COUNTRY REPORT – INDIA

Country report presented in the Fourth Session of the Technical Committee of APCAEM, held during 10-11 February, 2009 at Chiang Rai, Thailand

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STATISTICS (in Mha)

Total geographical area	329.00
Net sown area	142.00
Area sown more than once	46.84
Gross cropped area	187.94
Cultivable waste land	13.66
Net irrigated area	55.00
Gross irrigated area	75.14
Cropping intensity	133.20 %
Total agricultural workers	234.10 Million

INDIAN AGRICULTURE
CHARACTERISTICS

- **Agro ecological diversity (15 ecological and 20 agro-climatic regions),**
- **Small and fragmented land holdings (165 million ha land possessed by 106 million farm holders)**
- **Hill agriculture and shifting cultivation.**
- **Abundance of marginal land with low humus and minimal irrigation facility.**
- **Erratic weather conditions**
- **Majority of the population dependent on agriculture**
- **Land preparation, harvesting, threshing and irrigation are the operations, which utilize most of the energy.**
- **The share of animate power in agriculture has decreased from 92 per cent in 1950-51 to <15 per cent in 2005-06.**

National Agricultural Research System

Institutes	…49
NRCs, Bureaux, Project Directorates	…45
AICRPs	…77
Agricultural Universities	…50
Total Scientists in Agriculture	~6000

Agricultural Production and Productivity

- Introduction of mechanical power has expanded agricultural engineering activities considerably.
- To meet the food grain need of 1.363 billion by 2025, productivity has to be increased by 100%
- This in possible by intensive farming.
- Energy input to agriculture has to be increased form 1.3 to 2.4 kW/ha.

Agricultural Production and Productivity

- Total food grain production increased from 50.8 MT in 1950-51, to 212 MT in 2006-07
- Productivity increased from 522 kg/ha to more than 1707 kg/ha
- Production of fruits (46 MT), vegetables (91 MT), milk (81 MT), fish (57 MT) has also increased
- Use of certified/quality seeds has increased to 700,000 tonnes.
- Fertilizer consumption has increased to 21.65 million tonnes (more than 112.69 kg/ha) in 2006-07 from 0.29 million tonnes in 1960-61. Annual growth rate was 11.7%
- Use of plant protection chemicals has increased to 56.11 thousand tonnes (0.4 kg/ha)

Global ranking of India in farm production and productivity

Crop	Production rank	Productivity rank
Paddy	2nd	30th
Wheat	2nd	22nd
Maize	7th	35th
Total cereals	3rd	36th
Groundnut	2nd	40th
Rapeseeds	3rd	28th
Pulses	1st	44th
Potato	4th	26th
Fruits	2nd (10% share)	-
Vegetables	2nd (9% share)	-

ENGINEERING INTERVENTIONS FOR

Increasing –

- Production & Productivity
- Comfort & Safety
- Return and profitability to farmer
- Reducing - Cost of cultivation
- Reducing - Drudgery

Advantages of Mechanization

Increase in productivity	**12 - 34%**
Seed-cum-fertilizer drill facilitates : **Saving in seeds** **Saving in fertilizer**	 **20%** **15-20%**
Enhancement in cropping intensity	**5-22%**
Increase in gross return	**29-49%**

Mechanization of Agriculture in India

Agricultural operations/machine	No. in million		Command in percentage of net area sown
	1992	2004 (Estimated)	
Tractors	1.22	3.00	
Iron plough animal drawn	9.60	14.84	26.13
Seed drill tractor drawn	0.39	0.87	18.38
Seed drill animal drawn	7.35	11.05	26.13
Thresher			
i) Wheat	1.07	3.80	88.9
ii) Paddy	0.035	0.40	5.50
iii) Multicrop	0.17	0.38	3.22
Plant protection equip.	2.97	6.88	57.08

FARM MECHANIZATION

- Availability of farm power or energy per unit area (kW/ha) is an important parameter for mechanisation.
- Power availability from all sources increased from 0.20 in 1950-51 to 0.90 kW/ha in 1996-97 and to 1.34 kW/ha in 2005-06
- Ratio of tractive power to total farm power has increased from 0.82 to 1.085

LEVEL OF FARM MECHANIZATION

Sl. No.	Operation	Percentage
1	Tillage Tractor Animal	40.2 15.6 24.7
2	Sowing with drills and planters Tractors Animal	28.9 8.3 20.6
3	Irrigation	37
4	Thresher- Wheat Paddy and others	47.8 4.4
5	Harvesting by Reapers Combines	 0.56 0.37
6	Plant protection	34.2

Present status of mechanization of crops

Crops	% Operations mechanized			
	Seedbed preparation	Sowing/planting/transplanting	Weed & pest control	Harvesting & threshing
Paddy	90	<1	90	70-80
Wheat	100	80-90	70-80	100
Potato	100	90	80-90	80
Cotton	75-100	30-50	50-60	<1
Maize	100	80-90	70-80	<20
Gram (chicpea)	75-100	30-50	60-70	<10

Present status of mechanization of crops

Crop	% Operations mechanized			
	Seedbed preparation	Sowing/planting/transplanting	Weed & pest control	Harvesting & threshing
Sorghum	75-100	30-50	60-70	<20
Millets	75-100	30-40	60-70	<20
Oilseeds	80-100	20-40	60-80	<20
Sunflower	80-100	40-50	80-90	60-70
Fodder crops	80-100	30-40	80-90	<1
Veg crops	80-100	<2	80-90	<1
Horticultural crops	60-70	20	40-50	<1

Population growth trends in stationary farm power sources in India for pump sets

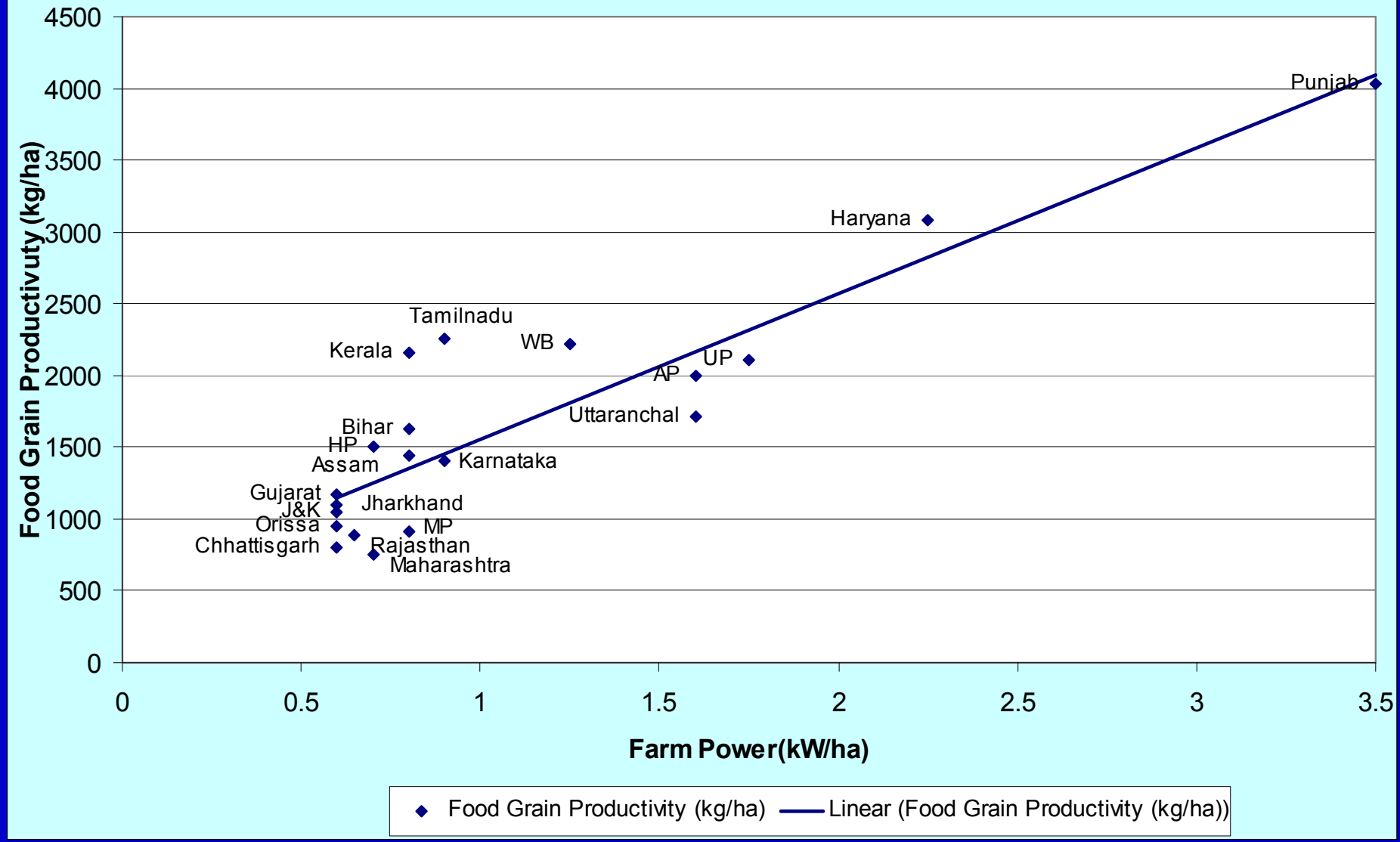
(in million)

Power	1961-62	1981-82	1991-92	1996-97	2003-04
Electric pump	0.1	4.33	9.34	11.57	16.0
Diesel pump	0.23	3.1	4.59	5.58	9.0

ENERGY IN AGRICULTURE

- 81792 million units of electricity and 40.12 million tonnes of high-speed diesel are available in the country as of 2005-06.
- Use of energy in agriculture varied from 9600 MJ/ha to as high as 21000 MJ/ha including seeds and fertilizer.
- Operational energy for crop production increased from 3,374 to 8,138 MJ/ha (annual growth rate of 3.6 per cent) during 1970 to 1996

Power Productivity Relationship



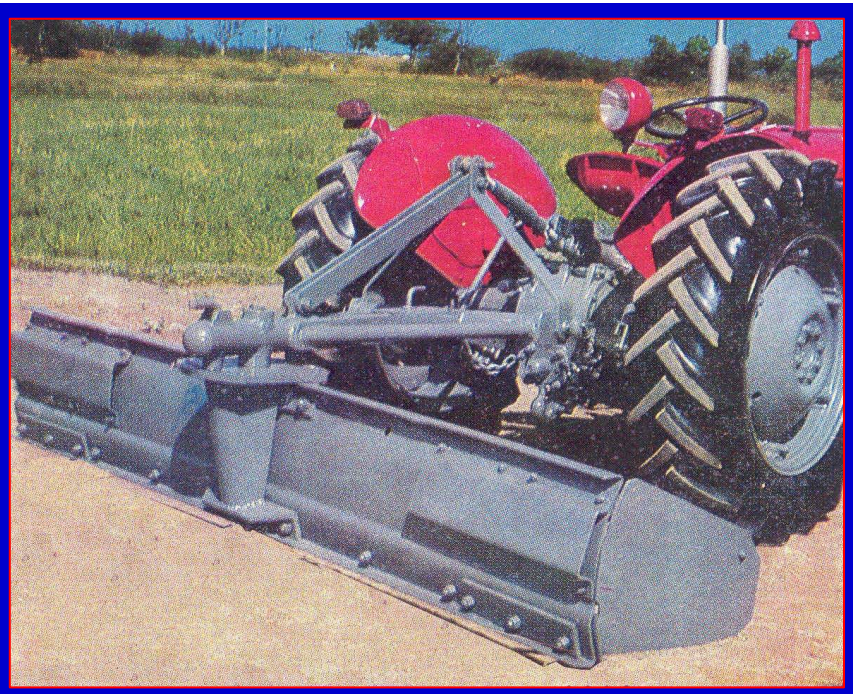
FOOD PROCESSING INDUSTRY

- Only 6% of total produce converted to processed and packed foods.
- Target to increase it to 20 per cent.
- More than 73% of rice, 55% maize, 24% pulses, 45% oil seeds, 45% sugarcane are processed by modern machinery
- Indian food industry is one of the largest in terms of production, consumption and growth prospects.

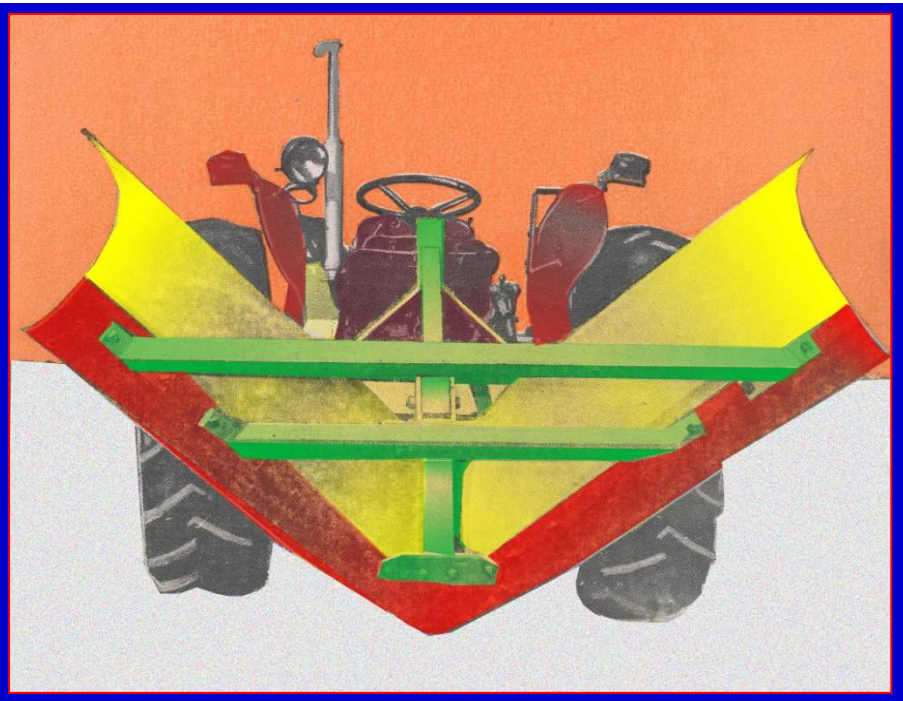
WOMEN FRIENDLY IMPROVED TOOLS AND EQUIPMENT FOR AGRICULTURE

- Women play active role in production agriculture.
- Women work force in agriculture is 61 million which is 30% of total rural workers.
- Women carry out crop production and food processing operations

IMPROVED FARM IMPLEMENTS AND MACHINERY

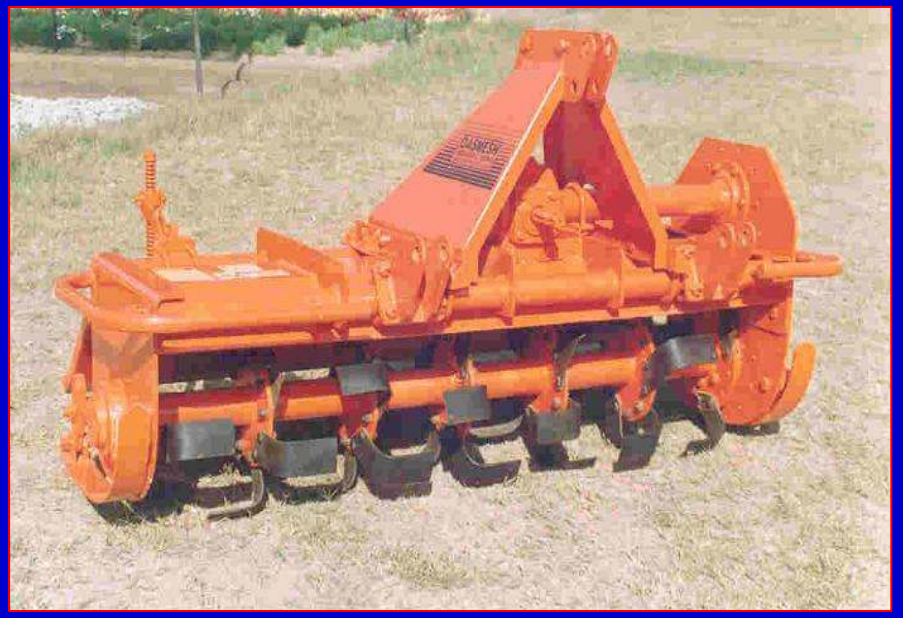


TERRACER BLADE



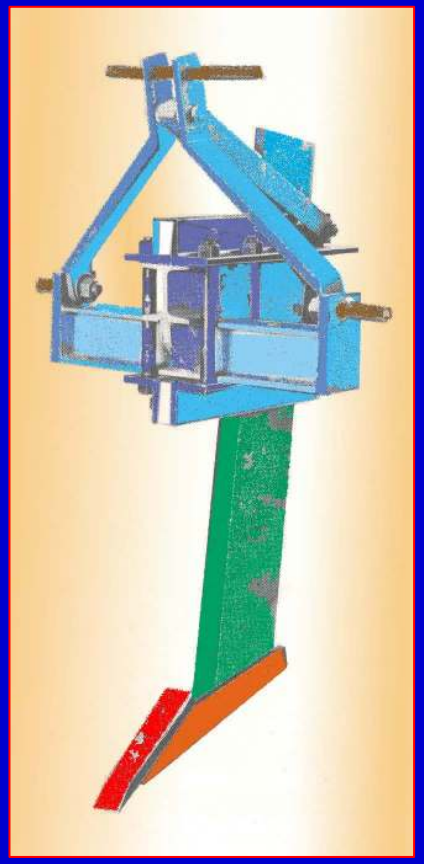
DITCHER

MB PLOUGH



ROTAVATOR

LAND LEVELLER



SUB SOILER

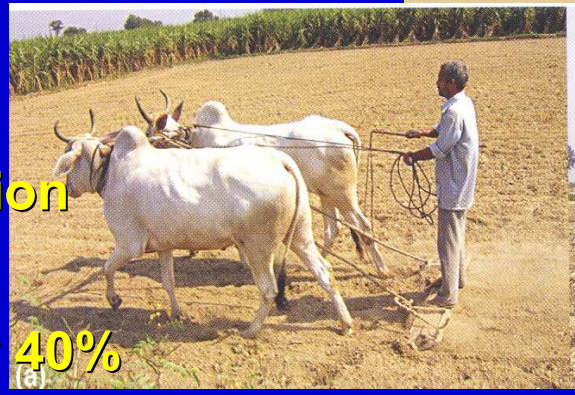
MOLE PLOUGH

DISC PLOUGH

R.C. through use of laser land leveling

- Leveling by
  - animal drawn leveler
  - tractor drawn leveler
  - laser land leveler (both direction)
- Poor crop stand
- Laser land leveler
- Reduces over irrigation and uneven distribution due to unevenness
- Increase water application efficiency up to 50%
  - Cropping intensity by 40%
  - Labour requirement by 35%
  - Crop yield by 15 to 66%
  - Increase cultivable area -3-5 %

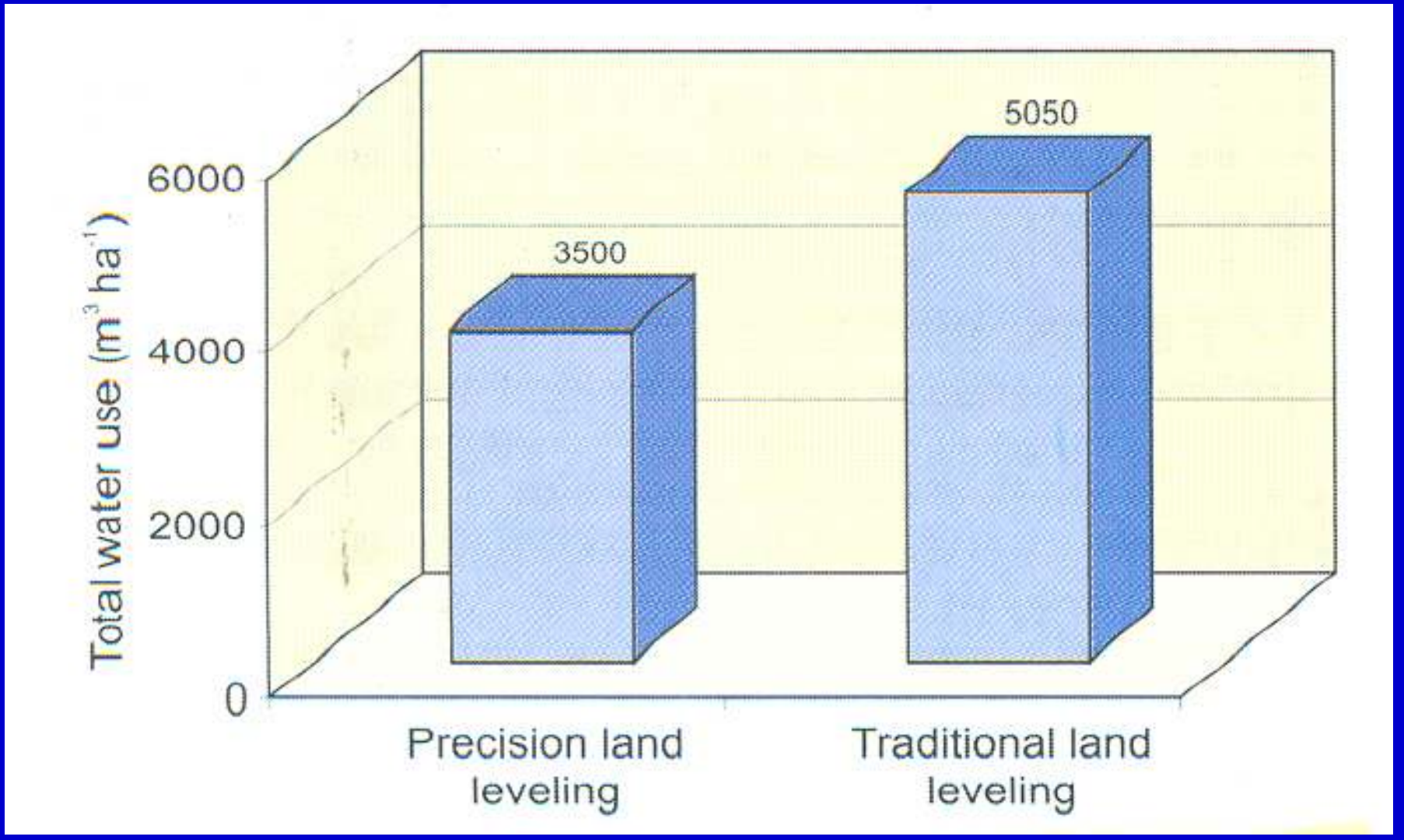
Laser land leveler



Advantages of Laser land levellers

- Punjab – 500 laser land leveler
  - 50 in U.P.
- Recover cost in 2-3 years
- Total water use in wheat and rice reduced by 50% and 32%,
- Laser leveling of 2 m.ha. will save
  - 1.5 m.ha. m water
  - 200 m litres of diesel
  - Improve crop yield amounting to US $ 1500 million in 3 years
  - Reduce GHG emission equivalent to 500 million kg

Total water use (m^3 ha^{-1}) in wheat under precision and traditional land leveling



FARM MACHINERY

Puddlers

Patela puddler

Lug wheel puddler

Animal drawn puddlers

Two passes of puddler saves 50% time and 60% cost of puddling per ha compared to 06 passes of traditional puddling

Lug wheel puddler

Peg type puddler

Tractor drawn puddlers

One pass is sufficient for puddling.

Tractor Mounted Rotary Tiller

- Output capacity: 0.25–0.40 ha/h

- Saves 40-60% of time and 20-30% water through puddling.
- Saving of 25-40% fuel for rice
- 15-25% fuel for wheat
- as compared to to conventional tillage implements.

Tractor mounted pulverizing roller attachment to tiller

- **Field capacity is 0.4 ha/h**
- **20-35 % savings in fuel**
- **20-30% savings in time**
- **Saves 20-30 percent water requirement for paddy fields due to better puddle.**

Plastic mulch laying machine

- Field capacity: 0.23 ha/h
- Efficiency of plastic laying machine = 75%

SOWING & PLANTING

Manual inclined plate planter

- ❖ Uniform distribution of seeds
- ❖ Saving of 30 % time/ man-hr and 20% seed and cost of operation.

A.D. Inclined plate planter

- ❖ Saving of 50 % of seed

Power tiller mounted seed cum fertilizer drill

SOWING & PLANTING

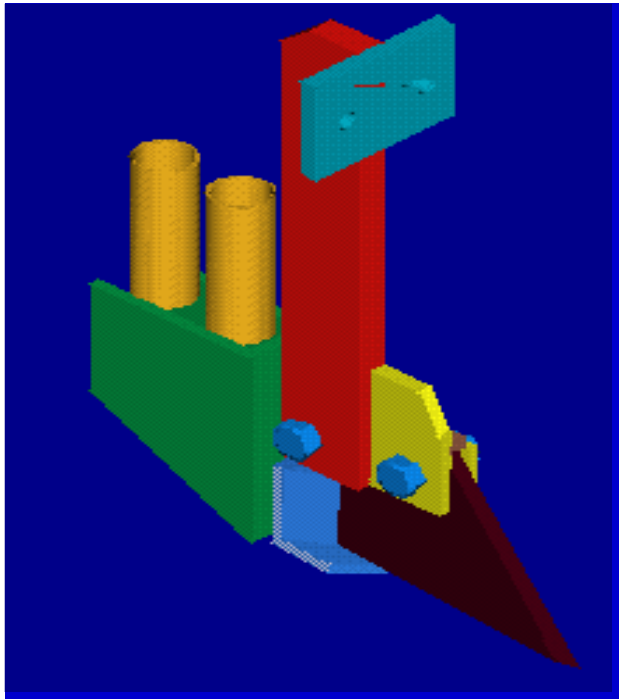
Tractor mounted till planter

Saving of Rs. 2500/- per ha over conventional planting

Tractor mounted plate planter

- Uniform distribution of seeds.
- Suitable for sowing of intercrops on Flat or Raised Beds.

Tractor Mounted Pneumatic planter
Savings of Rs.850/ha through of seed and cost of operation



Inverted 'T' furrow opener for no-trill-drill

Energy & Moisture conservation

Saving in time : 40-70%

Saving in fuel : 64%

Saving in water:10-15 %

No-trill-drill in operation

Energy Saving through use of No-till Drill in Wheat Crop

Parameter	Conventional practice	No-till drill	%saving
Labour requirement, man-h/ha	12	8	33.3
Fuel consumption, l/ha	31.6	12	62
Total operational energy, MJ/ha	6687	5777	13.7

Conservation drills

Particulars	Zero till drill	Strip till drill	Roto dill drill
Source of power	45 hp tractor	45 hp tractor	45 hp tractor
Type/no. of furrow openers	Inverted 'T' type/ 09-11	Shoe type/09	Shoe type/11
Row spacings, mm	180 (Adjustable)	200 (Fixed)	160 (Adjustable)
Working width, mm	1600-2000	1800	1750
Drive wheel	Angle lug – front mounted	Angle lug – side mounted	Star lug – rear hinged
Weight, kg	210	250	280
Unit price, Rs	30000	65000	85000

COMBO HAPPY SEEDER

(Machine for resource conservation)

- **Power Required : 45 hp Tractor**
- **Function : Direct drilling in combine harvested paddy field**
- **Capacity : 0.50 – 0.75 acre/h**
- **Cost : Rs. 90,000/-**

Happy Seeder in Operation

Tractor mounted raised bed planter

- Field capacity is 0.25 ha/h
- Forward speed is 2.5 - 3.5 km/h.
- More energy efficient and cost effective
- Saves about 20% seeds, 25% fertilizers and 30-35% irrigation water.

Tractor mounted inclined plate planter

- **Field capacity is 0.4 ha/h**
- **Effective width of coverage of 1850 mm**
- **Field efficiency of 64%.**
- **Reduces cost of planting compared to flat sowing of wheat.**

Manually operated low land rice seeder

- Output capacity: 0.10 to 0.14 ha/h
- Drum-seeded rice comes to harvest 7 days earlier as compared to transplanted crop.
- More number of panicles per plant
- More number of plants per square metre
- 6-7% increase in grain yield.

Self-propelled rice transplanter

- Uses mat type seedlings
- Capacity is 1.2-1.5 ha/day
- Works at a speed of 1.1-1.5 km/h
- Needs 5 persons for support
- Saves 65% labour
- Saves 40% in cost of operation

Tractor operated multipurpose implement for sugarcane

- **Field capacity is 0.20 ha/h for sugarcane setts**
- **0.8 ha/h for interculture**
- **0.4 ha/h for earthing up.**
- **Being costly machine multipurpose implement could facilitate interculture and earthing up operations in addition to planting of sugarcane setts.**

Tractor operated two/three row all crop transplanter (Picker wheel type)

Vegetables: Tomato, chilli, Brinjal, Cauliflower, Cabbage
Crops: winter maize, gobhi sarson, cotton

Two row

Three row

Row spacing = 60 cm Plant mortality = 0-7% Missing hills = 0-

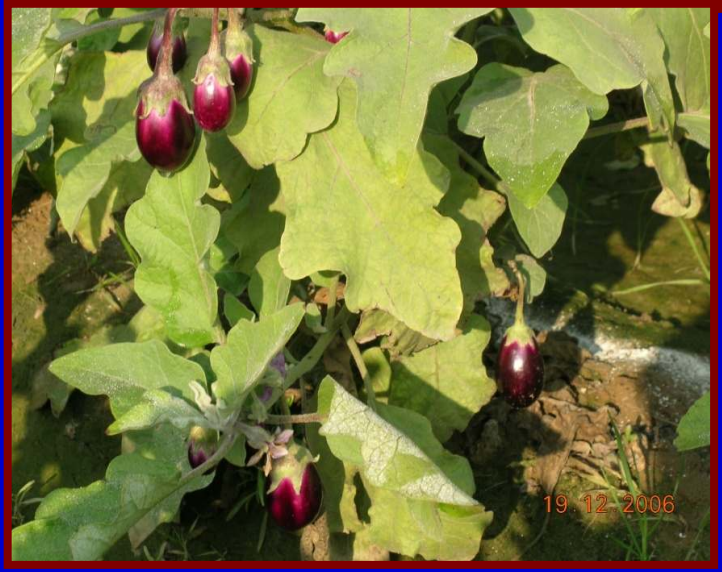
Vegetable Transplanter

Used for transplanting vegetable seedlings of tomato, brinjal, cauliflower etc and other row crops like maize, mustard etc on the beds as well as on flat.

Field capacity = 0.1 ha/h; Speed of operation = 1.0 km/h

Sarson

Brinjal



Cabbage

Cauliflower

Crop stand transplanted by transplanter

At farmer's field

At fresh farm field

Sunflower

Tractor operated hill drop planter in field operation

- Field capacity: 0.26 ha/h
- Save 87% time and 95% labour compared to manual sowing in hills.
- Cost of operation: Rs. 2000/ha

Tractor operated Cumin Planter

Used for planting small spice seeds

Field capacity

= 0.24 ha/h

Seed rate

Cumin = 10-12 kg/ha

Fenugreek =18-20 kg/ha

Coriander = 10 kg/ha

Twin-auger-digger sugarcane planter

- **Two pits dug simultaneously**
- **Pit to pit distance 120 cm**
- **Depth of pit is 28-35 cm**

8 setts per pit in star formation

Field Capacity is 0.02 -0.025 ha/h

Fuel consumption is 5.5-6.0 l/h

Manual Weeders

Grubber weeder

Cost saving up to 60% is possible at the early stages of crop growth.

Wheel hoe

The cost of weeding is also saved up to 50%.

Cono weeder

Weeding under wetland paddy cultivation

Self Propelled Weeder

Saves 90% time

Saves 30% in cost of operation

As compared to manual weeding

Tractor operated three row rotary weeder

Used for weeding in row crops

Speed of operation	2.0 -4.0 km/h
Width of machine	2-2.4 m
Row Spacing	67.5-90 cm
Weeding efficiency	61-82%
Damage	<3%
Labour saving	>70%
Cost saving	>50%

Tractor-operated Weeder

SMALL HP TRACTOR MOUNTED SUGARCANE INTER-CULTURING IMPLEMENTS

- Speed of operation:3.3 km/h
- Width: 1.2 m
- Field capacity : 0.3 ha/h
- Weeding efficiency: 95%
- Depth of operation: 10.5 cm

Self-propelled sprayer

AEROBLAST sprayer

Effective Field capacity is 0.41 ha/h

Field efficiency is 88.55 %

POWER TILLER MOUNTED ORCHARD SPRAYER

Area covered , ha :- 18.90
Coverage , ha/day :- 3.20- 5.60
Cost of operation, Rs./ha :- 128.28 to 224.50

Tractor-operated Aero-blast Sprayer

Tractor front mounted vertical conveyor reaper

- **Output capacity:**

  0.4 ha/h when operated at forward speed of 2.5-3.5 km/h

- **There is a saving of 130 man-h/ha and Rs. 1000/ha with the use of tractor operated reaper**

Self-propelled walking type Vertical conveyor reaper

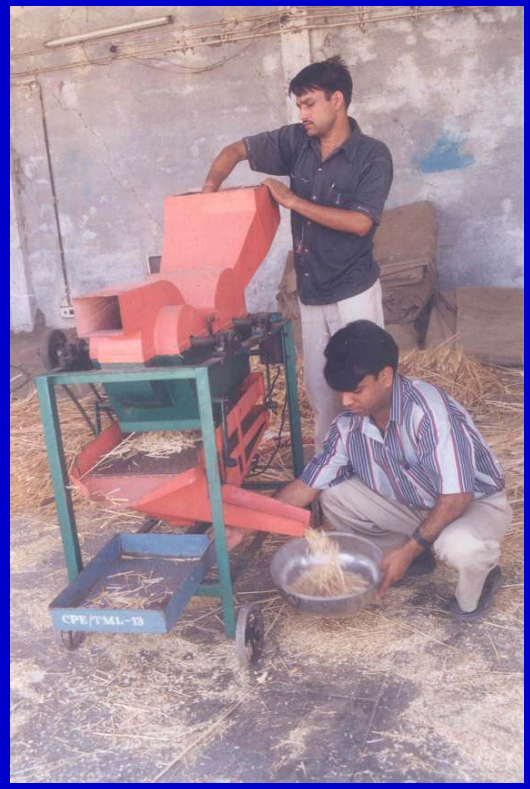
- **Output capacity:**

  0.15 - 0.17 ha /h

- **Saving of 90-95% in labour, time and cost of operation as compared to conventional method of manual harvesting with sickles**

Threshers

Single ear head thresher



Plot thresher

Suitable for threshing of ear heads and very small size samples from experimental plots.

A view of root crop harvester in operation for digging potato

A view of root crop harvester in operation for digging carrot crop

GROUNDNUT DIGGER

Digging efficiency is 98 %

PIGEON PEA THRESHER

- Saves 55-75% in cost of operation
- Saves time
- Electric motor or tractor power can be used
- Threshed stalk can be saved for domestic use

GROUNDNUT THRESHER

Suitable green and freshly harvested groundnut crop

Sunflower thresher

- Output capacity is 6-9 q/h
- Threshing efficiency is 100%
- Saves 70-80% of labour
- Saves 40-50% in cost of operation
- Axial flow design gives 3-4 times more output

HIGH CAPACITY MULTI-CROP THRESHER

- Output capacity:
- 16-20 q/h for wheat
- 8-10 q/h for raya
- 6-8 q/h for bengal gram
- 4-5 q/h for green gram
- Threshing efficiency: 98-99%
- Un-threshed grain 1.5-2.0%
- Visible damage 1.0%.
- Average total losses are about 5%.
- Capacity and power required varies as per model

WHOLE PLANT MAIZE THRESHER

- **Output: 500 kg/h**
- **Threshing eff.:100%**
- **Cleaning eff.: 96%**
- **Cost of threshing: Rs. 50/q**

MAIZE DEHUSKER CUM SHELLER

SELF PROPELLED HARVESTER FOR BARSEEM

FLAIL TYPE HARVESTER-CUM-LOADER

Cuts straw from bottom collects straw and loads into trailer

- **Power requirement is 35 hp**
- **Width of Machine is 1.5 m**

TRACTOR OPERATED STRAW REAPER (COMBINE)

- Output capacity: 0.4 to 0.6 ha/h
- Straw recovery is about 70-80%.
- Depends on stubble height
- Straw recovery rate varies from 25 to 35 q/ha.
- Grain recovery is 100-120 kg/ha.

MANUAL CLIMBING DEVICE FOR PALMYRA

- **Suitable for palmyra trees about 9 to 15 m tall.**
- **Suitable for trunk diameter of 350 to 150 mm**
- **By pushing the slider and locking it in position, the width of the gripping frame can be adjusted.**
- **Climbing 10 m/1.5 min**
- **Cost of unit is Rs. 2000**

CUTTER BAR TYPE HARVESTER AND CHAFFER-CUM-LOADER

Used for cutting tall fodder crops such as jowar, bajra, maize etc.

Effective width of cut = 1.5 m
Size of cut of fodder = 18-20 mm
Capacity Mower = 0.2 ha/h Chaffer-cum-loader = 12-18 t/h

Chaffer-cum-loader

Used for cutting fodder crop into small pieces and loading into trolley

Barseem Crop

Field capacity: 0.05 to 0.10 ha/h

Field efficiency: 95-99%

Height of cut: 4-6 cm

Oat Crop

Cutter bar type forage harvester

Used for cutting small fodder crops such as barseem, oats etc.

Self-propelled flail type forage harvester with collection basket

Used for cutting fodder crop and collecting in basket

Tractor mounted onion harvester-cum-elevator

- **Depth of operation: 76-115 mm**
- **Speed of operation : 2.0-2.5 km/h**
- **Capacity: 0.25 ha/h**
- **Exposed tuber = > 99%**
- **Damage = < 1%**

TRACTOR MOUNTED CARROT HARVESTER-CUM-ELEVATOR

Carrot Digger Harvester Elevator

- Depth of operation:76-115 mm
- Speed of operation: 2.0-2.5 km/h
- Capacity: 0.25 ha/h

- Exposed roots = > 99%
- Labour saving = 60%
- Damage = < 1%

Combine Harvester

Rice Straw Chopper cum Spreader


CLAAS


CLAAS

- **ERGONOMICS AND SAFETY**
  - methodology and instrumentation for data collection on anthropometric and strength parameters
  - design of farm tools and equipment based on ergonomic principles & anthropometry of local workers
  - workplace design and layout
  - accident prevention measures and safety gadgets
  - technology for reduction of noise and vibrations

- **GENDER ISSUES**

GENDER SPECIFIC EQUIPMENT DESIGN










Irrigation Equipments

- Sprinkler Systems
- Drip Systems

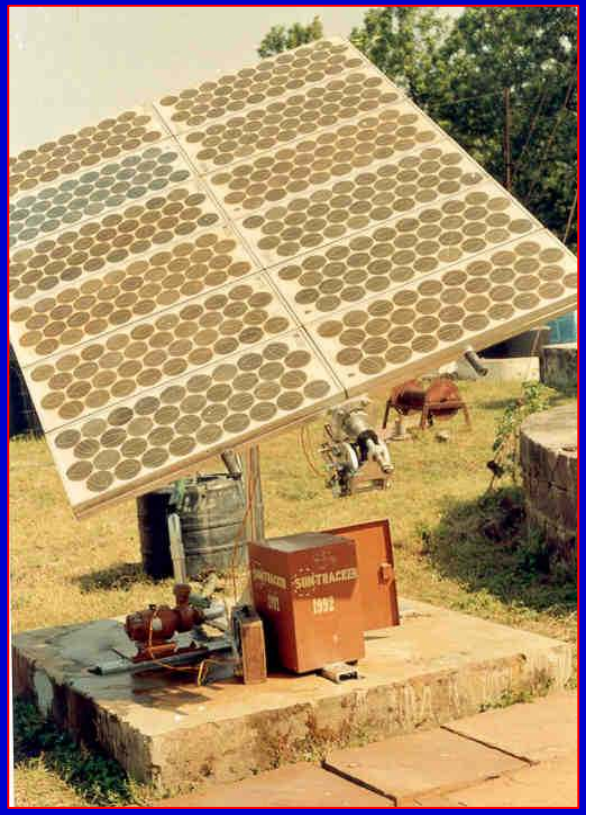
Sprinkler Systems

Drip Systems

Renewable Energy Technologies

Double Reflector Solar Cooker

Improved cook stove



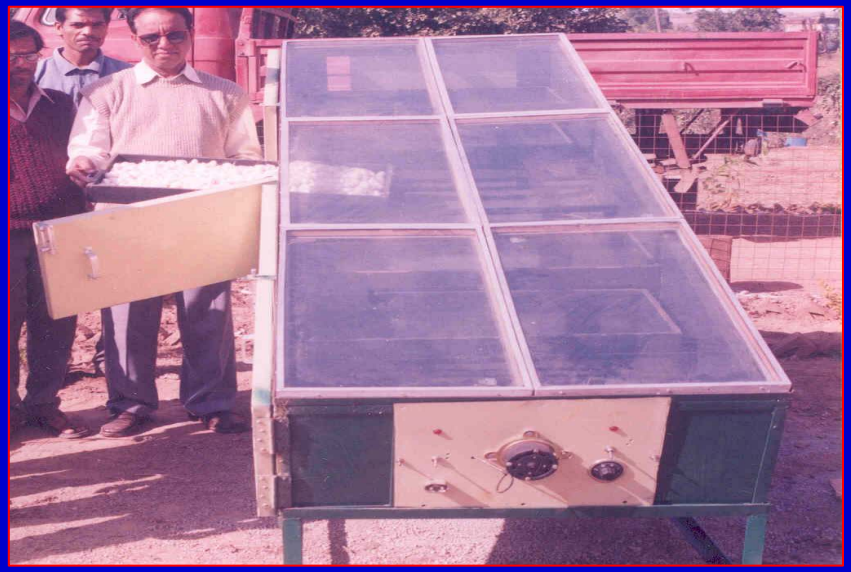
Sun tracker

Solar cum wind aspirator

Community biogas plant

Sun dryer

Biogas plant for chicory



Cocoon stifler

Solar tunnel dryer

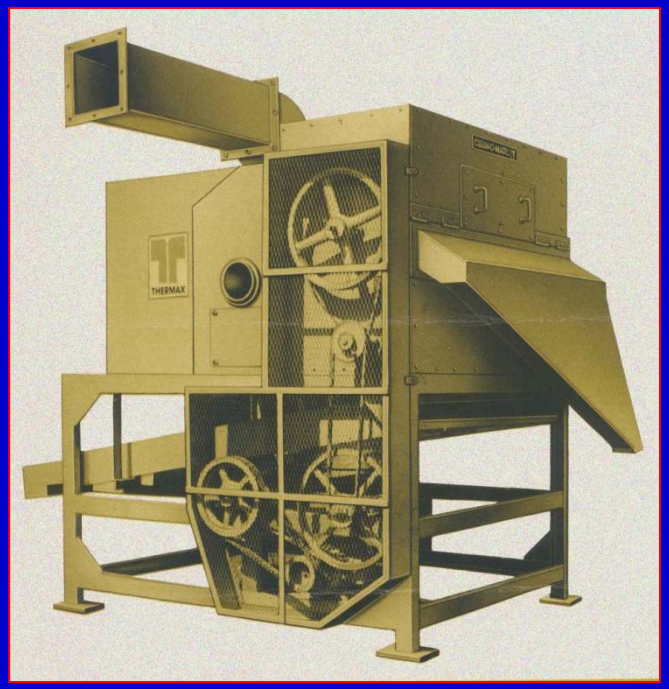
Janta Biogas Plant

100 kW gasifier

Agro Processing Machinery

Hanging Type Cleaner

Pedal Cum Power Operated Cleaner Grader



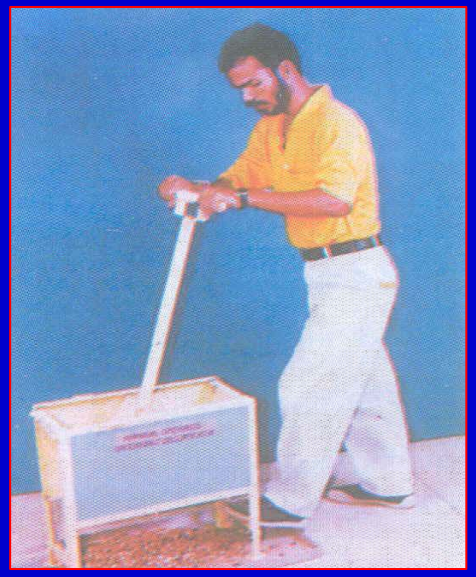
Seed Cleaner

Sack Holder

Spectrum Virbo Cleaner

Seed Cleaner cum Grader-4 Screen

Sitting Type Groundnut Decorticator



Groundnut cum Caster Decorticator

Grain Mill

Chilli Seed Extractor

Dal Mill

Seed Extractor

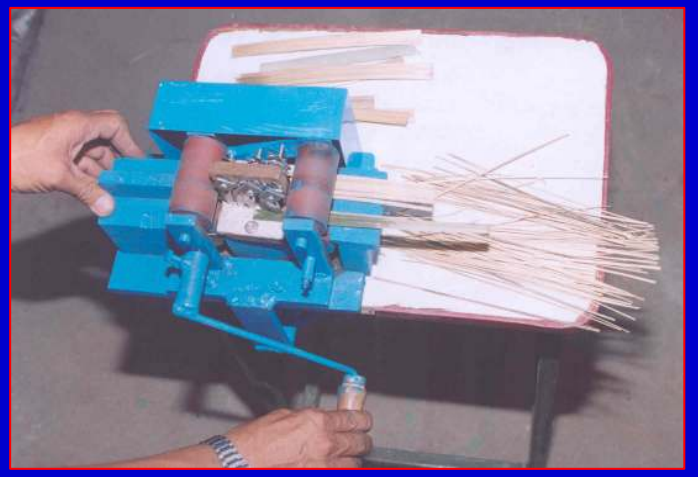
Fruits and Vegetable washer

Tomato Seed extractor

Soybean Dehuller

Rice Dehuller

Integral Extrusion expelling unit



Bamboo stick making m/c

Soybean Flanking Machine

Cottage Level Soy Paneer Plant

Soy-paneer

Full-fat soyflour

Soy-biscuits

Soy-rasogulla

Soy-yogurt

Soy-muffins

Soy-nuts

Soy-shrikhand

Soy-amrakhand

Agro-processing centres

APC was established with

- Flour mill (80 kg/h),
- Dal mill (50 kg/h for final split dal),
- Burr mill (30 kg/h for final split dal) and
- Multi purpose grain mill (30 kg/h)

Selling the products at 20% of profit as compared to the cost of production of the products the Return On Investment and Pay Back Period of the Agro Processing Centre was found to be 104% and 0.44 years (5.3 months) respectively.

Agro-processing centres

More agro processing centres are going to be setup in production catchments based on

- Produce
- Surplus over local consumption
- Perishability
- Market

Agro Based Enterprise Development

- Entrepreneurship development through custom hiring
- Entrepreneurship development through agro-processing centres for
  - Value addition
  - Loss reduction
  - Higher returns to farmers
- Entrepreneurship development through farm machinery manufacturing

Through custom hiring

To derive advantage of low unit operating cost and high labour productivity, high capacity farm equipment are gaining popularity through custom hiring. This aspect will have great influence on farm mechanization in future.

Success stories of India in Harayana State includes:

- **Tractor mounted zero till seed cum fertilizer drill ;**
- **High capacity multi crop thresher;**
- **Straw combine;**
- **Tractor mounted rotavator.**

Summary of success stories of custom hiring

No.	Equipment	Crops	Area covered, ha	Net profit Rs/ Year/ Machine
1	Zero till seed cum fertilizer drill	Wheat	5,00,000	10,000
2	Multi crop thresher	Raya, Wheat, Gram	2275	86,000
3	Straw Combine	Wheat	770	66,000
4	Rotavator	Wheat, Rice	70,000	1,01,625

Through farm machinery manufacturing

To meet out the demand from all corners of the country, it is not possible to supply the desired machinery through centralized manufacturing.

Transportation cost and repair and maintenance adds to increase in cost of equipment.

Efforts are to be made to develop decentralized manufacturing of agricultural machinery

Opening up of service centers for repair and maintenance through entrepreneurship in rural areas

TRAINING AND TESTING ACTIVITIES FOR TRACTORS AND FARM MACHINERY

- The Ministry of Agriculture, Government of India has four Farm Machinery Training and Testing Institutes one each in North, South, North-East and Central India.
- Central Farm Machinery Training and Testing Institute, Budni is a premier Institute functioning since 1955.
- Other sister institutes are located in Hisar (Haryana), Anantpur (Andhra Pradesh) and Biswanath Charially (Assam).
- The main objectives of these are training in agricultural machinery and promotion of farm mechanization and testing of tractors and agricultural machinery.

TRAINING AND TESTING FACILITIES

- Bureau of Indian Standards also accredits the laboratories of these institutes for testing of the samples under BIS central certification marks scheme.
- Engine tests laboratory for testing of stationary diesel engines as per IS:10001 and petrol/ kerosene engines as per IS:7347.
- Centrifugal pump test laboratory for testing of centrifugal pumps as per IS:6595.

TRAINING AND TESTING FACILITIES

The testing wings have laboratories for testing agricultural machines.

- Plant protection equipment test laboratory
- Implement test laboratory.
- Fuel filter test laboratory.
- Design and drawing section.
- Instrumentation cell
- Computer cell & Reprographic section.
- It is authorized to test Self-propelled Combine Harvesters and engines having output capacity from fractional horsepower to 700 kW.

STATE-OF-THE ART-FACILITIES AT CIAE

Tillage and Soil Dynamics
Seeding and Planting: Sticky belt setup

Soil Bin

Ergonomics : equipment for anthropometric and strength data measurement

Plant Protection:
Nozzle test setup

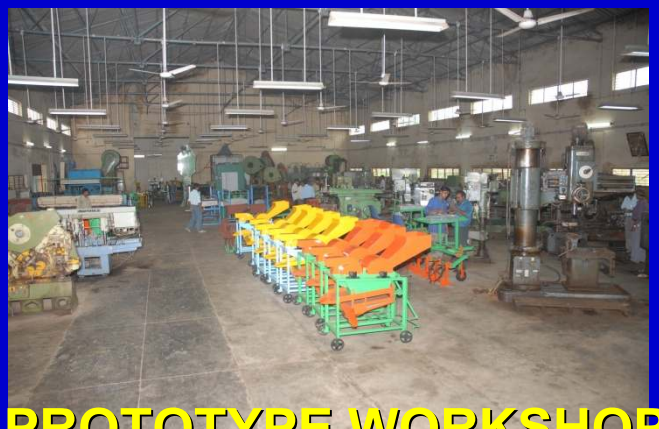
STATE-OF-THE ART-FACILITIES AT CIAE

- Engineering Properties of food materials
- Food Processing and Product Development
- Material Testing for manufacturing of agricultural equipment
- Instrumentation for agricultural engineering R&D and testing of farm equipment

CAD Centre

LIBRARY

INTERNATIONAL GUEST HOUSE



PROTOTYPE WORKSHOP

STATE-OF-THE ART-FACILITIES AT CIAE

- Engineering Properties of food materials
- Food Processing and Product Development
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INTERNATIONAL TRAINING PROGRAMMES

- Design, Testing and Production Technology of Agricultural Implements and Machinery
- Machinery for Mechanization of Rice Cultivation
- Field Plot machinery for mechanization of Field Research.
- Utilization of improved agricultural machinery for increasing production & productivity.
- Women friendly technologies on the farms for crop production, value addition, renewable energy utilization & rural entrepreneurship
- Instrumentation for R&D in Agricultural Engineering
- Computer Aided design of Agricultural Machinery
- Manufacturing Technology for agricultural machinery

Contd.,

INTERNATIONAL TRAINING PROGRAMMES

- Entrepreneurship development for custom hiring of farm equipment
- Irrigation Equipment Testing
- Use of Ergonomics in design of farm tools & equipment
- Material testing for manufacturing of farm equipment
- Use of soybean for fortification of conventional foods and neutraceutical applications.

WHAT WE CAN DO TOGETHER

In Research & Development

- Mechanization studies and formulation of need based mechanization packages
- Design and development of hand tools, animal drawn implements, and power operated equipment.
  - Seedbed preparation
  - Sowing, planting and fertilizer application
  - precision planting
  - transplanting
  - weeding, interculture
  - plant protection
  - harvesting, threshing
- Manufacturing technology for batch production of farm equipment

Contd.,

WHAT WE CAN DO TOGETHER

- Ergonomics and safety
  - methodology and instrumentation for data collection on anthropometric and strength parameters
  - design of farm tools and equipment based on ergonomic principles & anthropometry of local workers
  - workplace design
  - accident prevention measures and safety gadgets
  - technology for reduction of noise and vibrations

WHAT WE CAN DO TOGETHER

Policy

- **Impact studies on farm mechanization**
- **Identification of suitable designs of tools and equipment and their need based exchange among member countries.**
- **Network of testing, certification and quality control facilities among the member countries.**
- **Guidance to post graduate students of agricultural engineering and allied fields for their projects/ dissertations.**
- **Project appraisal, feasibility studies, consultancy and contract research in various sub disciplines of agricultural mechanization**

CONCLUSIONS

India has made significant progress in the adoption of modern methods of cultivation

India has excellent infrastructure for utilizing the national resources available at its command.

India's image has been transformed from *'begging bowl' to 'bread basket'* through the efforts of various agencies combined with scientific and engineering inputs in agriculture.

Indian agriculture has evolved into a mature and modern enterprise over the last five decades.

Farm mechanization has leapfrogged over the years with the net sales of machinery to over Rs 500 billion, entirely through indigenous efforts.

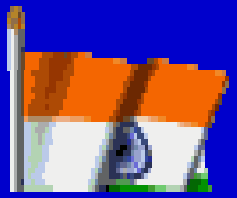
CONCLUSIONS

Impact of tractorization as against oxenisation is evident from the fact that India is the largest producer of tractors in the world.

Increase in cropping intensity, timeliness of operations and reduction in drudgery have encouraged the adoption of modern methods of cultivation.

An increase of 15% in productivity and a reduction of 20% in the cost of cultivation is possible by engineering interventions.

There is an urgent need to extend it to the entire gamut of production agriculture in the country.



Thank You

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