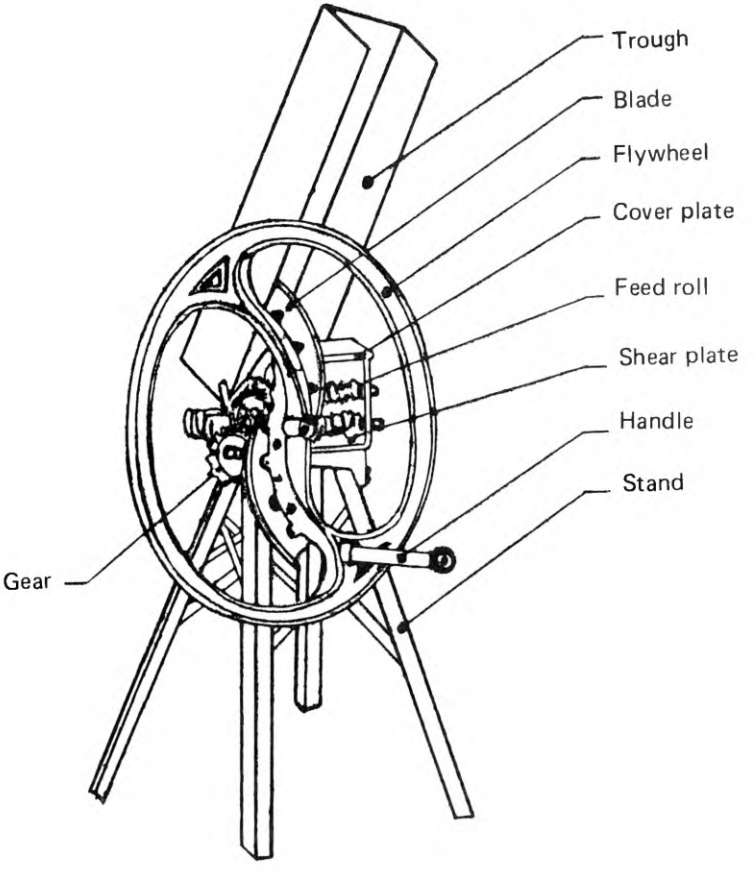
Sale Price	Rs 450 (US$50)
Operating	Rs 8/100 kg (US$1)

6. General

The chaff cutter has a flywheel with curved spokes. Two curved knives are fixed to the spokes. The fodder is moved forward by the two worms provided in the feed hopper. The stationary knife is fitted to the box. By fixing a pulley to the axle near the flywheel, this could be worked on electric power also.

7. Availability

Being produced by a number of manufacturers. For particulars, address to: Director, Central Institute of Agricultural Engineering Bhopal, India



CHAFF CUTTER

PEANUT SHELLER

1. Function — Breaks shells of peanut

2. Specifications

Make	UPLB
Type	Stationary Roller with reciprocating slotted plate
Power	Man: Pedal-operated, two men (one for pedalling and the other for loading and collecting the peanuts
Length	1320 mm
Width	1040 mm
Height	1220 mm
Weight	70 kg

3. Developed at — Institute of Agricultural Engineering and Technology, University of the Philippines at Los Baños, Philippines

4. Test Results

Suitable for	Peanut
Work capacity	40-80 kg/hour

5. Cost

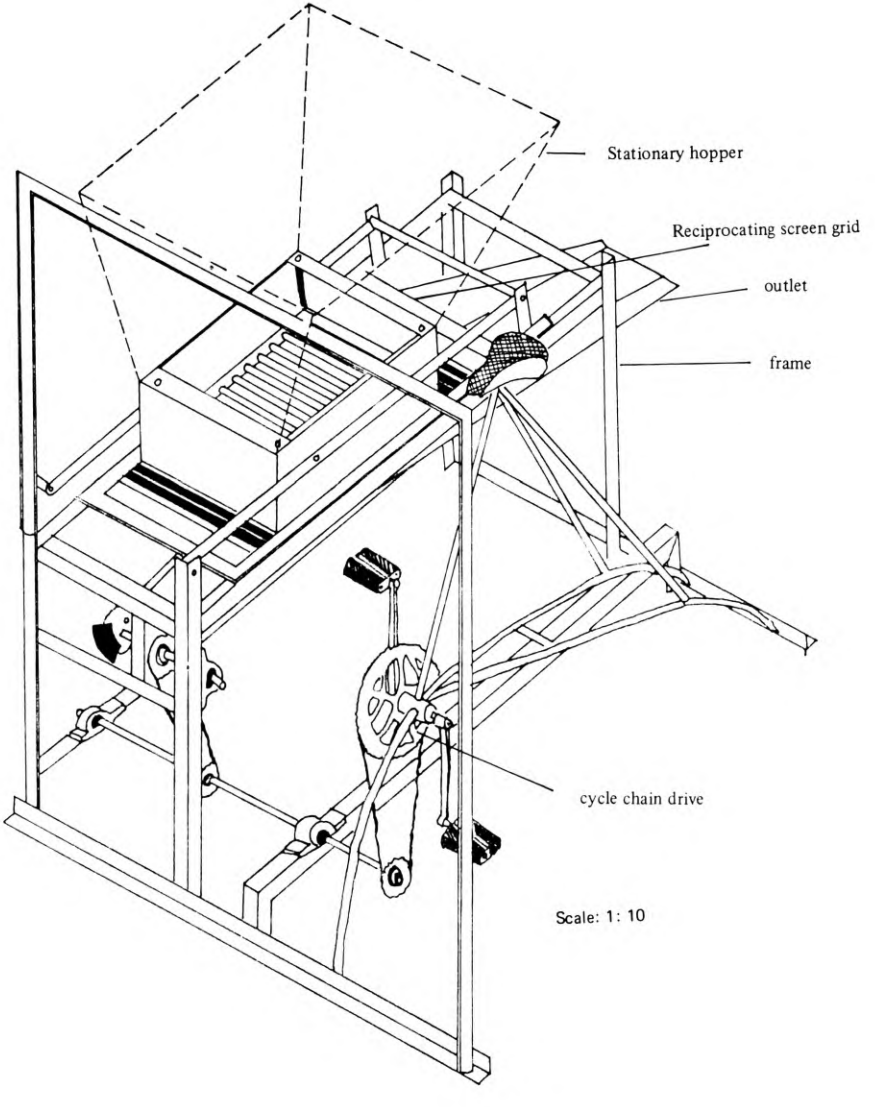
Sale Price	P1,050 (US$150)
Operating	P25/ha (US$3.60)

6. General

The shelling unit consists of a stationary hopper with built-in spring loaded shelling bars and underneath it is a reciprocating slotted screen. Length and width of this are 340 and 240 mm. Shelling is accomplished by the crushing and shearing action among peanuts between the stationary shelling bars and the reciprocating slotted screen grid. The reciprocating grid causes agitation which allows the nuts and the shells to move down through the slotted screen bars thus avoiding excessive shelling. The percent of broken nuts at optimum sheller adjustment is 4–10%.

7. Availability

As in (3) above



UPLB PEANUT SHELLER

CASSAVA CHIPPING MACHINE

1. Function — For cutting the roots into chips from sizes 2 to 6 mm thick and length not exceeding 4 to 5 cm

2. Specifications

Make	BPI
Type	Four bladed rotary plate
Power	Man (foot-pedal)/2.5 HP engine and two men
Length	610 mm
Width	250 mm
Height	1220 mm

3. Developed at — Agricultural Engineering Division, Bureau of Plant Industry, Metro Manila, Philippines

4. Test Results

Suitable for	Could cut peeled and unpeeled fresh cassava
Work capacity	1300 kg/hour when engine driven

5. Cost

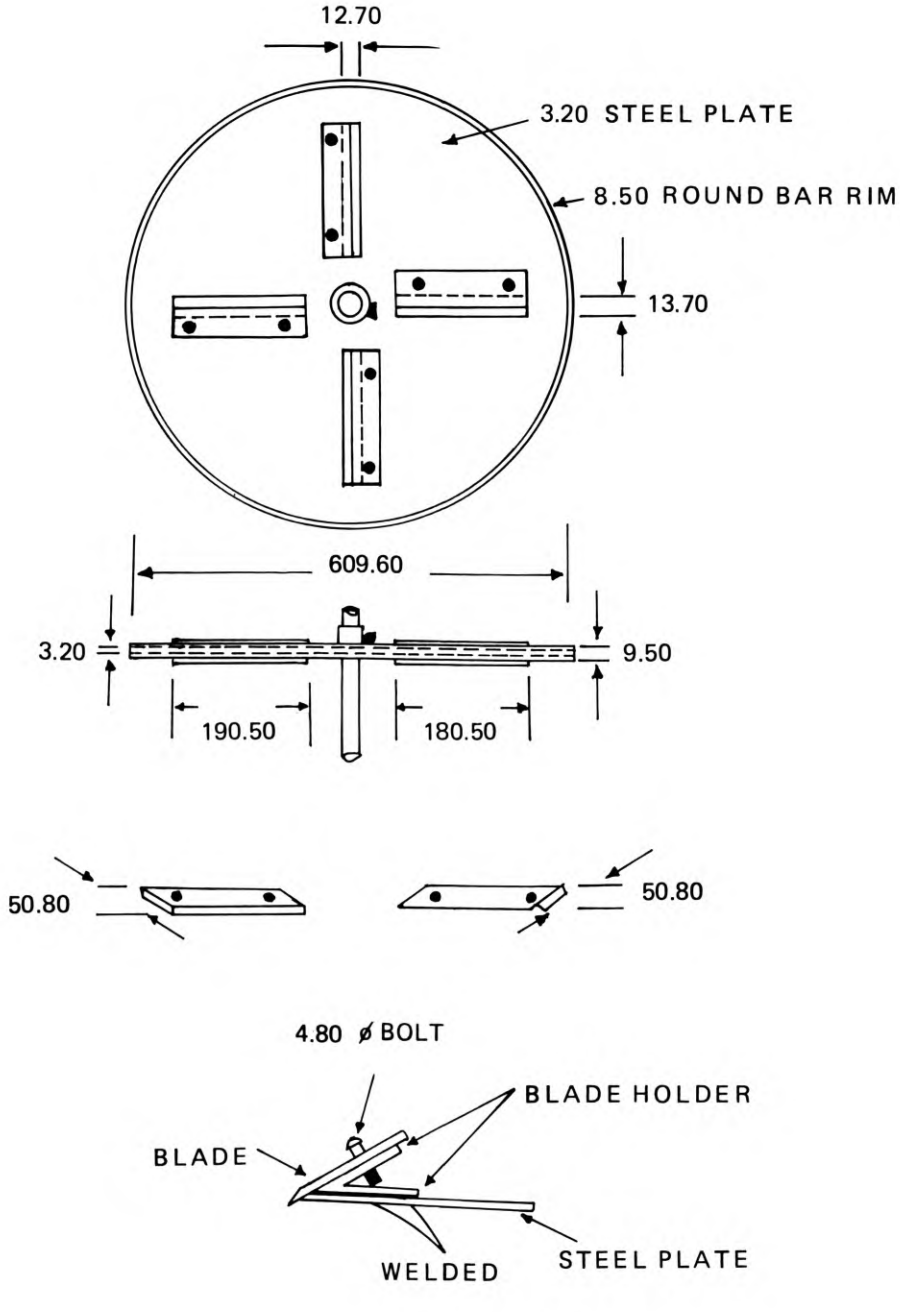
Sale Price	P864 (US$118)
Operating	P0.05 per kg

6. General

The BPI-designed chipper used for cutting the roots into chips from sizes 2-6 mm thick and 50 mm long uses No. 16 G.I. sheets 610 mm in diameter with a 50 mm wide and 630 mm thick flat bar rim on its outer periphery comprising a rotating circular blade to which four blades are attached. A 630 mm wide blade opening is provided to enable the cutting edge to be in contact with cassava roots. Blades could be adjusted at varying depth so that it could cut chips at varying sizes and thickness. The blade is made of 50 x 300 mm tempered steel plate with 1850 mm long cutting edge that protrudes at the blade opening. A rectangular feed trough with 15 degrees inclination faces the half portion of the rotating circular blade. Cassava roots are positioned horizontally on the trough across the blade to be cut into chips. The machine was designed to be operated manually by means of foot-pedal but if bigger output is desired it could be hitched on a 2½ HP engine.

7. Availability

As in (3) above



CASSAVA CHIPPING MACHINE

COFFEE PULPER

1. Function — For pulping fresh coffee seeds

2. Specifications

Make	BPI
Type	Manual – two men for feeding and bagging
Power	Man
Width	38 mm
Height	83 mm

3. Developed at — Agricultural Engineering Division, Bureau of Plant Industry, Metro Manila, Philippines

4. Test Results

Suitable for	Dried coffee seeds even of different sizes
Work capacity	5 kg/hr of dried coffee seeds

5. Cost

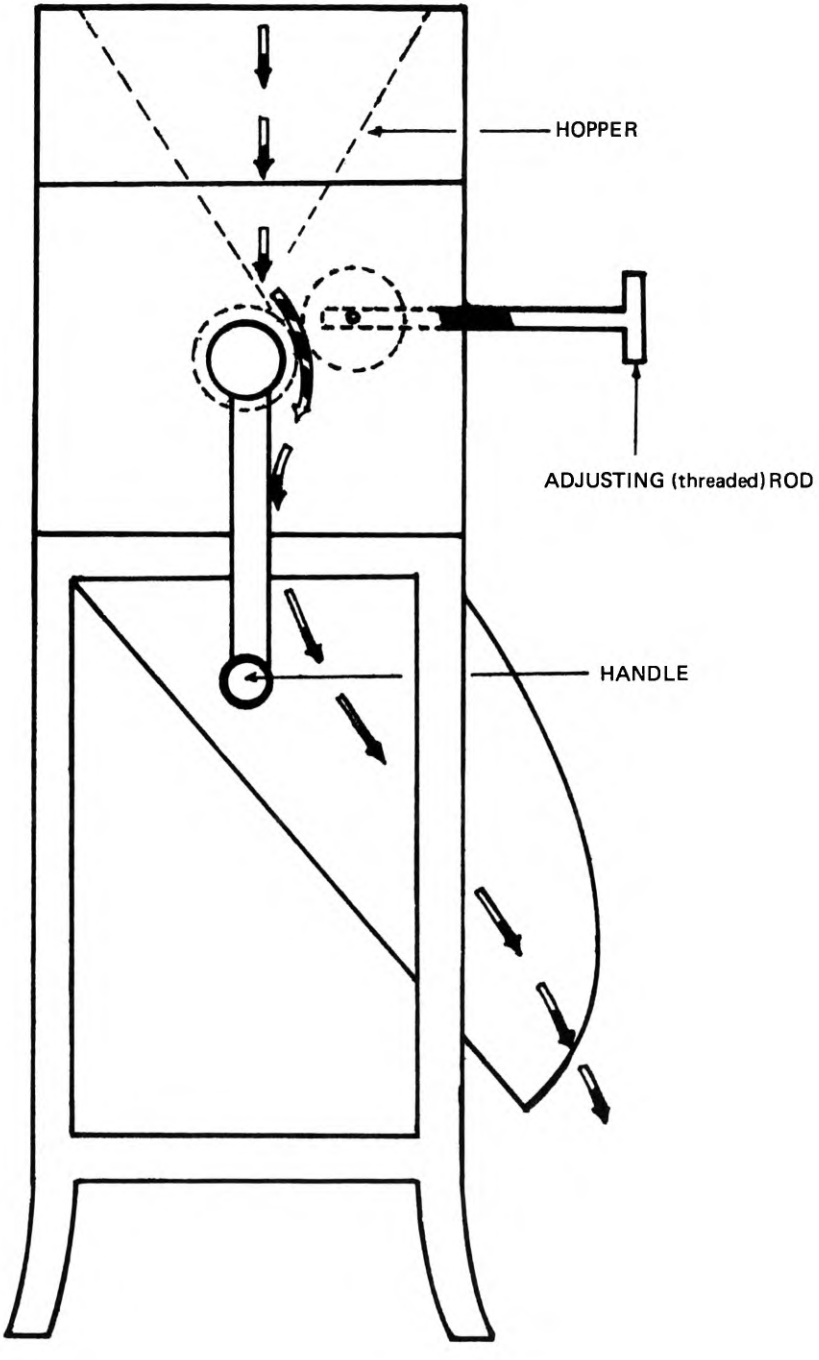
Sale Price	P200 (US$27)
Operating	P0.30 (US$0.05 per kg dried coffee)

6. General

Pulping of coffee seeds is made by feeding coffee seeds into the hopper which then pass through between the blade cylinders. Clearance between the two blade cylinders can be adjusted to facilitate pulping different grades of coffee seeds. Portability and ease in operation are its important features.

7. Availability

As in (3) above



COFFEE PULPER

PEDAL WINNOWER

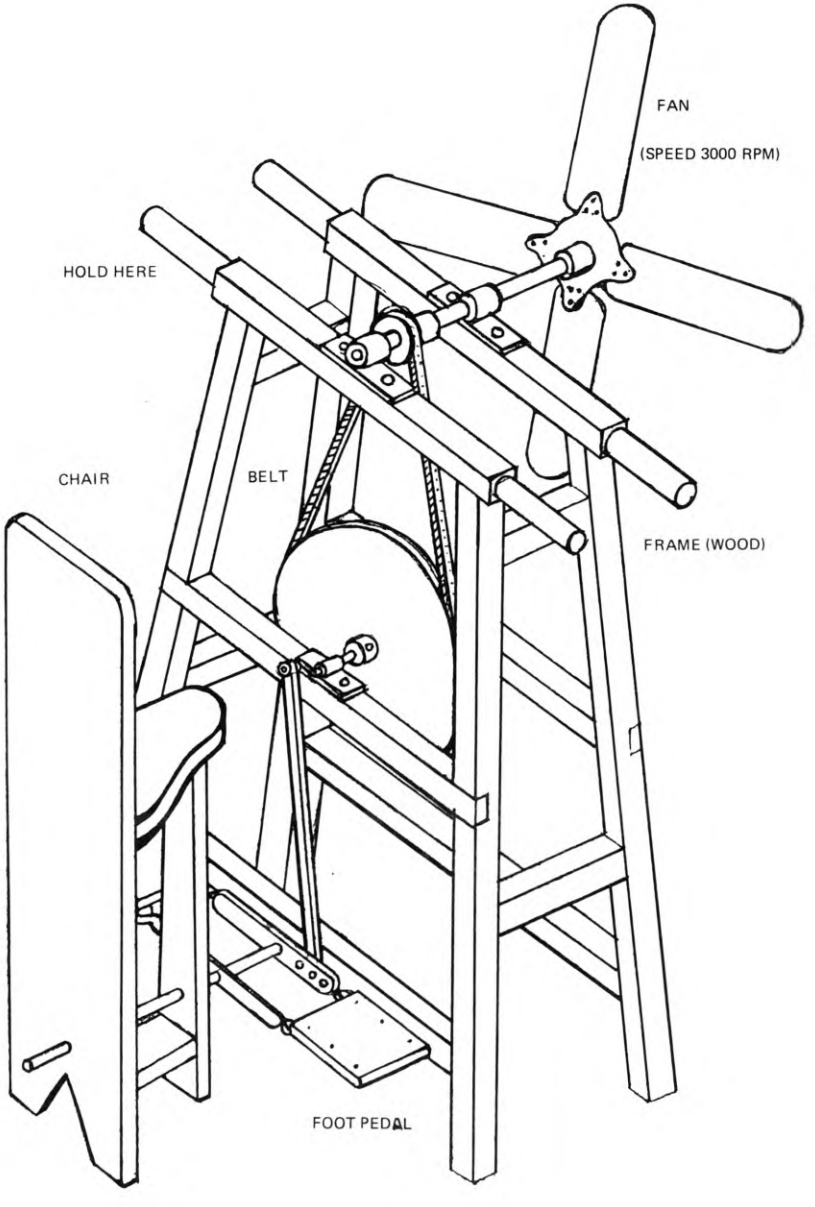
1.	Function	For winnowing and cleaning threshed grain
2.	Specifications	
	Make	FMRC
	Type	Manual pedal-operated
	Power	Manual – two men to operate and two to feed
	Weight	25 kg
3.	Developed at	Farm Machinery Research Centre, Maha Illupallama, Sri Lanka
4.	Test Results	
	Suitable for	grains
	Work capacity	800 kg/hour
5.	Cost	
	Sale Price	Rs 500 (US$34)
	Operating	Rs 1.5/100 kg (US$0.01)

6. General

One man sits and pedals while two others tip the uncleaned paddy into the air stream in the traditional manner. All parts for the winnower can be made or obtained at a local level. The crank wheel drives the pulley on the fan shaft at a higher speed. The grains drop in front of the fan and get separated from the impurities.

7. Availability

Implements Workshop, Welisara, Sri Lanka



PEDAL WINNOWER

HAND–OPERATED WINNOWING MACHINE

1. Function — Winnowing husked rice

2. Specifications

Make	Local manufacturers
Type	Hand-operated winnowing machine
Power	Manual – four persons
Length	1650 mm
Width	838 mm
Height	1423 mm
Weight	80 kg

3. Developed at — Available with all manufacturers

4. Test Results

Operation speed	350 rpm
Wind speed	400-450 m/pm
Cleaning efficiency	90%
Losses	Less than 5%
Capacity	1000 kg/hour

5. Cost

Sale Price	Bht 1,800 (US$90)
Operating	Bht 12/hr (US$0.60)

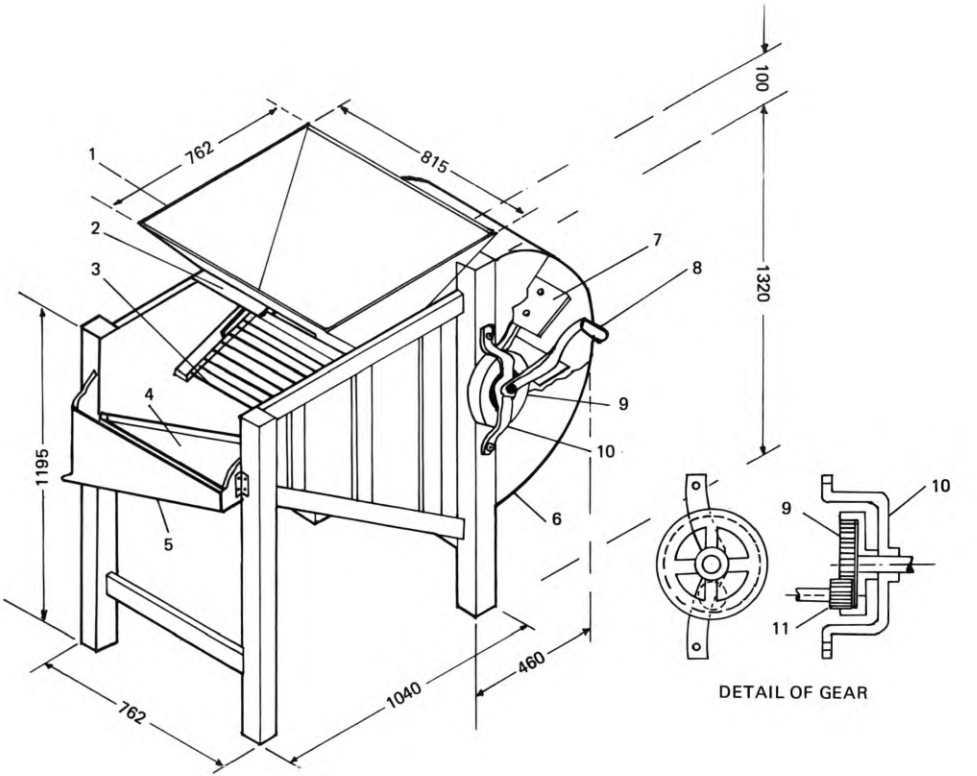
6. General

The hand-operated winnowing machine consists of a wooden blade blower rotated by hand. The blast from this passes through the husked rice which falls down from the feed hopper. The impurities are blown out to the outlet and the clean husked rice falls down through the inclined floor.

7. Availability

Local manufacturers, Thailand

(1) FEED HOPPER
(2) FEED CONTROL
(3) SCREEN
(4) INCLINING FLOOR
(5) IMPURITY GRAIN OUTLET
(6) BLOWER BLADE
(7) BLOWER HOUSING
(8) HANDLE
(9) GEAR
(10) GEAR HOLDER
(11) BLOWER-SHAFT GEAR



HAND–OPERATED WINNOWING MACHINE

MAIZE DEHUSKER

1. Function — Dehusking of maize

2. Specifications

Make	UU
Type	Power-operated, roller
Power	Electricity – 7.5 HP motor and 3 persons
Length	1780 mm
Width	700 mm
Height	1175 mm
Weight	150 kg

3. Developed at — College of Technology and Agricultural Engineering University of Udaipur, Udaipur, India

4. Test Results

Suitable for	Maize
Work capacity	5/100 kg/hour
Dehusking efficiency	95%
Breakage of grain	3–4%

5. Cost

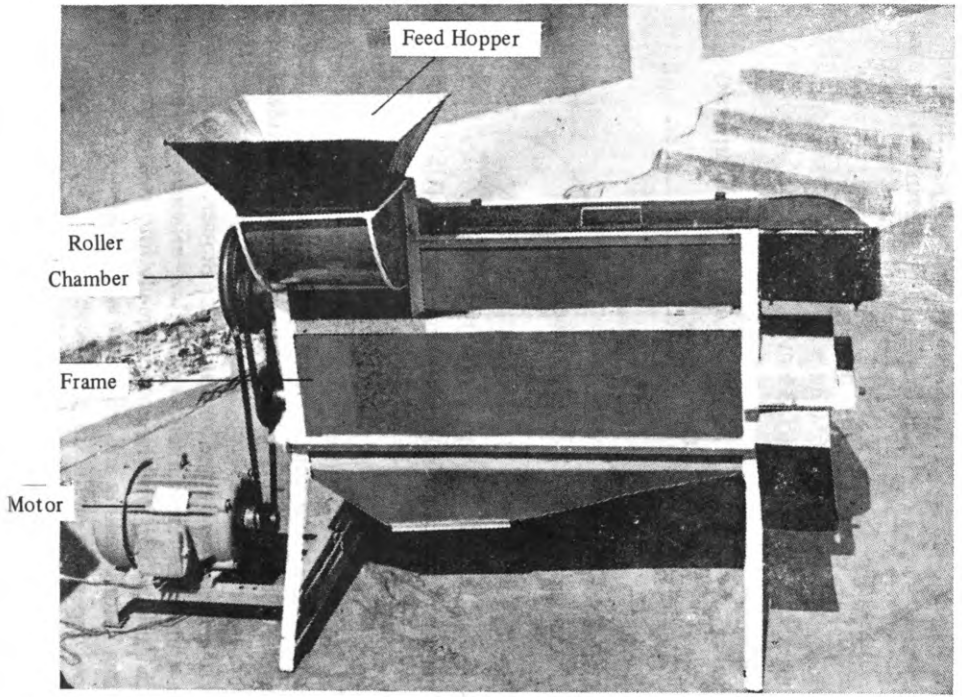
Sale Price	Rs 2000 (US$250)
Operating	Rs 0.80/100 kg (US$0.10)

6. General

The maize cob dehusker consists of a feeding hopper, a dehusking bed, husk discharge unit and a power unit. There is a pair of roller- one of which is rubber and the other is welded mild steel rod made to a spiral form. Also welded over the periphery of the pipe are small spikes of triangular shape to provide a positive hold on the husk. There is a chute at the end of rollers to discharge the dehusked cobs and a husk conveying auger of 185 mm diameter. Below it is a sieve. The cobs fed into the machine where dehusking takes place come in contact with rollers. The dehusked cobs move over rollers and are discharged at the other end. The speed of the roller is 190 m/min. The husk conveying auger removes the husk out of the machine. The shelled grain falls through sieve and is collected at the spout.

7. Availability

As in (3) above



MAIZE DEHUSKER

MAIZE SHELLER

1. Function — Shelling of maize

2. Specifications

Make	TNAU
Type	Power-operated, disc type, continuous
Power	Electric – 1 HP electric motor and one person
Length	1250 mm
Width	650 mm
Height	1370 mm

3. Developed at — Tamil Nadu Agricultural University, Coimbatore, India

4. Test Results

Suitable for	Maize
Work capacity	300 kg kernels/hr

5. Cost

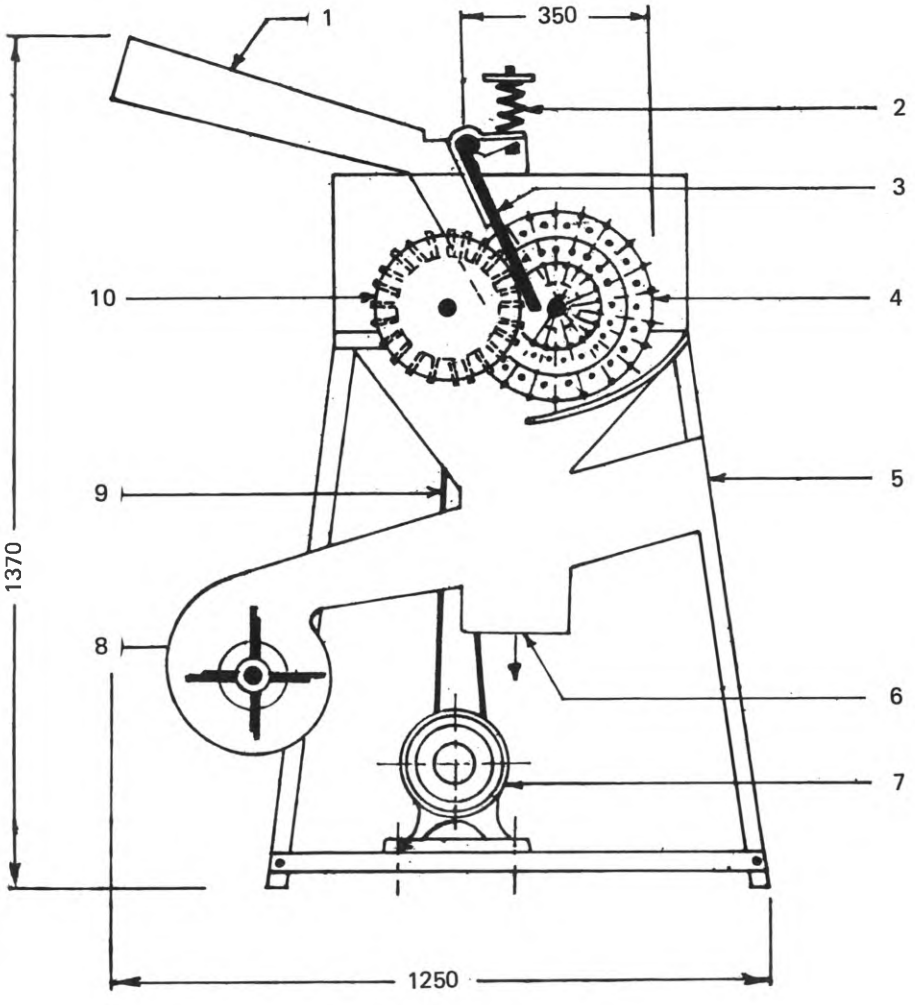
Sale Price	Rs 1600 (US$200)
Operating	Rs 2/100 kg of kernels (US$0.25)

6. General

The maize sheller consists of a feed hopper, a compression spring, a bevel gear fixed adjacent to a shelling disc, which pulls the cobs inside, while a spring-loaded tongue which is provided above the bevel gear holds the cob tight against the shelling disc. Shelling is accomplished by the rotating disc. Blower separates the foreign matters from the kernels. For getting efficient performance it is advisable to sort out the cobs manually into two or three different sizes before shelling and adjust the spring loaded nut to the required level depending on the size of the cobs.

7. Availability

As in (3) above



(1) FEED HOPPER
(2) COMPRESSION SPRING
(3) HOLDING TONGUE
(4) THRESHING DISC
(5) EMPTY COB OUTLET
(6) GRAIN OUTLET
(7) ELECTRIC MOTOR
(8) BLOWER
(9) V BELT DRIVE
(10) BEVEL WHEEL

MAIZE SHELLER

SUNFLOWER SEED SHELLER

1. Function — Shelling

2. Specifications

Make	TNAU
Type	Power-operated, centrifugal
Power	Electric motor – 3 HP electric motor, two persons to operate
Length	2000 mm
Width	1000 mm
Height	2800 mm

3. Developed at — Tamil Nadu Agricultural University, Coimbatore, India

4. Test Results

Suitable for	Sunflower
Work capacity	100 kg of seed/hour

5. Cost

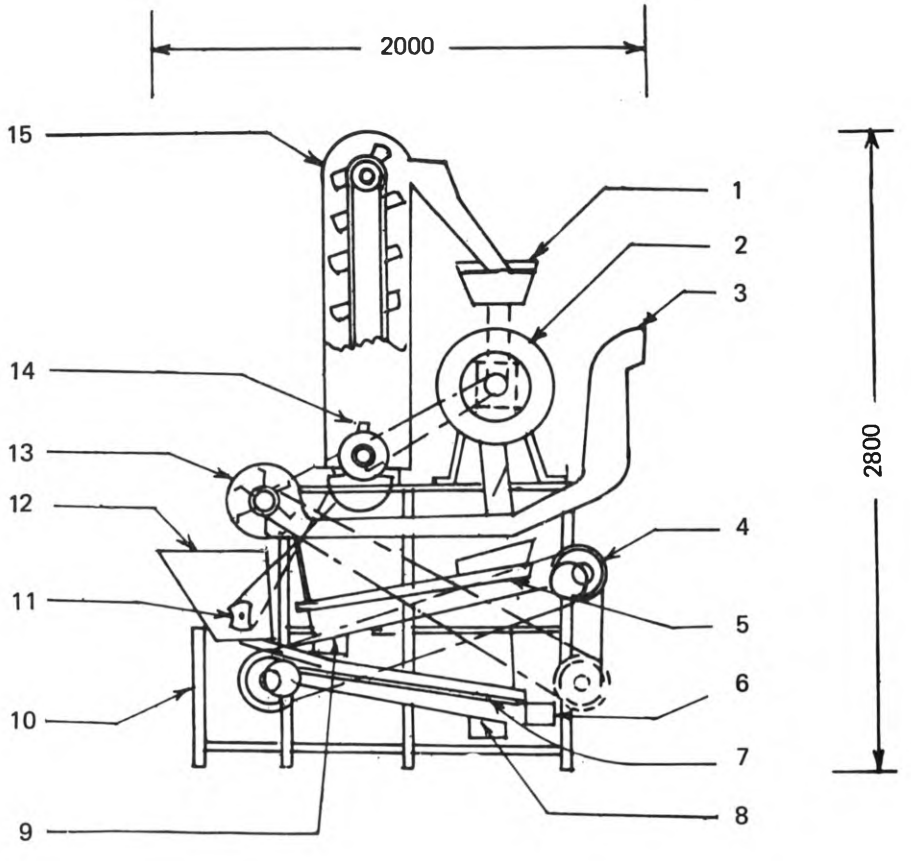
Sale Price	Rs 4,500 (US$560)
Operating	Rs 6/100 kg of seed (US$0.75)

6. General

The sheller mainly consists of a high speed rotor, a rubber lined stator, a blower and sieve assembly. Rotor consists of six curved vanes with two plates in each. The stator is a tapered wooden surface lined with a thick hard rubber. Seeds are fed into rubber lined stator from the hopper and graded by the sieve assembly. Graded seeds are fed into an elevating mechanism from where they pass through inlet of the rotor. Rotor throws the seed on the stator at a high velocity and seed get shelled due to high impact force. The shelled material is subjected to an air blast in a chute and the shell is separated. The shelled kernels are separated in the sieve assembly.

7. Availability

As in (3) above



(1) HOPPER
(2) STATOR WITH ROTOR
(3) CHUTE FOR HUSK
(4) ECCENTRIC
(5) SIEVE SLOT, 2.5 x 50
(6) FIRST GRADE GRAIN / SEED
(7) SIEVE SLOT, 3.5 x 50
(8) SECOND GRADE GRAIN/SEED
(9) KERNEL
(10) FRAME
(11) FEEDING ROLLER
(12) FEED HOPPER
(13) BLOWER
(14) ELECTRIC MOTOR, 3 hp
(15) BUCKET ELEVATOR

SUNFLOWER SEED SHELLER

HUSKER–SHELLER FOR MAIZE

1. Function — Dehusking and shelling

2. Specifications

Make	TNAU
Type	Power-operated, drum-type rotor
Power	Electricity – seven HP electric motor with seven persons
Length	2450 mm
Width	1250 mm
Height	1500 mm

3. Developed at — Tamil Nadu Agricultural University Coimbatore, India

4. Test Results

Suitable for	Maize
Work capacity	100 kg of kernels/hour

5. Cost

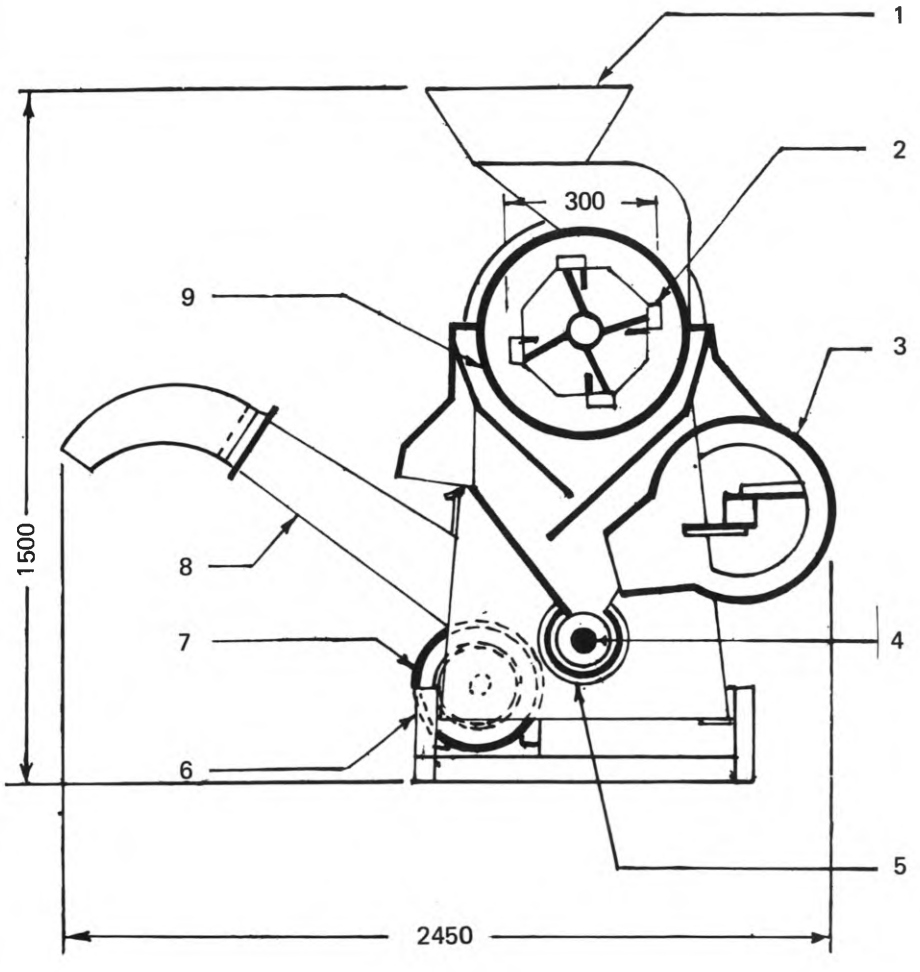
Sale Price	Rs 6000 (US$750)
Operating	Rs 2.3/100 kg of kernels (US$0.32)

6. General

The unit mainly consists of a hopper, a rotor, a sieve, a blower, auger and an elevator. Removal of sheath and shelling of cob take place in rotor-sieve assembly. Shelled kernels are carried by the auger to one and then elevated and collected. The shelling efficiency is about 98%.

7. Availability

As in (3) above



(1) FEED HOPPER
(2) ROTOR
(3) BLOWER
(4) AUGER
(5) AUGER CASING
(6) FRAME
(7) ELECTRIC MOTOR
(8) GRAIN ELEVATOR
(9) CONCAVE SIEVE

HUSKER – SHELLER FOR MAIZE

GROUNDNUT DECORTICATOR

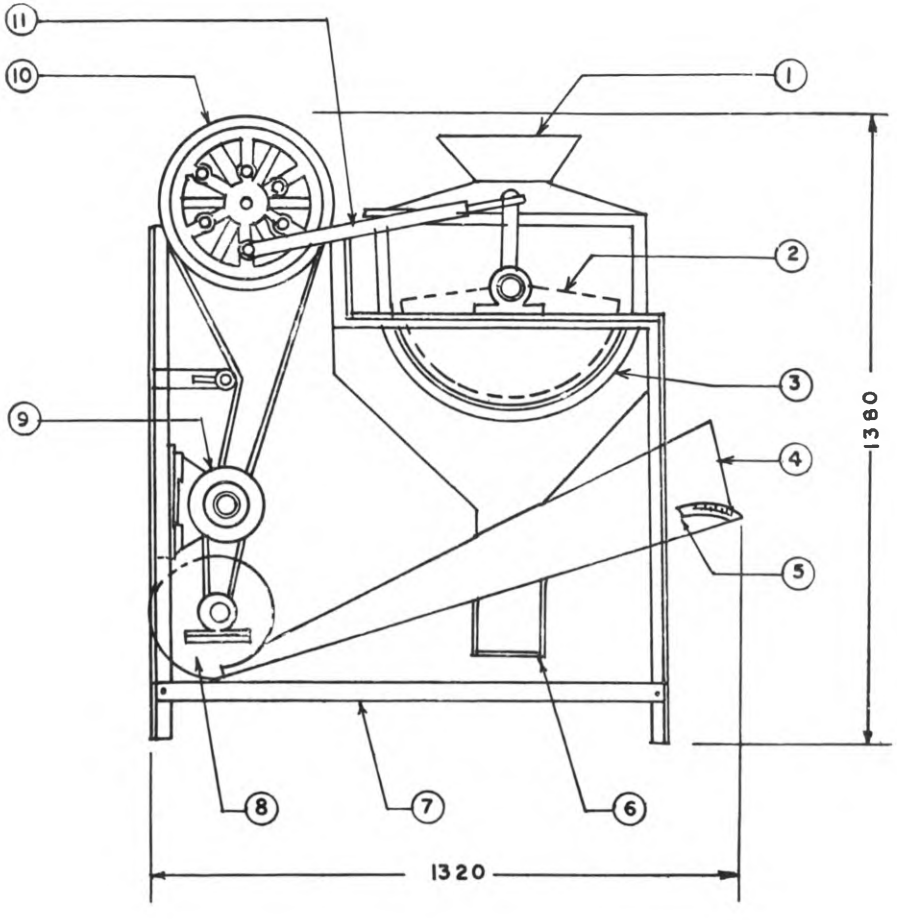
1.	Function	Shelling of groundnut (Peanut)
2.	Specifications	
	Make	TNAU
	Type	Power-operated, oscillating drum-concave
	Power	Electricity – 1 HP electric motor and one person
	Length	1320 mm
	Width	450 mm
	Height	1380 mm
	Weight	195 kg
3.	Developed at	Tamil Nadu Agricultural University Coimbatore, India
4.	Test Results	
	Suitable for	Groundnut
	Work capacity	260 kg kernels/hour
5.	Cost	
	Sale Price	Rs 2,700 (US$338)
	Operating	Rs 2/100 kg of kernels (US$0.25)

6. General

The machine mainly consists of a hopper, double crank-lever mechanism, oscillating drum concave, a concave sieve and a blower. All are fixed on a frame. A number of cast iron pegs are fitted in the oscillating unit. Groundnut pods are shelled between the oscillating unit and the perforated concave sieve fixed to the frame. The blower separates the kernels and shell. Kernels are collected through the spout at the bottom. The clearance between oscillating unit and concave sieve is adjustable to decorticate pods of different varieties of groundnut. The sieve is also replaceable.

7. Availability

As in (3) above



(1) FEED HOPPER
(2) OSCILLATING SECTOR
(3) CONCAVE SIEVE, 8 x 50
(4) HUSK
(5) CHUTE
(6) KERNEL
(7) FRAME
(8) BLOWER
(9) ELECTRIC MOTOR, 5 hp
(10) FLY WHEEL
(11) CONNECTING ROD

GROUNDNUT DECORTICATOR

MANGO SEED DECORTICATOR

1. Function — Decortication of mango seed

2. Specifications

Make	GBPUAT
Type	Power-operated rasp bar type decorticator
Power	Electricity (3.5 HP) motor and two persons
Length	2500 mm
Width	770 mm
Height	1120 mm
Weight	400 kg

3. Developed at — College of Technology
G.B. Pant University of Agriculture and Technology, Pantnagar, India

4. Test Results

Suitable for	Mango seed and groundnut
Work capacity	100 kg/hour (mango seed)

5. Cost

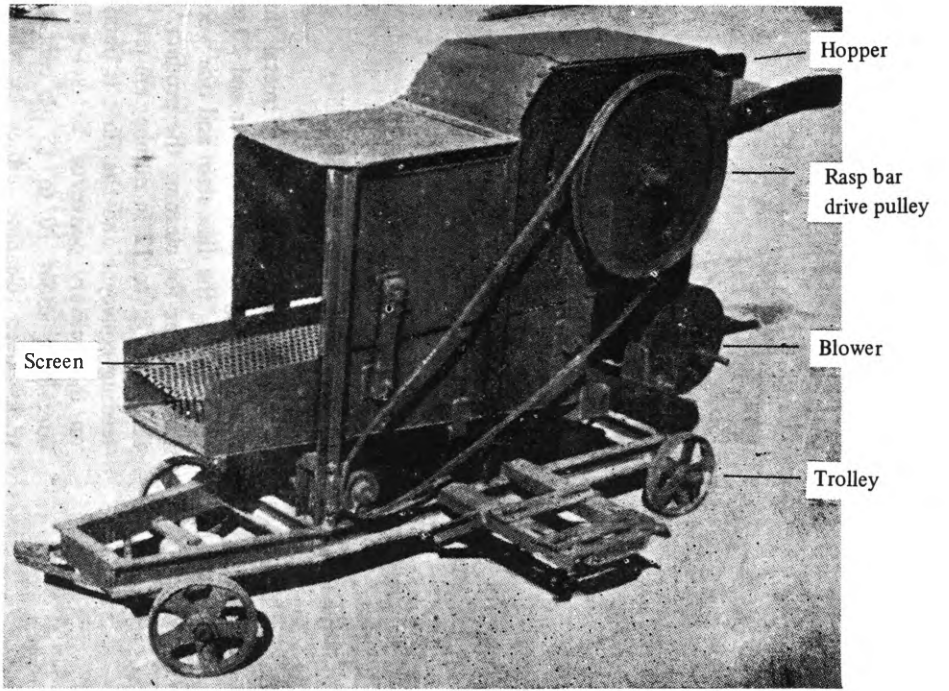
Sale Price	Rs 3000 (US$375)
Operating	Rs 5.50/100 kg (US$0.75)

6. General

The decorticator mainly consists of a feeding pan, rasp bar cylinder, concave, sieves, blower, delivery chute, wheel chassis and electric motor. The seeds are dried and fed into the cylinder and concave assembly through feeding pan. In decorticating the seeds, the rasp bars and concave hold the seeds and the rotation of the cylinder imparts impact and rubbing force on it. A blower assembly helps in separating kernel from shell when the decorticated material falls over the sieve. The kernel passes through and are collected at delivery chute. When used as groundnut decorticator, the rasp bars on cylinder are changed and an open type concave is used. The cleaning sieves are also suitably changed.

7. Availability

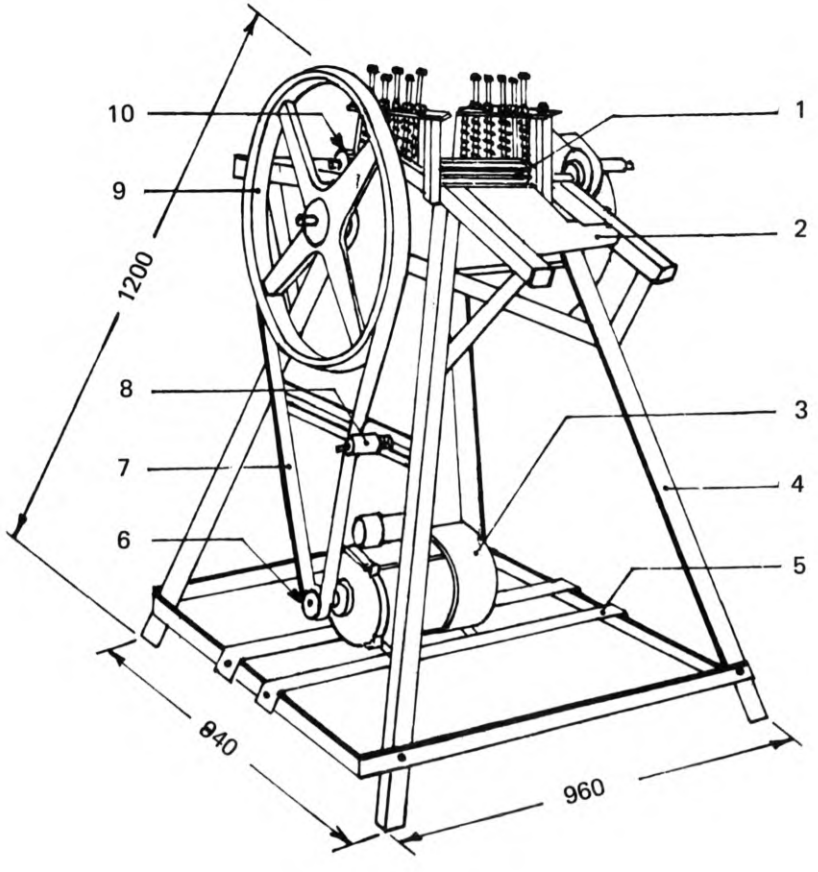
As in (3) above



MANGO SEED DECORTICATOR

FLAX SCUTCHING MACHINE

1.	Function	Extraction of fibre
2.	Specifications	
	Make	JARI
	Type	Power-operated, continuous
	Power	Electricity – 0.75 HP motor and one person
	Length	960 mm
	Width	840 mm
	Height	1200 mm
	Weight	150 kg
3.	Developed at	Agricultural Engineering Division, Jute Agricultural Research Institute, Barrackpore India
4.	Test Results	
	Suitable for	Flax
	Work capacity	5 kg of fibre/hour
5.	Cost	
	Sale Price	Rs 2100 (US$250)
	Operating	Rs 100/100 kg of fibre (US$12.50)
6.	General	This unit has three pairs of metal fluted rollers having 33 mm diameter and 20 teeth for breaking the flax stem and one wooden fluted roller for cleaning the product. Dry flax stems 8 to 12 in number are fed to the feeding conveyor and the fibre is obtained on the delivery conveyor Extracted fibre containing about 10 to 15 per cent loose sticks need cleaning either by vigorous shaking by hand or with the help of a rotating wheel having wooden blades.
7.	Availability	As in (3) above



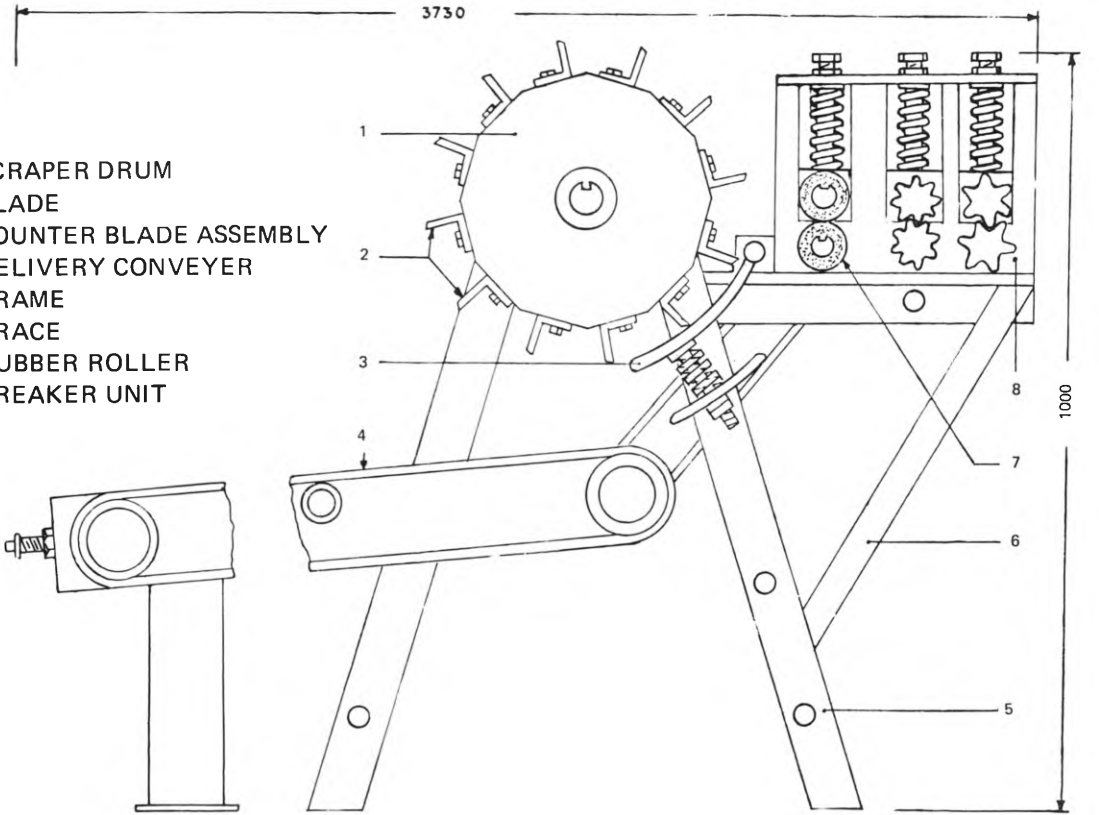
(1) WOODEN FLUTTED ROLLER
(2) CONVEYOR
(3) ELECTRIC MOTOR
(4) MACHINE FRAME
(5) MOTOR BASE
(6) V PULLEY
(7) V BELT
(8) BELT TIGHTNER
(9) V PULLEY
(10) GEAR

FLAX SCUTCHING MACHINE

JUTE FIBRE EXTRACTOR

1.	Function	Extraction of fibre
2.	Specifications	
	Make	JARI
	Type	Power-operated, continuous type
	Power	Electricity – 5 HP motor and three persons
	Length	3730 mm
	Width	620 mm
	Height	1000 mm
	Weight	250 kg
3.	Developed at	Jute Agricultural Research Institute Barrackpore, India
4.	Test Results	
	Suitable for	Jute
	Work capacity	500 kg of jute plant/hour
5.	Cost	
	Sale Price	Rs 5000 (US$625)
	Operating	Rs 1/100 kg of green jute (US$0.15)
6.	General	The unit consists of three pairs of rollers and a scraper drum. First pair of rollers breaks the jute stem, the second pair loosens the stocks from fibre and the third pair known as holder rollers, helps in feeding the stock to scraper drum. The recommended rpm of scraper drum and rollers are 850 and 200 respectively. Four to six green plants are fed into the unit at a time in a single layer. Extracted fibres are collected from the delivery conveyor and then conditioned in water for five days for producing fibre of commerce.
7.	Availability	As in (3) above

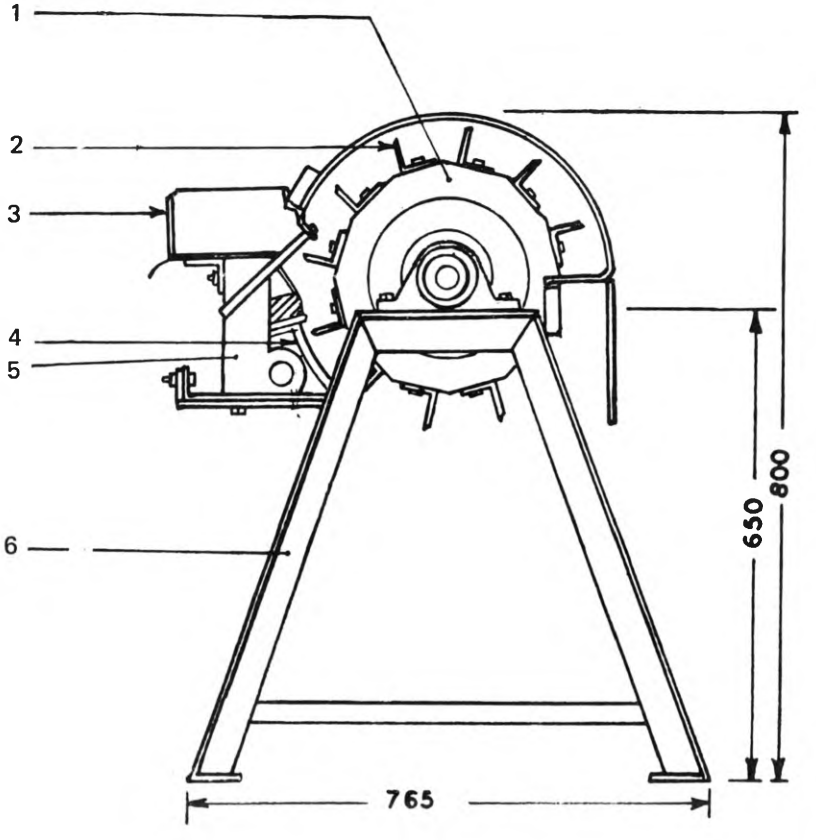
(1) SCRAPER DRUM
(2) BLADE
(3) COUNTER BLADE ASSEMBLY
(4) DELIVERY CONVEYER
(5) FRAME
(6) BRACE
(7) RUBBER ROLLER
(8) BREAKER UNIT



JUTE FIBRE EXTRACTOR

RAMIE AND SISAL DECORTICATOR

1.	Function	Extraction of fibre
2.	Specifications	
	Make	JARI
	Type	Power-operated, batch
	Power	Electricity – 3 HP motor and one person
	Length	765 mm
	Width	720 mm
	Height	800 mm
	Weight	150 kg
3.	Developed at	Agricultural Engineering Division, Jute Agricultural Research Institute Barrackpore India
4.	Test Results	
	Suitable for	Ramie and sisal
	Work capacity	1 ton of green plants/hour
5.	Cost	
	Sale Price	Rs 2500 (US$315)
	Operating	Rs 1.0/kg of finished fibre (US$0.15)
6.	General	The machine consists of a rotating drum with blades and a counter blade mounted on a stand. For extraction of fibre, one end of the stem to be decorticated is fed into the gap between the rotating blades of the drum and the counter blade while holding its other end. The hard woody core and other tissues are beaten and loosened in the forward movement of the feed material and the same are eliminated from the fibre while pulling the stem out by the operator. Then the other half is fed into the unit holding the cleared end and the process is repeated to complete the fibre extraction. About 2 to 4 stems are fed at a time. In case of ramie, extracted fibre is chemically treated to produce finished fibre whereas in case of sisal the extracted fibre is only washed in ordinary water and dried in sun.
7.	Availability	As in (3) above



(1) DRUM
(2) BLADES
(3) FEEDING CHUTE
(4) COUNTER BLADE
(5) COUNTER BLADE AJUSTER
(6) STAND

RAMIE AND SISAL DECORTICATOR

PADDY PRECLEANER

1. Function — Cleaning of paddy and other grains

2. Specifications

Make	TNAU
Type	Power-operated, continuous
Power	Electric - 1 HP electric motor and two persons
Length	1800 mm
Width	600 mm
Height	2250 mm

3. Developed at — College of Agricultural Engineering
Tamil Nadu Agricultural University
Coimbatore, India

4. Test Results

Suitable for	Paddy and other cereals
Work capacity	150 kg/hour

5. Cost

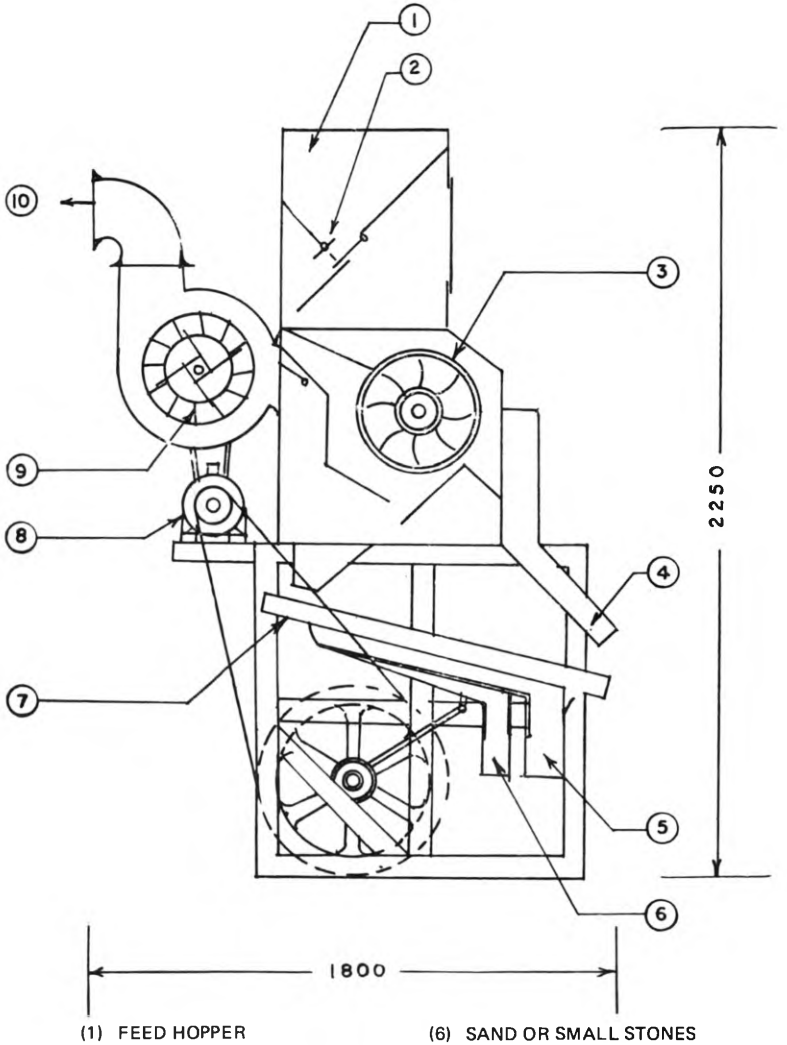
Sale Price	Rs 5500 (US$700)
Operating	Rs 2/100 kg (US$0.25)

6. General

The machine consists of a feed hopper, a feed roller, rotary scalping sieve, a horizontal sieve, a blower, frame and other accessories. The rotary sieve is 300 mm in diameter and 500 mm in length. The blower has a capacity of 150 mm/min. of air. Paddy is fed on the rotary scalping sieve through the hopper where large impurities are sieved out. As the sample drops from the rotary sieve an air stream is sucked through it which takes along the dusts chaffs and other lighter materials. Thereafter, grains fall on the horizontal reciprocating sieve where sand and stone pieces are separated from the paddy mass. This cleaner can also be used for cleaning other foodgrains by suitably changing the sieve size.

7. Availability

As in (3) above



(1) FEED HOPPER
(2) FEED ROLLER
(3) ROTARY SIEVE
(4) LARGE IMPURITIES OUTLET
(5) CLEANED SEED OUTLET
(6) SAND OR SMALL STONES
(7) SIEVE BOX
(8) ELECTRIC MOTOR, 1 hp
(9) BLOWER
(10) DUST

PADDY PRECLEANER

FIBRE EXTRACTOR

1. Function — Fibre extraction

2. Specifications

Make	TNAU
Type	Power-operated, beater type, portable
Power	Electric motor
Length	1300 mm
Width	650 mm
Height	1050 mm

3. Developed at — College of Agricultural Engineering
Tamil Nadu Agricultural University
Coimbatore
Tamil Nadu, India

4. Test Results

Suitability	Jute, sannhemp
Actual output	0.10 q of dry fibre/hr
Power requirement	1.5 kw (2 hp)
Labour requirement	One person

5. Cost

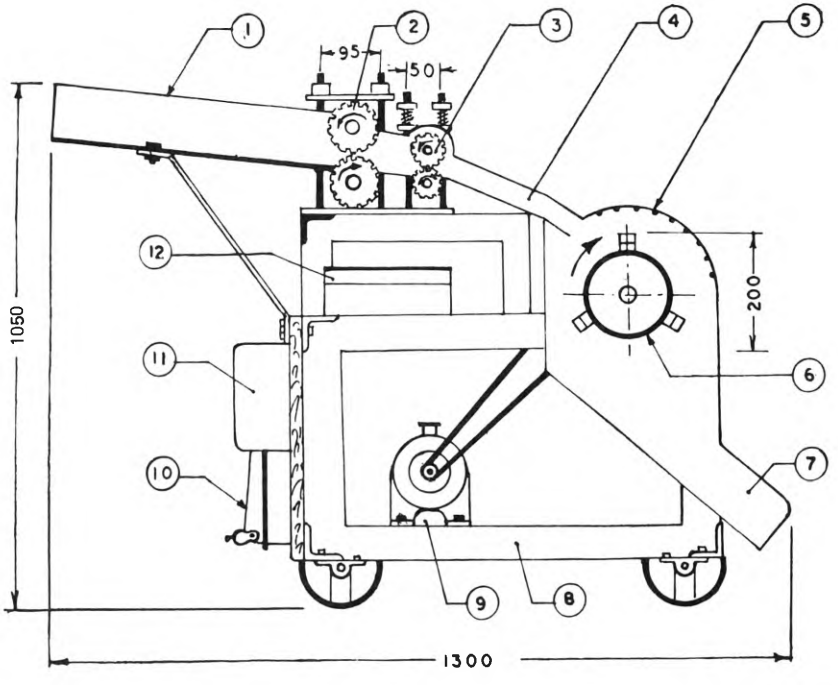
Sale Price	Rs 1800 (US$ 225) without electric motor
Operating	Rs 40/q of processed fibre (US$ 5)

6. General

The fibre extractor mainly consists of feed tray, 2 primary feed-in-rollers, 2 secondary feed-in-rollers, a beater and necessary frame work. Stems of fibrous crops are fed into the machine with the help of feed-in-rollers which crush and move them forward through guide chamber to the beater where the skins of the stems containing fibre are separated from the woody portion. The wet extracted fibre is then conditioned in water for about 8 days and thereafter washed and dried, mostly in sun. Saving in the cost of processing is about 33% as compared to the conventional method of fibre extraction and processing.

7. Availability

As in (3) above



(1) FEED TRAY
(2) PRIMARY FEED IN ROLLER
(3) SECONDARY FEED IN ROLLER
(4) GUIDE CHAMBER
(5) MILD STEEL COWL
(6) BEATING CYLINDER
(7) FIBRE OUTLET
(8) MAIN FRAME
(9) ELECTRIC MOTOR
(10) SWITCH
(11) STARTER
(12) CROP JUICE COLLECTOR

FIBRE EXTRACTOR

GROUNDNUT GRADER

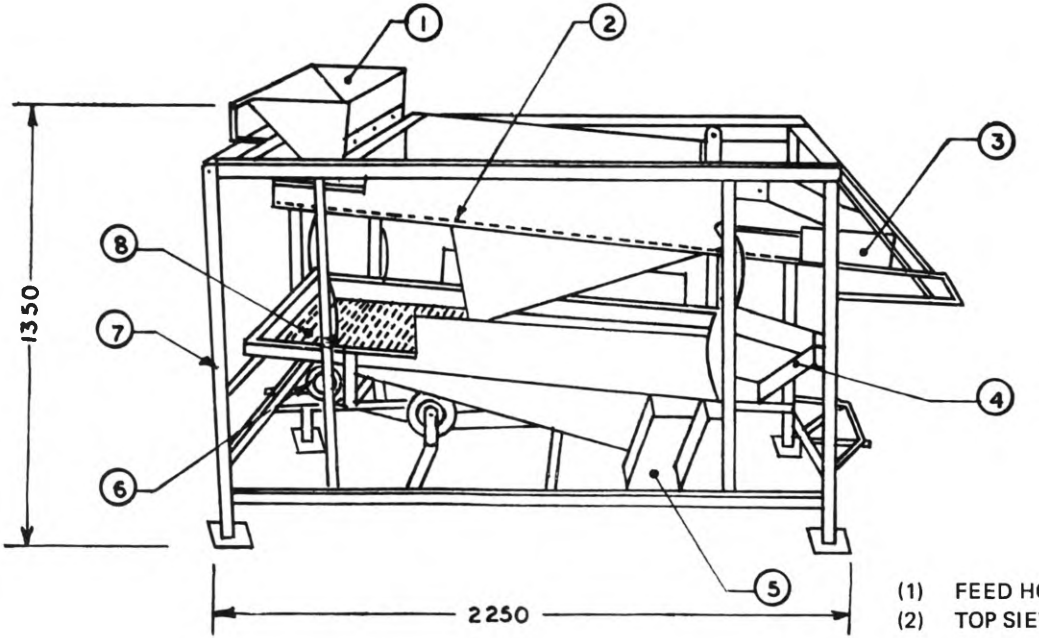
1.	Function	Grading
2.	Specifications	
	Make	TNAU
	Type	Power-operated, slotted oscillating sieve
	Power	Electricity – 1 HP electric motor and one person
	Length	2250 mm
	Width	1050 mm
	Height	1350 mm
3.	Developed at	Tamil Nadu Agricultural University Coimbatore, India
4.	Test Results	
	Suitable for	Groundnut
	Work capacity	600 kg/hour
5.	Cost	
	Sale Price	Rs 2800 (US$350)
	Operating	Rs 0.65 (US$0.08)

6. General

Groundnut grader consists of a feed hopper, two slotted oscillating sieves, an eccentric mechanism and a frame. The two oscillating sieves have slot sizes of 10.75 x 50 mm and 9.50 x 50.50 mm respectively. Sieves are oscillated by the eccentric mechanism. The machine grades groundnut pods/kernels into three distinct grades according to size. Oscillating sieves could be replaced by different grades depending upon the groundnut varieties to be graded.

7. Availability

As in (3) above



GROUNDNUT GRADER

(1) FEED HOPPER
(2) TOP SIEVE, 12 x 50 mm
(3) FIRST GRADE OUTLET
(4) SECOND GRADE OUTLET
(5) THIRD GRADE OUTLET
(6) ELECTRIC MOTOR, 1 hp
(7) FRAME
(8) BOTTOM SIEVE, 10 x 80 mm

SEED GRADER

1. Function — Grading of seeds

2. Specifications

Make	GBPUAT
Type	Power-operated, laboratory model, oscillating sieve
Power	Electricity – 3.7 kw (5 HP motor and two persons
Length	1050 mm
Width	620 mm
Height	1500 mm

3. Developed at — College of Technology, G.B. Pant University of Agriculture and Technology, Pantnagar India

4. Test Results

Suitable for	Soybean, pea and gram
Work capacity	300 kg/hour (soybean)

5. Cost

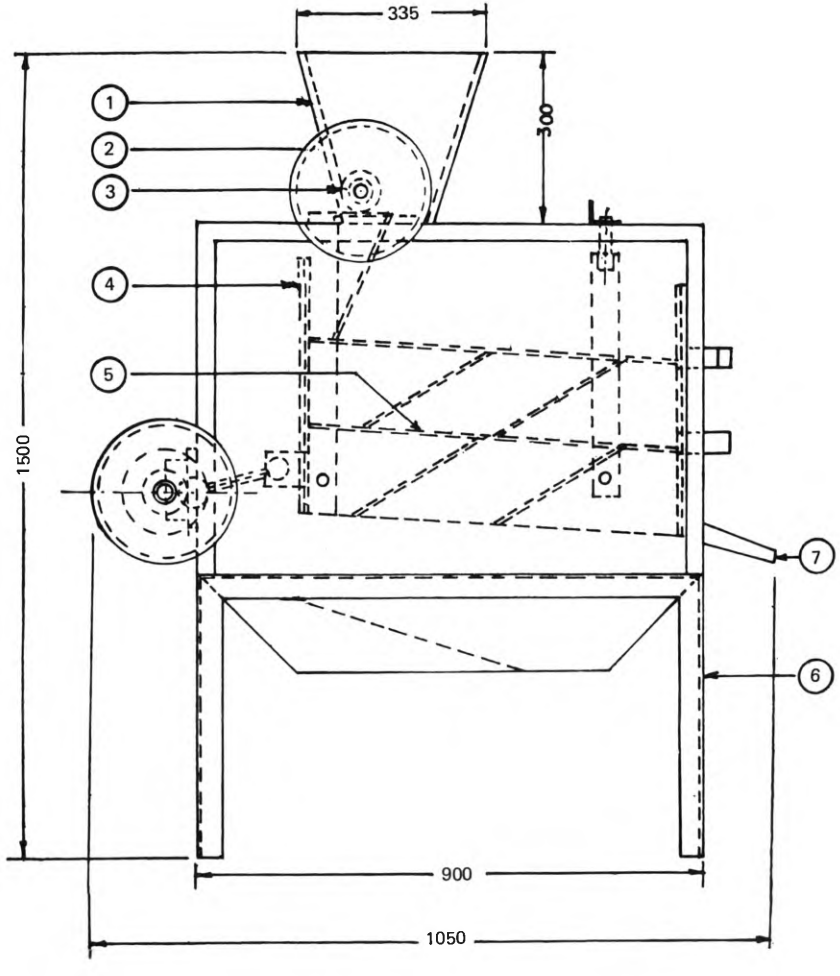
Sale Price	Rs 3000 (US$375)
Operating	Rs 0.15/100 kg (US$0.02)

6. General

The seed grader consists of a seed hopper, seed roller for controlling the feed rate, set of three sieves, pulley and eccentric system, seed outlets, frame and electric motor. The sieves are detachable and can be replaced by suitable sieves if other round grains are to be graded. The seed is put into the hopper and is dropped on to the sieve through feed roller. Sieves are vibrated through the eccentric system. Graded seeds are collected through three different seed outlets.

7. Availability

As in (3) above



(1) HOPPER
(2) PULLEY
(3) FEED ROLL
(4) HANGER
(5) SIEVE
(6) FRAME
(7) SEED OUTLET

SEED GRADER

APPLE GRADER

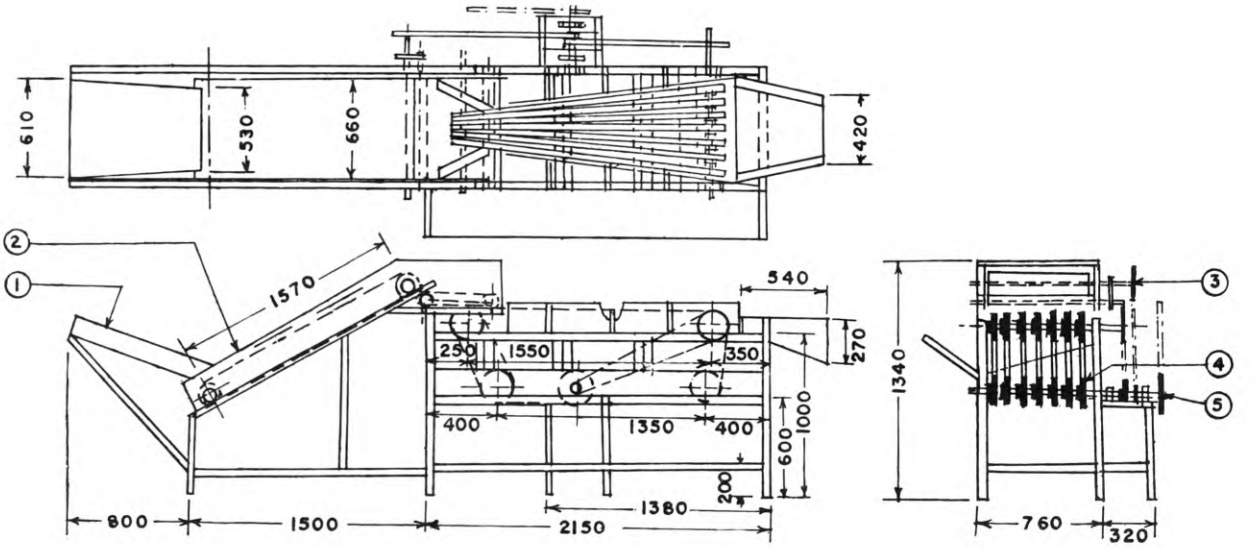
1.	Function	Grading of round shaped fruits
2.	Specifications	
	Make	GBPUAT
	Type	Power-operated, differential speed, V-belt expanding pitch
	Power	Electricity – 2 HP electric motor and two persons
	Length	4900 mm
	Width	1500 mm
	Height	1340 mm
	Weight	500 kg
3.	Developed at	College of Technology, G.B. Pant University of Agriculture and Technology, Pantnagar India
4.	Test Results	
	Suitable for	Apple
	Work capacity	1500 kg/hour
5.	Cost	
	Sale Price	Rs 2000 (US$250)
	Operating	Rs 1.25/100 kg (US$0.16)

6. General

The apple grader consists of six numbers of V-belts with 24 wooden pulleys mounted over four shafts. The distance between adjacent belts increases gradually from 200 mm from the feed end to 550 mm at the delivery end. The upper portion of the belts between the upper pulleys act as grading sections and the whole grading length is divided into three parts to give three different grades. The size range of various grades can be changed by changing the position of partition walls provided to separate grades. The separation efficiency of the machine is 76% at a grader speed of 40 rpm and feed rate of 1500 kg/hour. To increase the separation efficiency of this grader, differential speeds have been provided to adjacent belts. Due to difference in speed of belts over which an apple moves, there is a rotational effect imparted on the apple which helps in better separation. This machine can also be used for grading potato.

7. Availability

As in (3) above



(1) FEEDING CHUTE
(2) CONVEYER
(3) PULLEY
(4) GRADER PULLEY
(5) DRIVING PULLEY

APPLE GRADER

POTATO GRADER

1. Function — Grading of potatoes and round fruits

2. Specifications

Make	PAU
Type	Power-operated, expanding pitch rubber-spool
Power	Electrical – 1 HP motor with two persons
Length	5200 mm
Width	1640 mm
Height	1690 mm
Weight	550 kg

3. Developed at — College of Agricultural Engineering, Punjab Agricultural University, Ludhiana, India

4. Test Results

Suitable for	Potato and fruits cush as apple, malta, oranges
Work capacity	25/100 kg/hour

5. Cost

Sale Price	Rs 4,000 (US$500)
Operating	Rs 1/100 kg

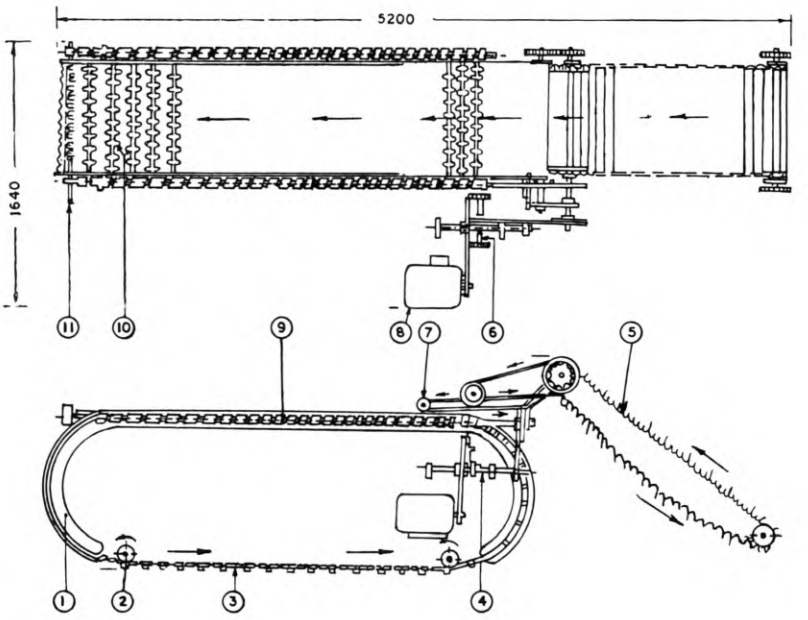
6. General

The machine comprises of a frame, an elevator, feed-conveyor with rubber spools, two identical driving rollers with helical grooves of gradually increasing pitch, collecting platform with partitions and gates, fenders, transport wheels and a power transmission system. The rods with the spools are carried forward as the rollers rotate and in this way, the gap between individual spool goes on increasing gradually according to the pitch of the helics of the driving rollers. This leads to sizing of the tubers as these are carried forward over the sizing conveyor. The separation of the tubers of smaller size starts first and that of the bigger size towards the end of sizing bed. The accuracy of sizing depends on the uniformity of shape. Sizing accuracy is better in round shaped varieties than in oblong or irregular shapes.

7. Availability

i) College of Agricultural Engineering, Punjab, Agricultural University, Ludhiana, India

ii) M/s Universal Farm Machinery Corporation, Patiala Road, Narwana, India



(1) SUPPORT GUIDE FOR THE SPOOL MOUNTING RODS
(2) IDLERS
(3) CONNECTING CHAIN FOR CARRYING THE SPOOLS
(4) INTERMEDIATE SHAFT - I
(5) ELEVATOR SHAFT - I
(6) INTERMEDIATE SHAFT - 2
(7) INTERMEDIATE CONVEYER
(8) ELECTRIC MOTOR
(9) EXPANDING PITCH DRIVING HELIX
(10) RUBBER SPOOLS
(11) ROLLER CHAIN AND SPROCKET DRIVE

POTATO GRADER

DEHULLER

1. Function — Dehulling and splitting of pulse grains

2. Specifications

Make	GBPUAT
Type	Power-operated
Power	Electricity – A 2-HP motor and one person
Length	1050 mm
Width	500 mm
Height	720 mm

3. Developed at — College of Technology, G.B. Pant University of Agriculture and Technology, Pantnagar India

4. Test Results

Suitable for	Soybean, pea and gram
Work capacity	300 kg/hr

5. Cost

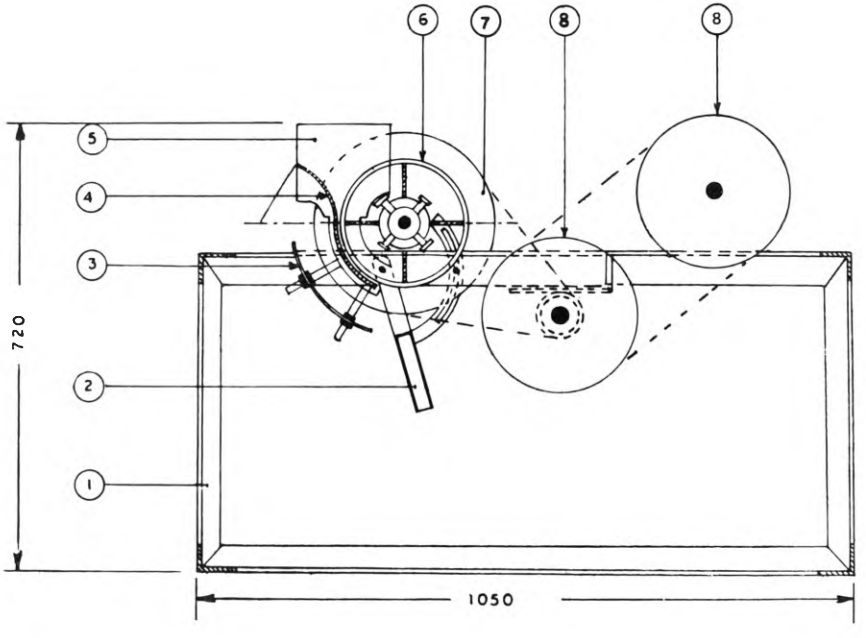
Sale Price	Rs 2000 (US$250)
Operating	Rs 55/100 kg (US$7)

6. General

The dehuller basically consists of a cylinder concave system, a 2 hp electric motor as prime mover, variable speed reduction, discharge tube and a supporting frame. Raw material is fed in between the concave and cylinder and the splitted pulse discharges out through the discharge tube. Clearance between the concave and cylinder is variable and due to this the equipment is capable of handling ungraded material. Under optimum conditions cotyledon breakage is less than 2% with a recovery of 80 to 85%. By making suitable modifications this equipment may be made suitable for dehulling other pulse grains also.

7. Availability

As in (3) above



(1) ANGLE IRON FRAME
(2) DISCHARGE CHUTE
(3) SUPPORT
(4) CONCAVE
(5) SIDE BOARD
(6) CYLINDER
(7) PULLEY
(8) VARIABLE SPEED PULLEY

DEHULLER

SUGARCANE SETT CUTTING MACHINE

1. Function — Making sugarcane setts for planting

2. Specifications

Make	IISR
Type	Power-operated, circular saw, portable
Power	Electricity – 5 KW and four persons
Length	960 mm
Width	2440 mm
Height	1283 mm
Weight	110 kg

3. Developed at — Argicultural Engineering Division, Indian Institute of Sugarcane Research, Lucknow, India

4. Test Results

Suitable for	Sugarcane
Work capacity	13,000 setts/hour
Damage to no des	2.0 per cent

5. Cost

Sale Price	Rs 1250 (US$156)
Operating	Rs 8/1000 setts (US$1) with 7.5 HP engine Rs 24/1000 setts (US$3) with 35 HP tractor

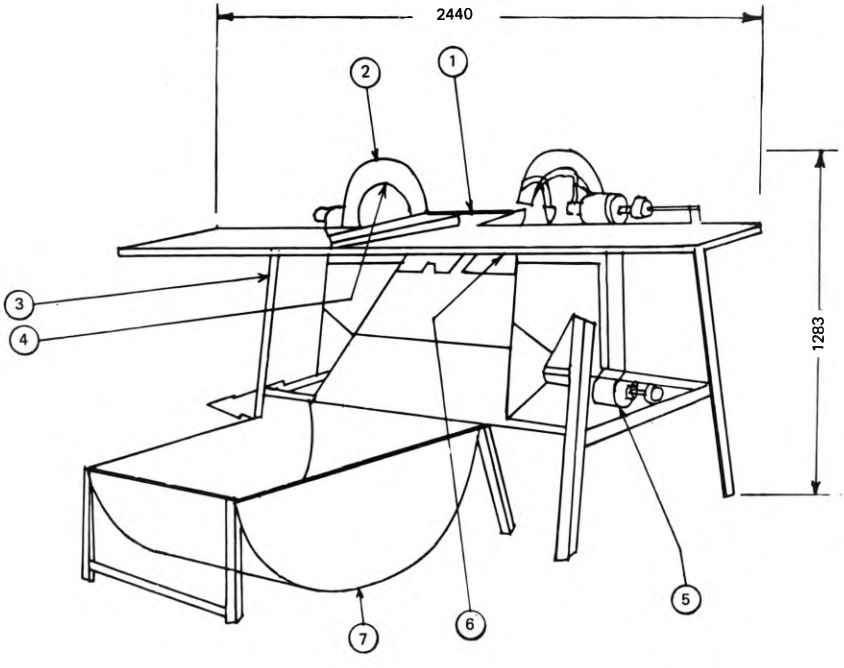
6. General

The design of this machine is based on the principle of circular saw. It consists of two circular saws mounted on a platform. Guards are provided over the blades for safety. The canes are fed in bundles (5 or 6) at a time from both the sides and the cut setts are dropped into a fungicidal tank from where they are removed and planted. For transport purposes the implement can be mounted on the tractor with 3-point linkage.

7. Availability

i) Agricultural Engineering Division, Indian Institute of Sugarcane Research, Lucknow, India

ii) M/s Sha Bandhu Engineers, 60 B, Guru Govind Singh Marg Lucknow, India



(1) WOODEN PLATFORM
(2) SAW BLADE GUARD
(3) FRAME
(4) SAW BLADE
(5) PULLEY
(6) WOODEN SLANTING PLATFORM
(7) FUNGICIDAL TREATMENT TANK

SUGARCANE SETT CUTTING MACHINE

RICE MILL

1. Function — Milling of rice

2. Specifications

Make	Sentosa
Type	Quick HS – 900 B
Power	Engine 18–20 PK, 800 RPM and two persons
Length	1500 mm
Width	1100 mm
Height	1650 mm
Weight	400 kg

3. Developed at — C.V. Karya Hidup Sentosa, J1. Magelan 144 Yogyakarta, Indonesia

4. Test Results

Suitable for	Paddy
Work capacity	700 – 900 kg/hour

5. Cost

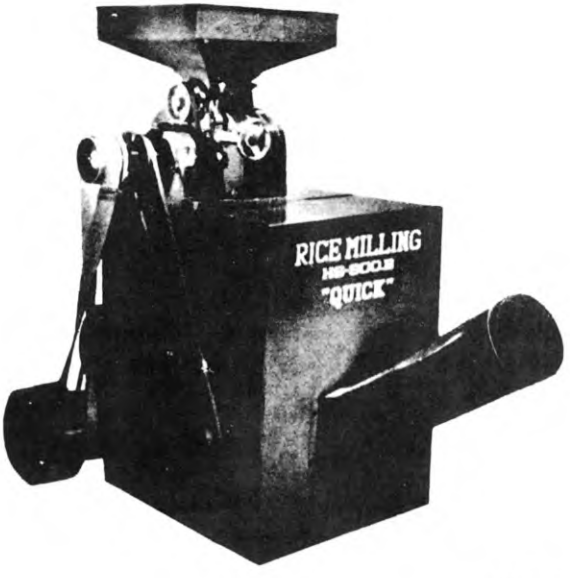
Sale Price	–
Operating	–

6. General

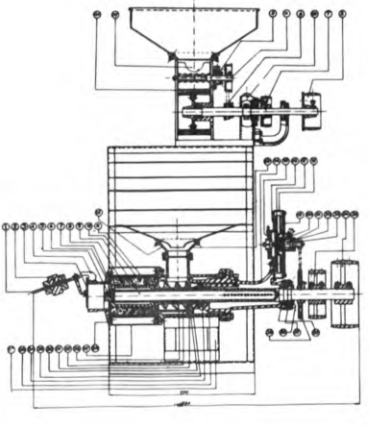
Various components of the machine are indicated in the line diagram.

7. Availability

As in (3) above



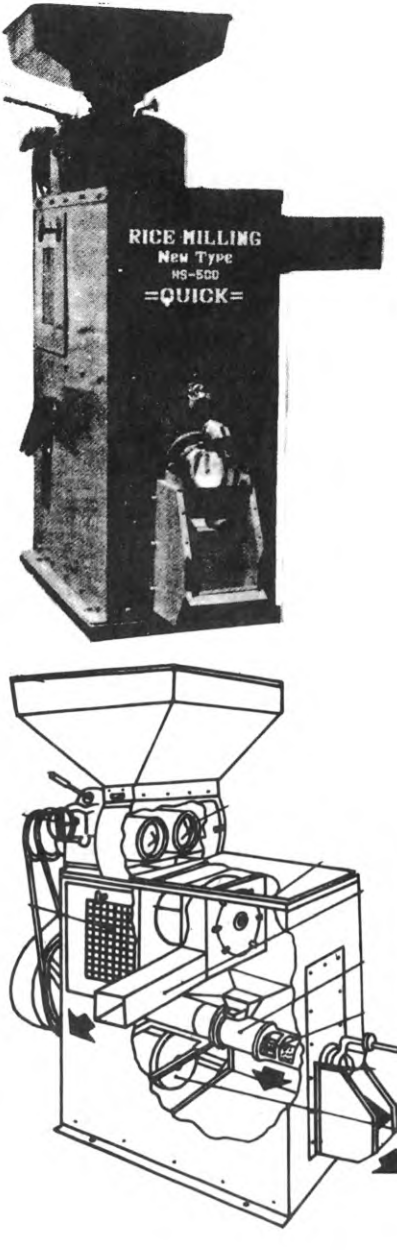
1. Lever
2. Weight
3. RESISTANCE PLATE
4. Bearer weight lever
5. Bolt
6. Ring Inner
7. Outlet
8. Milling Roller
9. Main Shaft
10. Screen
11. Inner Frame
12. Hopper
13. Funnel
14. Bearing
15. Air Volume-adjusting plate
16. Fan seat
17. FAN
18. Fan casing
19. Bearing Fan
20. Bearing Cover
21. Fan Shaft
22. Bearing Cover
23. V. Pulley
24. Plain Belt Pulley
25. Plate Pulley
26. Outer Frame
27. Cover
28. Screw Roller
29. Inner Cylinder
30. JOINT
31. Packing Receiver
32. MAIN BODY
33. Felt Ring
34. NUT
35. Bearing Cover Ring
36. Bearing Cover Ring
37. NUT
38. Bearing Cover
39. V. Pulley



RICE MILL

SINGLE PASS RICE MILL

1.	Function	Rice milling
2.	Specifications	
	Make	Sentosa
	Type	HS – 500
	Power	Engine, 9–12 HP, 700–800 RPM and two persons
	Length	1000 mm
	Width	450 mm
	Height	1400 mm
	Weight	225 kg
3.	Developed at	C.V. Karya Hidup Sentosa, J1. Magelan 144 Yogyakarta, Indonesia
4.	Test Results	
	Suitable for	Paddy
	Work capacity	350 – 400 kg/hr
5.	Cost	
	Sale Price	–
	Operating	–
6.	General	
	Rubber roll system	
7.	Availability	
	As in (3) above	



SINGLE PASS MILL

RICE HULLER

1. Function — Rice hulling

2. Specifications

Make	AGRINDO
Type	HC – 600 – Automatic
Power	Diesel engine, 3–4 HP and two persons
Length	735 mm
Width	600 mm
Height	1570 mm
Weight	179 kg

3. Developed at — P.T. Agrindo, Desa Dambe, Gredix, Jawa Timur, Indonesia

4. Test Results

Suitable for	Paddy
Work capacity	1000 kg/hour

5. Cost

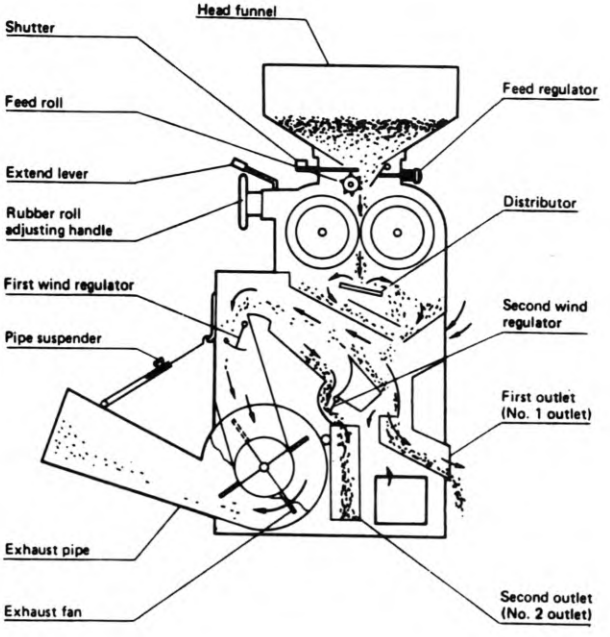
Sale Price	–
Operating	–

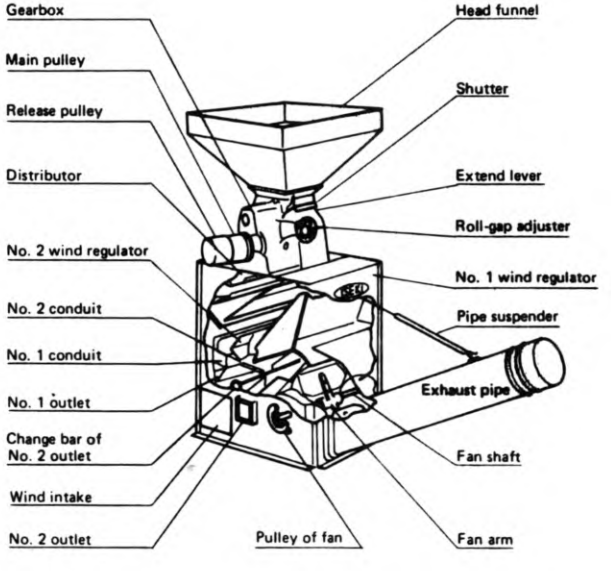
6. General

It has rubber roll system. Other components are all made of M.S. steel sheet, cast iron pulleys and steel angles.

7. Availability

As in (3) above


Head funnel
Shutter
Feed roll
Feed regulator
Extend lever
Rubber roll adjusting handle
Distributor
First wind regulator
Second wind regulator
Pipe suspender
First outlet (No. 1 outlet)
Exhaust pipe
Exhaust fan
Second outlet (No. 2 outlet)


Gearbox
Head funnel
Main pulley
Shutter
Release pulley
Distributor
Extend lever
Roll-gap adjuster
No. 2 wind regulator
No. 1 wind regulator
No. 2 conduit
Pipe suspender
No. 1 conduit
Exhaust pipe
No. 1 outlet
Change bar of No. 2 outlet
Fan shaft
Wind intake
No. 2 outlet
Pulley of fan
Fan arm

RICE HULLER

PEANUT SHELLER WITH CLEANER

1. Function — The machine cracks the pods, shells and cleans peanuts in one passing

2. Specifications

Make	BPI
Type	Roller
Power	3 HP electric motor and two men for feeding and bagging
Length	1400 mm
Width	600 mm
Height	450 mm

3. Developed at — Agricultural Engineering Division, Bureau of Plant Industry, Metro Manila, Philippines

4. Test Results

Suitable for	Dried peanuts
Work capacity	30 kg/hour

5. Cost

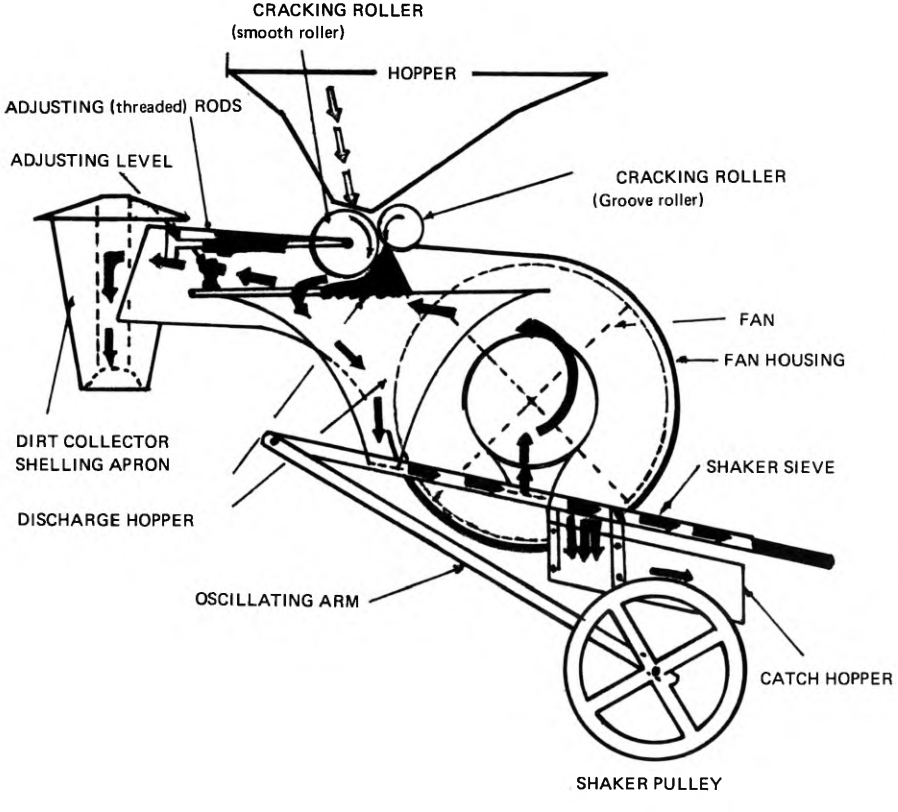
Sale Price	P3,000 (US$410) including labour and prime mover
Operating	P12/100 kg (US$16)

6. General

This machine could perform shelling without causing damage to the nut. Shelling and cleaning of peanuts for seed purposes can also be performed by this machine. It has three oscillating screen assemblies. Peanut is fed through a hopper and passes between two rollers with clearance just enough to crack the pods. The shelled and unshelled peanuts move down the oscillating inclined trough, passing below a suction duct. The shells of the peanuts are sucked upward by the suction fan and blown into the dirt collector for discharge. As the material leaves this area it passes through a wire mesh where the shelled peanuts readily drop into a secondary trough and then into a container.

7. Availability

As in (3) above



PEANUT SHELLER WITH CLEANER

CORN SHELLER

1. Function — For shelling the maize

2. Specifications

Make	KAZ–60
Type	Stationary, Power drive
Power	Tractor of 20 HP, electric motor of 10 HP and two persons to feed and collect the shelled material
Length	1750 mm
Width	1065 mm
Height	1500 mm
Weight	380 kg

3. Developed at — Agricultural Engineering Division, Faisalabad, Pakistan

4. Test Results

Suitable for	Maize
Work capacity	3200 kg/hour

5. Cost

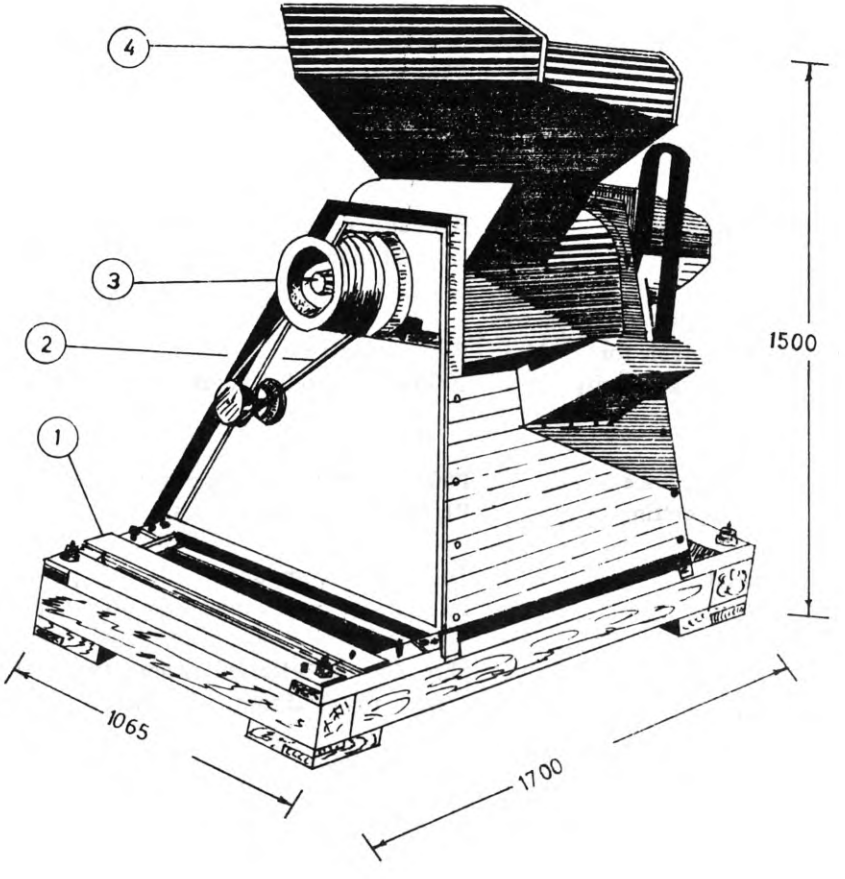
Sale Price	Rs 3500 (US$350)
Operating	Rs 40/hour (US$4)

6. General

The maize sheller produces clean and unbroken grain for seed purpose. Operation and maintenance is quite simple. It enables a high standard of shelling to be maintained with crops of varying moisture content and size of cob.

7. Availability

Karkhana Aalat-e-Zari, Bahawalpur, Pakistan

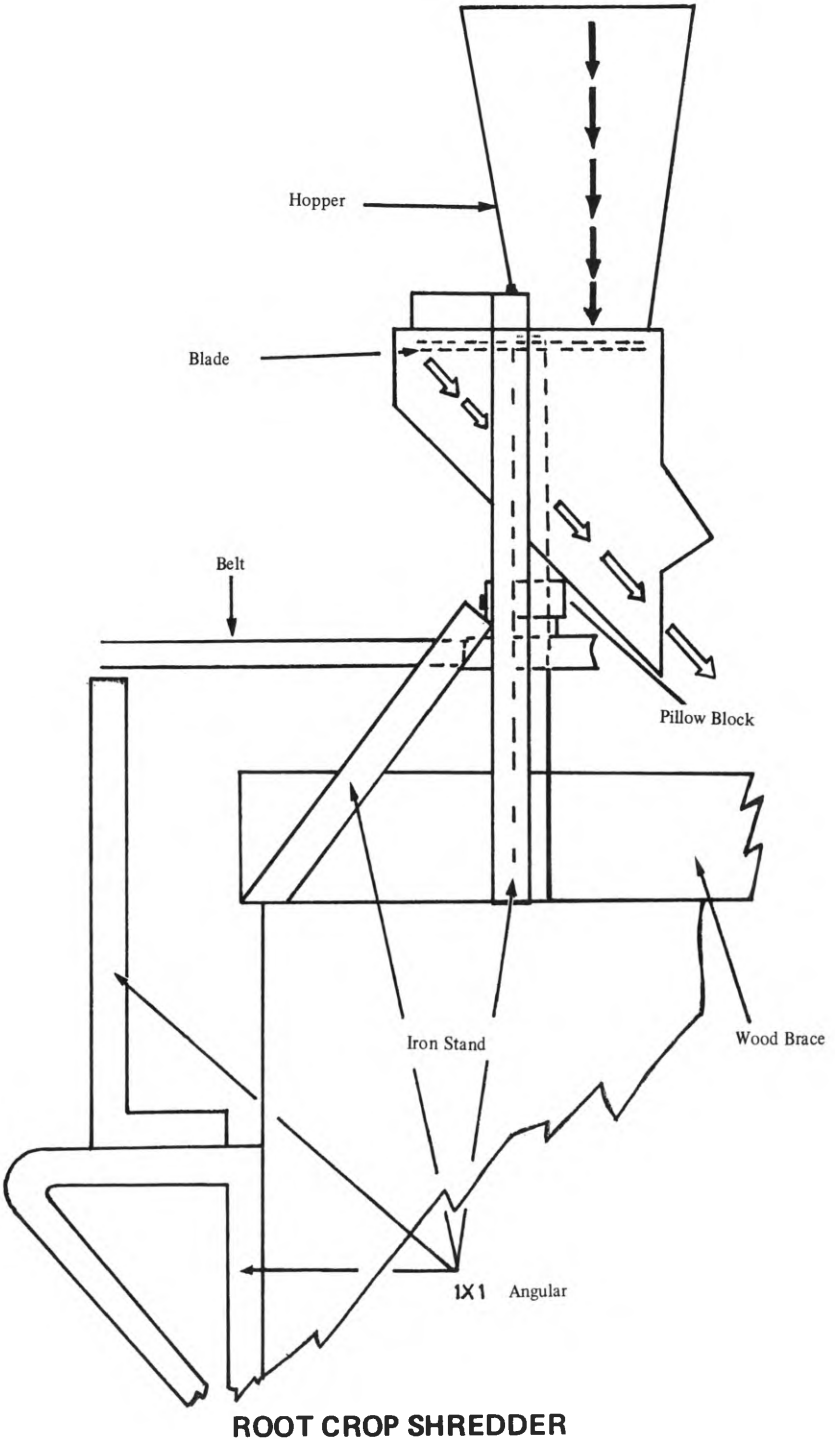


(1) Frame
(2) Belt
(3) Pulley
(4) Hopper

CORN SHELLER

ROOT CROP SHREDDER

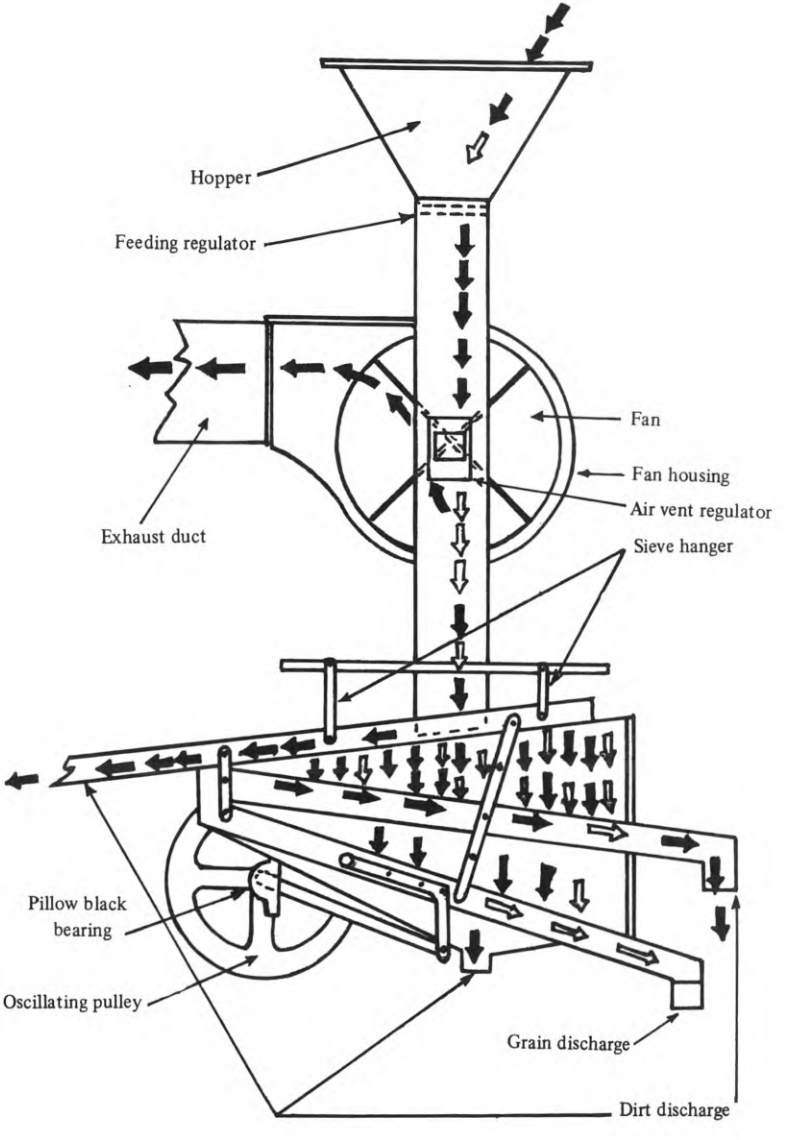
1.	Function	Shredding peeled cassava
2.	Specifications	
	Make	BPI
	Type	Blade
	Power	1 HP electric motor and two men for feeding and bagging
3.	Developed at	Agricultural Engineering Division, Bureau of Plant Industry, Metro Manila, Philippines
4.	Test Results	
	Suitable for	Peeled cassava
	Work capacity	200 kg/hour peeled cassava
5.	Cost	
	Sale Price	P600 (US$82) excluding prime mover
	Operating	P1/100 kg of peeled cassava
6.	General	The basic component of the portable cassava root crop shredder are body hopper, shredder blade and the prime mover. Shredding is effected when the peeled cassava passes through the shredder blade.
7.	Availability	As in (3) above



ROOT CROP SHREDDER

SEED CLEANER

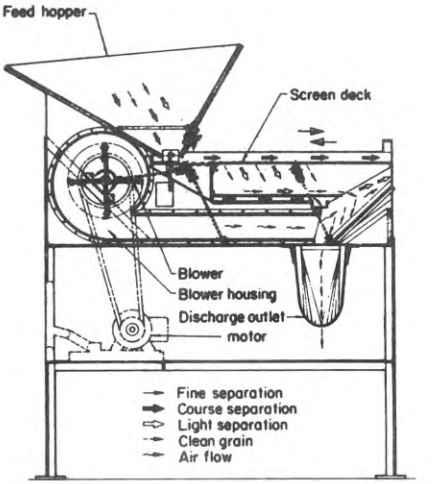
1.	Function	To separate foreign materials from seeds
2.	Specifications	
	Make	BPI
	Type	Suction
	Power	2 HP electric motor and two men for feeding and bagging
	Length	1280 mm
	Width	1030 mm
	Height	1690 mm
3.	Developed at	Agricultural Engineering Division, Bureau of Plant Industry, Metro Manila, Philippines and Araneta University Foundation
4.	Test Results	
	Suitable for	Palay, corn, peanut and soybeans
	Work capacity	Palay – 150 kg/hr Corn – 280 kg/hr Peanut – 100 kg/hr Soybeans – 100 kg/hr
5.	Cost	
	Sale Price	P2,140 (US$300)
	Operating	P0.70/sack (US$0.10)
6.	General	The seed cleaner is used to clean palay, corn and other seeds. The cleaner has the advantage of simplicity, compactness with small overall dimensions and low cost to fabricate. One kind of seed can be cleaned after another regardless of motor speed. An air vent on the inlet suction duct is enough to secure well cleaned seeds. The downflow of seeds to be cleaned is regulated by the shutter regulator at the hopper. The machine is powered by a 2 HP electric motor.
7.	Availability	As in (3) above



SEED CLEANER

PORTABLE GRAIN CLEANER

1.	Function	Cleaning of grains
2.	Specifications	
	Make	IRRI
	Type	air-screen cleaner
	Power	1 HP engine, 0.5 HP motor and two men
	Length	1260 mm
	Width	670 mm
	Height	1230 mm
	Weight	72 kg
3.	Developed at	Agricultural Engineering Department, The International Rice Research Institute, Los Baños, Philippines
4.	Test Results	
	Suitable for	multiple food grains – rice, sorghum, wheat, etc.
	Work capacity	Upto 1,000 kg/hr (rough rice)
	Grain purity	Upto 98%
5.	Cost	
	Sael Price	P3,000 (US$400)
	Operating	–
6.	General	The screen is interchangeable and horizontal oscillating type and blower is centrifugal blade type. Wood and steel are used in the construction. Grain is loaded into the wooden hopper and discharged to the horizontal oscillating screen. The eccentric and support linkages oscillates and move the grain over the horizontal screen. The dual screens separate larger and smaller than the grain size impurities while the air blast remove light impurities. The top screen is removable to suit grain sizes while feed rate is regulated by the hopper slide valve and blower loss by the adjustable windboard.
7.	Availability	As in (3) above



PORTABLE GRAIN CLEANER

I. CROP DRYERS AND COMPONENTS

VAPOURIZING KEROSENE BURNER

1. Function — Heating of air for grain drying

2. Specifications

Make	IIT
Type	Self vapourizing
Energy Source	Kerosene
Length	210 mm
Width	155 mm
Height	100 mm
Weight	3 kg

3. Developed at — Rice Process Engineering Centre, Indian Institute of Technology, Kharagpur, India

4. Test Results

Suitable for	Kerosene
Work capacity	5 li/hr
Efficiency	85%

5. Cost

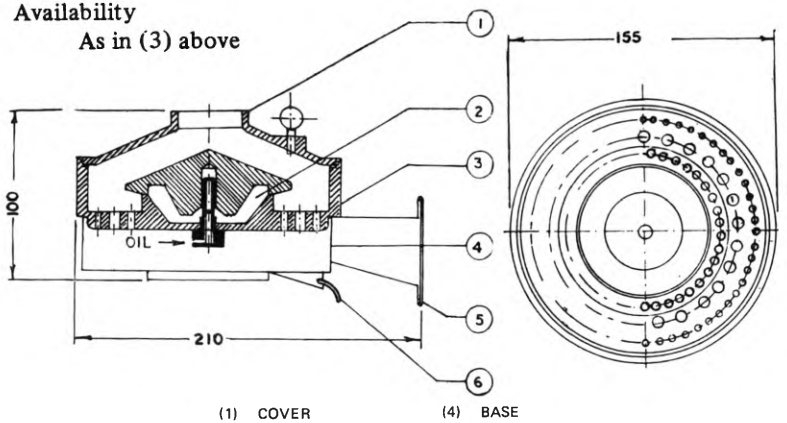
Sale Price	Rs 2500 (US$315)
Operating	Rs 0.75/hour (US$0.10)

6. General

The burner consists of one oil burning unit and a fuel tank connected together by means of flexible copper pipes. A hand shut off valve is provided in the line for controlling the fuel supply to the burning unit. It contains a needle valve which regulates fuel supply to the vapourizing cup. Initially the burner is heated by burning kerosene in it. After sometime the incoming kerosene starts evaporating by itself in the hot burner and is mixed with primary air being sucked through the holes in the body and secondary air in the main duct. The mixture burns in the duct of the air blower to heat the air for drying grains.

7. Availability

As in (3) above



(1) COVER
(2) OIL CUP
(3) VAPOURIZE
(4) BASE
(5) INLET OPENING FOR PRIMARY AIR
(6) EXCESS OIL DRAIN

PADDY HUSK STOVE

1. Function — Burning of paddy husk as fuel for cooking

2. Specifications

Make	PAU
Type	Single fill
Energy source	Paddy husk
Length	600 mm
Width	560 mm
Height	620 mm
Weight	36 kg
Tank capacity	4 kg

3. Developed at — College of Agricultural Engineering, Punjab Agricultural University, Ludhiana, India

4. Test Results

Suitable for	Paddy husk
Feed rate	2.5 kg/hr
Heating capacity	4,500 Kcal/hr
Efficiency	60%

5. Cost

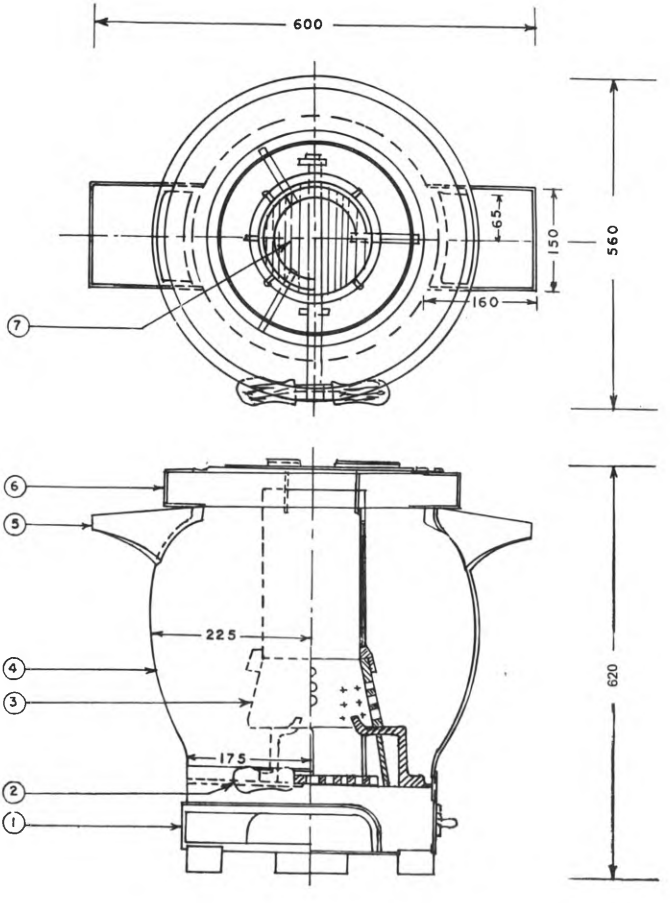
Sale Price	Rs 200 (US$25)
Operating	Nominal

6. General

Paddy husk stove comprises of a mild steel body, stand, roaster and lever for stirring. Four kg of husk is put in one filling and it lasts for 1.5 to 2 hours. Husk is burnt in a suspended condition. Stove gives a bluish flame without excessive smoke. Air intake of stove can be varied to get the desired amount of flame. Ash is taken out through the roaster provided at the bottom. Extra amount of husk, if needed can be filled through the two openings provided for this purpose without disturbing the flame.

7. Availability

As in (3) above



(1) STAND
(2) ASH STIRRING LEVER
(3) INSIDE BODY
(4) OUTSIDE BODY
(5) FEEDING TROUGH
(6) MAIN SUPPORT PLATE
(7) ROASTER

PADDY HUSK STOVE

HUSK FIRED DOMESTIC FURNACE

1. Function — Cooking and water heating

2. Specifications

Make	IIT
Type	Husk fired, continuous
Energy source	Paddy husk
Length	840 mm
Width	255 mm
Height	2000 mm

3. Developed at — Rice Process Engineering Centre, Indian Institute of Technology Kharagpur, India

4. Test Results

Suitable for	Paddy husk
Feed rate	3.5 kg/hour
Heating capacity	1900 Kcal/hour
Efficiency	18.0%
Labour requirement	One person

5. Cost

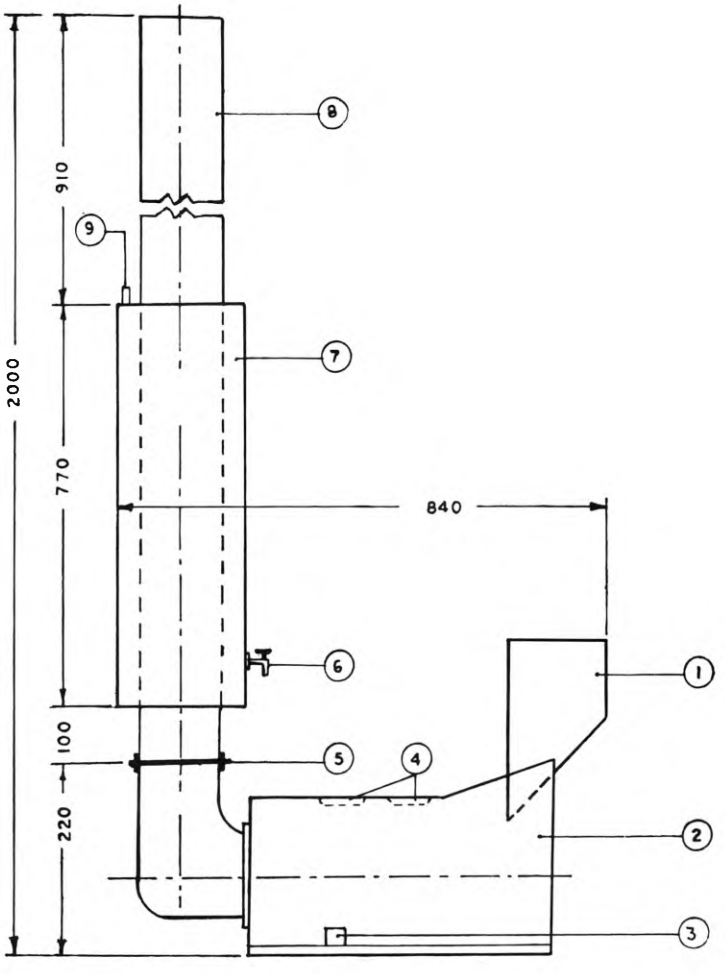
Sale Price	Rs 175 (US$22)
Operating	Rs 0.09/hour (US$0.01)

6. General

The unit is a step-grate stove with jacketted chimney. Husk is fed into the stove through a hopper and ash is taken out through an opening provided at the bottom. The jacket is 770 mm long and of 255 mm external diameter. It is provided around the chimney for heating water. It has a holding capacity of 20 litres. The stove is suitable for rural families where husk is available in plenty.

7. Availability

As in (3) above



(1) HOPPER
(2) HUSK BURNING UNIT
(3) OPENING FOR ASH REMOVAL
(4) COOKING SPACE
(5) FLANGE
(6) HOT WATER TAP
(7) WATER JACKET
(8) CHIMNEY
(9) COLD WATER INLET

HUSK FIRED DOMESTIC FURNACE

RECIRCULATING BATCH DRYER WITH HUSK FIRED FURNACE

1. Function — Drying of grain

2. Specifications

Make	IIT
Type	Batch type recirculating grain dryer
Energy source	Paddy husk, electricity
Length	4200 mm
Width	3000 mm
Height	6000 mm
Weight	1250 kg

3. Developed at — Rice Process Engineering Centre, Indian Institute of Technology, Kharagpur, India

4. Test Results

Suitable for	Rice
Actual Output	1.25 tons/batch
Power	4 kw
Labour	2 persons

5. Cost

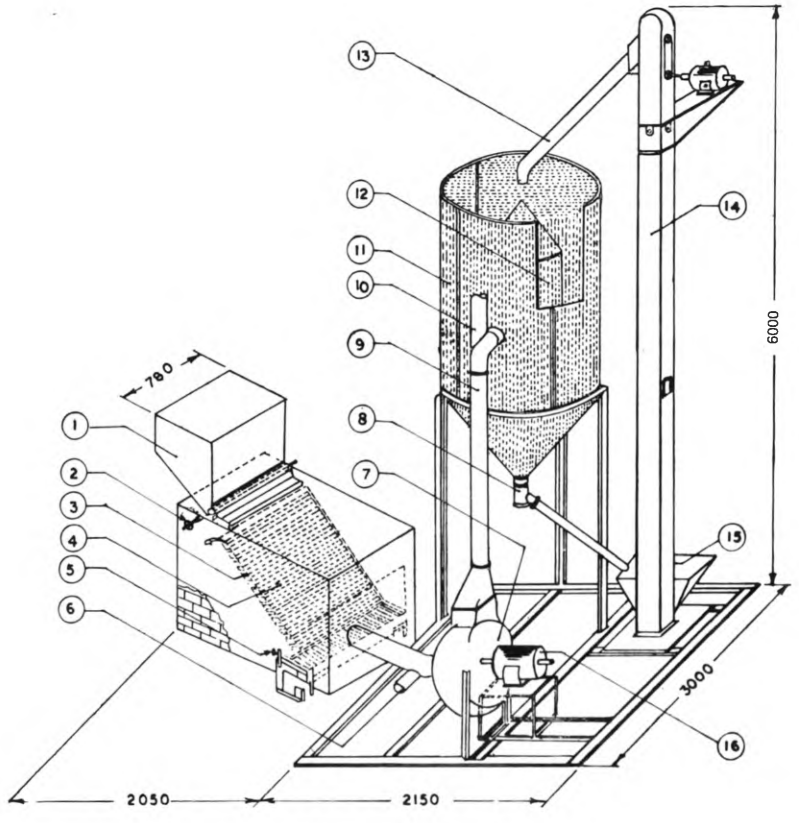
Sale Price	Rs 20,000 (US$2500)
Operating	Rs 8.50/ton of dried paddy (US$1)

6. General

The unit consists of a dryer and a husk fired furnace. Dryer has two concentric perforated cylinders bucket elevator having a capacity of 2.5 t/hr and a blower of .85 m^3/min capacity of a static pressure of 50 mm of water. The husk furnace consists of a hopper, a combustion chamber with inclined grate and a curtain wall. It can burn 20 kg of paddy husk per hour. The blower draws air through combustion zone of furnace and blows the hot air into inside chamber (12) which acts as a plenum chamber. Air from this chamber goes out through the paddy column and outside cylinder (11). Paddy is fed on top of inside cylinder and it comes in contact with hot air while flowing downwards in between two cylinders. Feed rate of paddy is controlled by closing or opening the gate (8) provided to the discharge hopper (15) of the dryer. Paddy is circulated till the moisture content drops down to 14%. This dryer can also be used for drying maize, jowar and pulses.

7. Availability

As in (3) above



(1) HOPPER
(2) PULLEY
(3) INCLINED GRATE
(4) FURNACE SPACE
(5) ROTATING LEVER
(6) SECONDARY INLET
(7) BLOWER
(8) DISCHARGE GATE
(9) HOT AIR DUCT
(10) FLUE GAS EXIT BY PASS
(11) OUTER CYLINDER
(12) INNER CYLINDER
(13) DELIVERY PIPE
(14) BUCKET ELEVATOR
(15) PADDY LOADING/DISCHARGE HOPPER
(16) MOTOR

RECIRCULATING BATCH DRYER WITH HUSK FIRED FURNACE

SEED TRAY DRYER

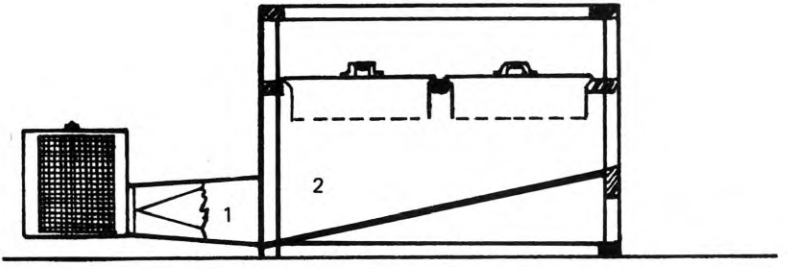
1.	Function	To dry certified vegetable seeds
2.	Specifications	
	Make	BPI
	Type	Batch
	Power	1/6 HP electric motor with 3 men
	Heat source	Electricity
	Length	1270 mm
	Width	1880 mm
	Height	8740 mm
3.	Developed at	Agricultural Engineering Division, Bureau of Plant Industry, Metro Manila, Philippines
4.	Test Results	
	Suitable for	All vegetable seeds
	Work capacity	25 kg/hour of operation depending upon the amount of moisture to be extracted
5.	Cost	
	Sale Price	P1,500 (US$205)
	Operating	P20/100 kg (US$3)

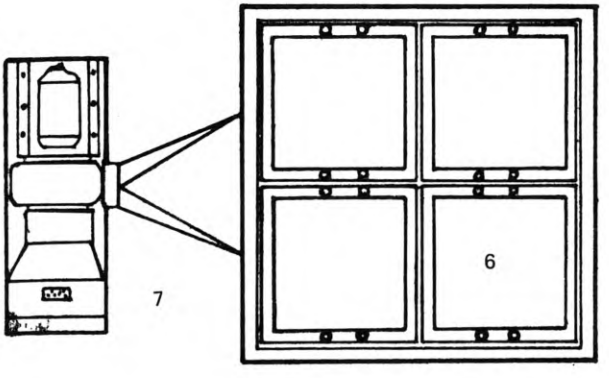
6. General

This dryer is a portable type with four components namely: (i) Bin – can accommodate 100 - 250 kg of seeds per hour of operation; (ii) Heater–made of series of nichrome wire; (iii) Blower – radial-type centrifugal fan and (iv) Prime mover – 1/6 HP electric motor. It has a direct system of transmitting heated air to the bin.

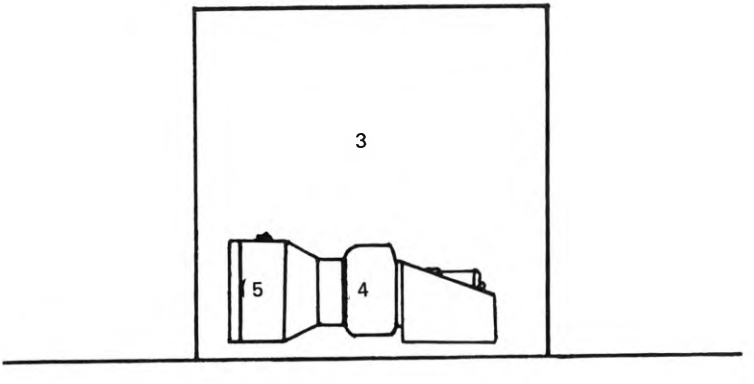
7. Availability

As in (3) above





(1) DUCT TRANSITION
(2) DUCT
(3) BODY
(4) BLOWER
(5) HEATER 5 KW
(6) TRAY
(7) SWITCH CONTROL



SEED TRAY DRYER

VERTICAL BIN BATCH DRYER

1. Function — To dry rice, corn, sorghum, etc.

2. Specifications

Make	IRRI
Type	Batch dryer
Power	3 HP electric motor 5 HP gasoline engine
Length	3440 mm
Width	1730 mm
Height	1580 mm
Weight	364 kg

3. Developed at — International Rice Research Institute, Los Baños, Philippines

4. Test Results

Drying capacity	2 tons (maximum)
Labour requirement	1 operator
Fuel Consumption:	
Engine	1.5 litres gasoline/hour
Burner	2.7 litres kerosene/hour
Drying rate	2% points/hour
Blower speed	2000 rpm
Grain bed thickness	460 mm
Fan	560 mm dia. tube-axial
Drying air temperature	43^{o}
Airflow	1.7 cu. m. m/sec

5. Cost

Sale Price	P8,000 (US$1,088)
Operating	P50/ton (rough rice, US$6.80)

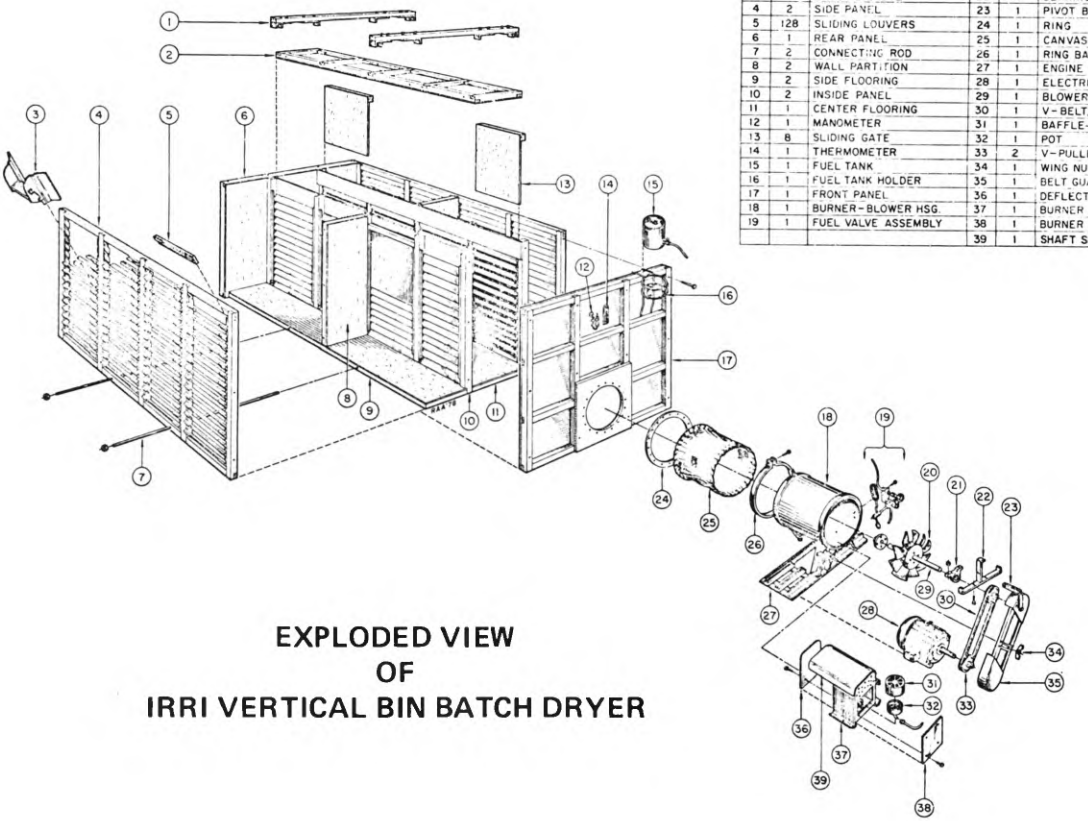
6. General

The dryer is made of wooden panels (4) (6) (8) (9) (10) (17) and bolted together forming a rigid unit. The grains are loaded on each side (4) of the bin and the heated air is supplied by the blower-burner (19) assembly. By adjusting the sliding gate (13) downward the unit could dry 1/2 to 1/4 of its capacity. Discharging the grain is made easy by inserting the bagging chute (3) with a sack in the side panel (4) and then remove one sliding louvres (5) directly above the bagging chute. Other important working details are i) Capacity – 2 tons paddy; ii) materials – wood and steel.

7. Availability

As in (3) above

COMPONENT PARTS LIST					
REF.	REQ'D	DESCRIPTION	REF.	REQ'D	DESCRIPTION
1	2	HORIZONTAL BRACE	20	1	BLOWER
2	1	CENTER COVER	21	2	1" PILLOW BLOCK BEARING
3	1	BAGGING CHUTE	22	1	BEARING MOUNT HANGER
4	2	SIDE PANEL	23	1	PIVOT BAR
5	128	SLIDING LOUVERS	24	1	RING
6	1	REAR PANEL	25	1	CANVAS
7	2	CONNECTING ROD	26	1	RING BAND
8	2	WALL PARTITION	27	1	ENGINE BASE
9	2	SIDE FLOORING	28	1	ELECTRIC MOTOR
10	2	INSIDE PANEL	29	1	BLOWER SHAFT
11	1	CENTER FLOORING	30	1	V-BELT, SECTION 'B'
12	1	MANOMETER	31	1	BAFFLE-COVER
13	8	SLIDING GATE	32	1	POT
14	1	THERMOMETER	33	2	V-PULLEY, SECT 'B'
15	1	FUEL TANK	34	1	WING NUT, 3/8"-16 NC
16	1	FUEL TANK HOLDER	35	1	BELT GUARD
17	1	FRONT PANEL	36	1	DEFLECTOR
18	1	BURNER-BLOWER HSG.	37	1	BURNER HOUSING
19	1	FUEL VALVE ASSEMBLY	38	1	BURNER HOUSING COVER
			39	1	SHAFT SHIELD



EXPLODED VIEW
OF
IRRI VERTICAL BIN BATCH DRYER

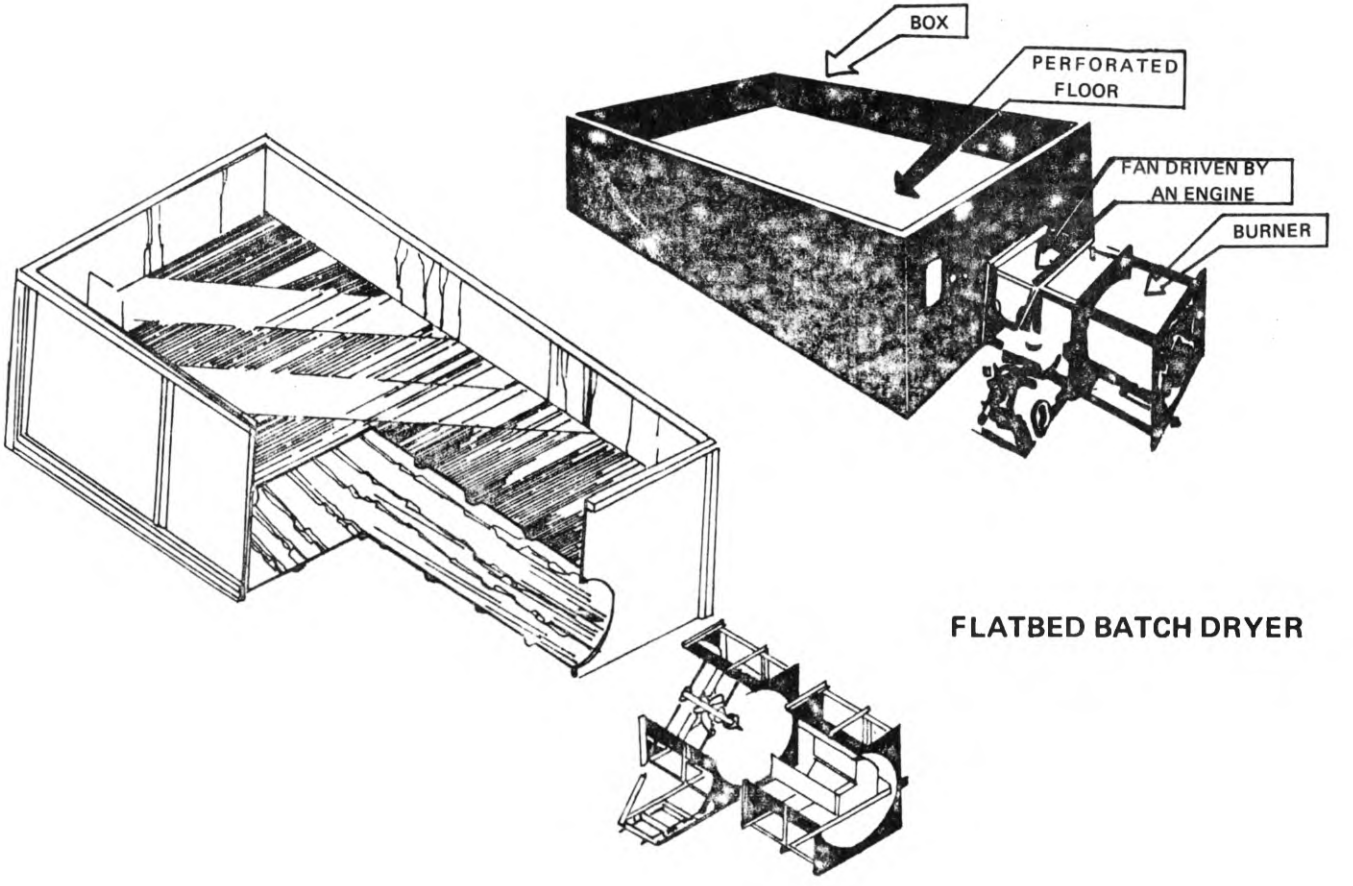
FLATBED BATCH DRYER

1.	Function	Drying of grain (paddy)
2.	Specifications	
	Make	UPLB–NFAC
	Type	Flatbed batch type
	Power	5-8 HP engine
	Heat source	Kerosene
		Drying bin:
	Length	3800 mm
	Width	290 mm
	Height	1220 mm
	Capacity	40 cavans (1 cavan – 50 kg at 14% moisture)
		Fan and Blower:
	Length	1220 mm
	Width	1130 mm
	Height	610 mm
3.	Developed at	Department of Agricultural Process Engineering and Technology, University of the Philippines at Los Baños, Philippines
4.	Test Results	
	Power Requirement	Gasoline – 1–5 li/hour
		Kerosene – 2 li/hour
	Air flow rate	3000 cfm per 40 cavans or 75 cfm per cavan
	Drying temperature	43.3°C (110°F)
	Work capacity	250 kg/hour
	Drying period	7–8 hours
5.	Cost	
	Sale Price	P3,643 (US$520)
	Operating	P1.20 (US$0.17)

6. General

The dryer has three main components: a bin to hold the grain in the perforated or lanced sheet metal floor above the plenum, a fan to force the drying air from the plenum through the grains, and a burner to heat the air. A direct flame, gravity-fed kerosene burner of vapourizing pot type is commonly used for the dryer. Rice hull-fired furnaces can also be used. Accessories are a U-tube manometer to indicate air pressure at the plenum and is used to set engine throttle opening or engine speed and a dial thermometer to indicate drying air temperature.

7. Availability — As in (3) above



FLATBED BATCH DRYER

GRAIN DYER

1. Function — Drying of grain

2. Specifications

Make	Hyub Sin Industrial Co.
Type	Recirculating type
Power	1.5 HP
Length	3,959 mm
Width	1,730 mm
Height	3,600 mm
Weight	759 kg

3. Developed at — Institute of Agricultural Engineering and Utilization, Suweon, Republic of Korea

4. Test Results

Suitable for	Rice and barley
Work capacity	1200 kg/hr

5. Cost

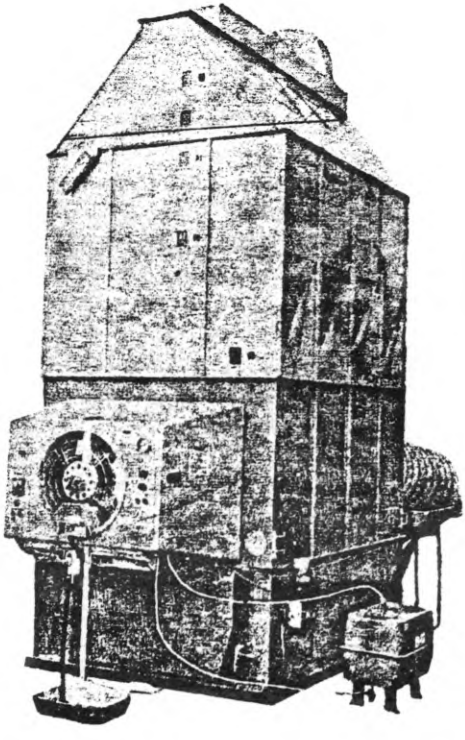
Sale Price	819,000 Won (US$1710)
Operating	880/hr (US$1.84)

6. General

Grain gets dried uniformly as it is lifted in bucker elevators.

7. Availability

As in (3) above



GRAIN DRYER