# COUNTRY PAPER - PAKISTAN

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ISLAMBAD

17-18 October 2913

## The 9th Session of the TC of UN-CSAM
## CIAE, Bhopal, India

# Pakistan Agricultural Research Council (PARC) is the apex national agricultural research organization

## Main Functions

- Undertake, aid, promote and coordinate agricultural research
- Arrange expeditious utilization of research results
- Establish research Institutions mainly to fill in the gaps in existing programmes of agricultural research
- Arrange the training of high level scientific manpower in
- agricultural sciences
- Generate, acquire and disseminate information relating to agriculture
- Establish and maintain a reference and research library
- Perform any other functions related to the matters aforesaid

# BASIC INFORMATION

| | | |
|---|---|---|
| Geographical Area | | 79.61 million ha |
| Population | | 184.35 million |
| Literacy Rate | | 58 % |
| | Male | 70% |
| | Female | 47 % |
| Rainfall (mm) | | 127 ~ 1250 |

## Area, Production and Yield of Major Crops

| Crop | Area ('000 ha) | Production ('000 tones) | Yield (kg/ha) |
|---|---|---|---|
| Wheat | 8649.8 | 23473.4 | 2713.8 |
| Cotton | 2834.5 | 13578.6* | 814.8** |
| Rice | 2571.2 | 6160.4 | 2395.9 |
| Sugarcane | 1057.5 | 58396.4 | 55221.2 |

*000 bales; ** Lint

# Agriculture in National Economy

| | |
|---|---|
| Å Gross Domestic Product | 21.4% |
| Å Employment | 45% |
| Å Export Earnings of Raw & Processed Products | 65% |
| Å Industrial Production | 51% |

# Farm Mechanization Aims at;

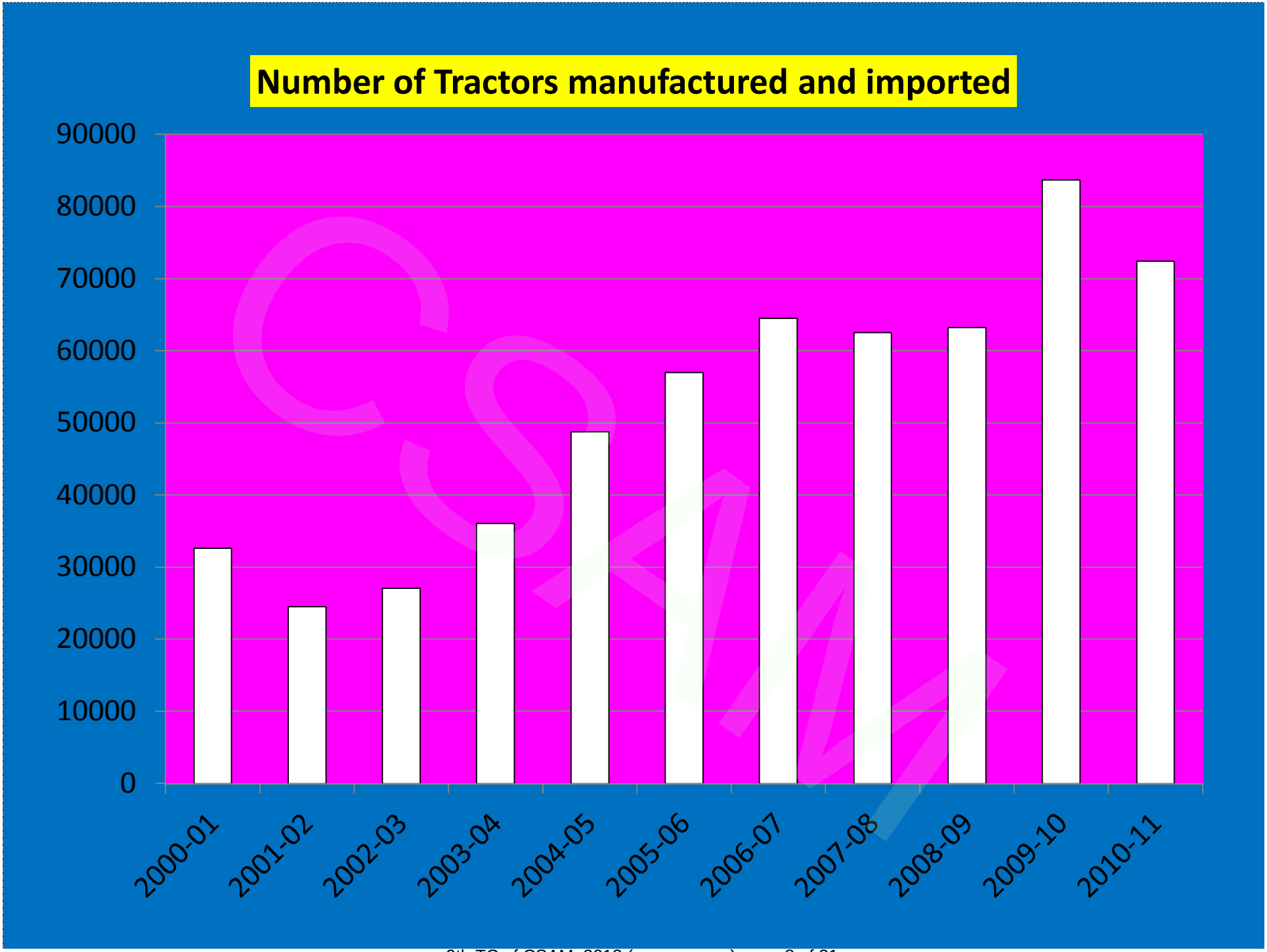
- Increasing productivity of land and labor
- Bringing in more area under cultivation
- Conserving energy and resources
- Sustaining agricultural production
- Improving operator's comfort and safety
- Protecting environment
- Increasing farm profits

# Farm Mechanization:
## National Perspective

- Practicing selective mechanization
- Mechanized operation for which there was shortage of labor, power or both
- Popular form of mechanization are:
  - Bulldozers
  - Power rigs
  - Tractors with cultivator, wheat thresher and sprayers
  - Tube wells

# Agricultural Machinery Used in Pakistan

| Machinery | 1968 | 1975 | 1984 | 1994 | 2004 |
|---|---|---|---|---|---|
| Tractor | 18,909 | 35,714 | 157,310 | 252,861 | 401663 |
| Cultivator | 14,338 | 31,619 | 146,863 | 236,272 | 369866 |
| Mould Board Plough | 2,335 | 2,734 | 7,319 | 28,413 | 40050 |
| Disc Plough | 2,513 | 2,938 | 6,355 | 20,372 | 29218 |
| Blade | 3,925 | 4,200 | 69,004 | 164,489 | |
| Chisel Plough | - | - | 712 | 6,535 | |
| Rotavator | - | - | 2,101 | 5,594 | |
| Bar/Disc Harrow | 2,007 | 2,373 | 8,140 | 12,233 | 23764 |
| Ridger | - | 120 | 4,711 | 10,984 | 71338 |
| Grain Drill/Planter | 563 | 1,174 | 11,251 | 64,126 | 70810 |
| Sprayer | - | - | - | 20,778 | |
| Trailer | - | 18,074 | 98,787 | 176,412 | 242655 |
| Wheat Thresher | - | 5,635 | 78,377 | 112,707 | 137270 |
| Reaper | - | - | - | 7,972 | |
| Combine Harvester (Wheat & Paddy) | - | - | - | 859 | 6000 |


Number of Tractors manufactured and imported
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
2000-01
2001-02
2002-03
2003-04
2004-05
2005-06
2006-07
2007-08
2008-09
2009-10
2010-11

# PRICES OF LOCAL/IMPORTED TRACTORS (2012-13)

| Tractors Model - Horse Power (HP) | Price/Unit (Rs) |
|---|---|
| NH/FIAT- 480S (55 HP) | 651,200 |
| NH/FIAT- 480 Power (55 HP) | 660,000 |
| NH/FIAT- Ghazi (65 HP) | 726,000 |
| NH/FIAT- Ghazi S(65 HP) | 737,000 |
| NH/FIAT- 640 (75 HP) | 940,500 |
| NH/FIAT- 640S DB(75 HP) | 951,500 |
| NH/FIAT- 640 S(85 HP) | 1,034,000 |
| NH/FIAT- 640 S DB(85 HP) | 1,045,000 |
| NH 55-56(55 HP) | 715,000 |
| NH 60-56(60 HP) | 797,500 |
| MF 240(50 HP) | 671,000 |
| MF 260(60 HP) | 737,000 |
| MF 350(50 HP) | 726,000 |
| MF 360(60 HP) | 779,000 |
| MF 375(75 HP) | 968,000 |
| MF 385(85 HP) | 1,078,000 |
| MF 385 (4WD) (85 HP) | 1,660,000 |
| Universal-530 (55HP) | 619,400 |
| Universal-530 (55HP)Plus | 665,175 |
| Universal-533 (55HP)Plus | 665,175 |
| Universal-640 (65HP) | 843,150 |
| Universal-683 (83HP) | 889,000 |
| Ursus-2812 (50 HP) | 6,34,700 |
| Ursus-3512 (60 HP) | 7,20,500 |

Source: Pakistan economic survey 201-13

# Tractors Deletion Achieved

| S.No. | Make | Model | Deletion % |
|---|---|---|---|
| 1 | Massey Ferguson | MF-240, MF-260 | 87 |
| 2 | Massey Ferguson | MF-265/375, MF-385 | 60 |
| 3 | Fiat | Fiat-480 & Fiat-640 | 85 |
| 4 | Belarus | MTZ-50 & UMZ-6AKM | 60 (no more in business) |
| 5 | Ford | 3600 & 4600 | no more in business |
| 6 | IMT | 540 & 560 | no more in business |

# Farm Power Available

| Power Source | Numbers | kW/ Unit | Power Available (Million kW) | Share of Each Source (%) |
|---|---|---|---|---|
| Agriculture Labor Force (million) | 34.8 | 0.075 | 2.61 | 8.1 |
| Work Animal (million) | 3.78 | 0.40 | 1.51 | 4.7 |
| Tube well (Diesel,Electric,others) | 922146 | 8.952 | 8.26 | 25.8 |
| Tractor Population<br>• Medium size Tractor (37 kW) – 80% of total population<br>• Large size tractor(51 kW) – 20% of total population | 396,800<br>99,200 | 37<br>51 | 14.60<br>5.06 | 45.6<br>15.8 |
| Total Power (kW) | | | 32.04 | |
| Total cultivated area (million ha) | | | 24.8 | |
| Power available (kW/ha) | | | 1.29 | |

# Mechanization Organizations

## R&D Institutions

- Agricultural & Biological Engineering Institute(ABEI),Islamabad
- Agricultural Mechanization Research Institute (AMRI), Multan
- Agricultural Mechanization Research Cell (AMRC), Tandojam
- Centre For Agricultural Machinery Industry (CAMI), Mian Channu
- Agricultural Light Engineering Programme, Mardan

## Universities

- University of Agriculture , Faisalabad
- Sindh Agricultural University, Tandojam
- Bahauddin Zakariya University, Multan
- University of Engineering & Technology, Peshawar
- Lasbela University of Agriculture, Water Management & Marine Sciences, Balochistan.
- PMAS University of Arid Agriculture, Rawalpindi

## SALIENT ACHIEVEMENTS OF THE R&D INSTITUTIONS

| Description | ABEI, NARC Islamabad | AMRI, Multan |
|---|---|---|
| Mechanization technologies developed and commercialized | Groundnut digger, groundnut thresher, sunflower thresher, paddy thresher, pneumatic row crop planter, zero-till drill, fertilizer band placement wheat drill, canola thresher, wheat straw chopper-cum-blower, hand operated groundnut shellers, ABEI olive oil extractor, wood shredder, and seed processing unit | Seed drills, planters, ridger, bed shaper, weeders, wheat thresher, rotary slasher, potato planter, groundnut digger, maize sheller, rotary tiller(rotavator), boom sprayer, fertilizer spreader, axial flow pump, seed cleaner/grader, hand dribbler, furrow bed/shaper planter, soil har pan tester, bullock drawn implements, and mobile boosa chopper and baler |
| Mechanization technologies being developed | FMI Seeder, Rocket seeder, Straw spreading Kit for combine harvester, PTO driven disk plough for Rice-wheat, vegetable planter, turmeric dryer, solar-cum- gas fired dryer, mini seed cleaner cum grader, flat bed dryer for canola, sunflower & maize, date dryer, and nursery raising plant | Power tiller, chain trencher, fodder cutter bar, sugarcane base cutter, pneumatic drill, rotary ditcher,, briqueter, ejector pump, maize cob harvester, cheaper biogas planter, vegetable nursery transplanter, groundnut sheller, rice thresher, seed-bed finisher, stubble shaver, and orchard sprayer |

# NEW R&D INITIATIVES

ABEI, Islamabad

# FMI Rocket Seeder

MAIN FEATURES

- Energy-efficient RCT drill
- Lightweight , low cost & compact
- Suitable to sow the wheat in heavy paddy residue up to 12 tons/ha
- Environment friendly through eliminating the residue burning option
- Yield increases 500kg/ha against traditional method

# Fertilizer Band Placement Wheat Drill

- Places fertilizer (DAP) about 5 cm away and 5 cm deeper than the wheat seed for improved fertilizer use efficiency
- Field capacity: 0.5 ha/h
- Phosphate fertilizer saving: 50% as compared to broadcast method
- Yield increases around: 10%

# ABEI Olive Oil Extractor

- Adapted, evaluated & demonstrated at farmers' fields in Punjab and Khyber Pakhtunkhwa Provinces
- Processing capacity: 32 to 38 kg/h
- Oil recovery: 10 to 20 %
- Late harvested olive fruit yields more oil recovery as compared to early harvested fruit irrespective of variety
- Mechanically extracted olive oil was graded as extra virgin

# Portable Small Seed Cleaner-cum-Grader

- Suitable for cereals, oilseeds, vegetables, grasses, herbs and medicinal plants.
- Cleaning and grading is achieved by air classification and sieves
- Capable to separate shriveled/ immature, damaged & non-viable seeds
- Different grades of seeds are obtained by changing the sieves
- Output capacity: 150 kg/h in case of wheat with 0.746 kW electric motor

# Mobile Flat-bed Dryer

- Developed for drying sunflower, canola, groundnut and ear-corn
- Drying rates for groundnut and ear-corn were estimated as 4 and 1 percentage points per hour, respectively
- Grain drying with this machine is easy and cost-effective as compared to traditional drying

# Mango Picking & Pre-cooling Technology

- Manual mango picking loss is about 30% which affects its quality and demand in international market
- Reduces labour requirement (about 65%) and harvesting time besides ensuring quality mango
- Picking capacity: 600 kg/h

# *Portable Bucket-type Milking Machine*

- The machine was adapted, evaluated and demonstrated on cows and buffaloes
- It is capable to produce vacuum pressure up-to 70 kPa
- The vacuum pressure was adjusted to 44-46 kPa for water buffaloes and 42-44 kPa for cows.

# *Vegetable Planter*

- Suitable for planting vegetable; Peas and Okra
- Row spacing and plant-to-plant distance can be adjusted as per requirement
- Seed damage is negligible
- Technically and economically viable machine

# *Turmeric Dryer*

- **Designed and developed for drying of turmeric produce at farm level**
- **Preliminary field tested during 2013.**
- **The machine consists of five major components; heating source (diesel burner), heating unit (heat exchanger), drying chamber, turmeric collectors (trays) and fan/blower.**
- **The drying capacity of the machine is about 1.5 tons per batch.**

# AMRI,Multan

# *Mobile Seed Cleaner Grader*

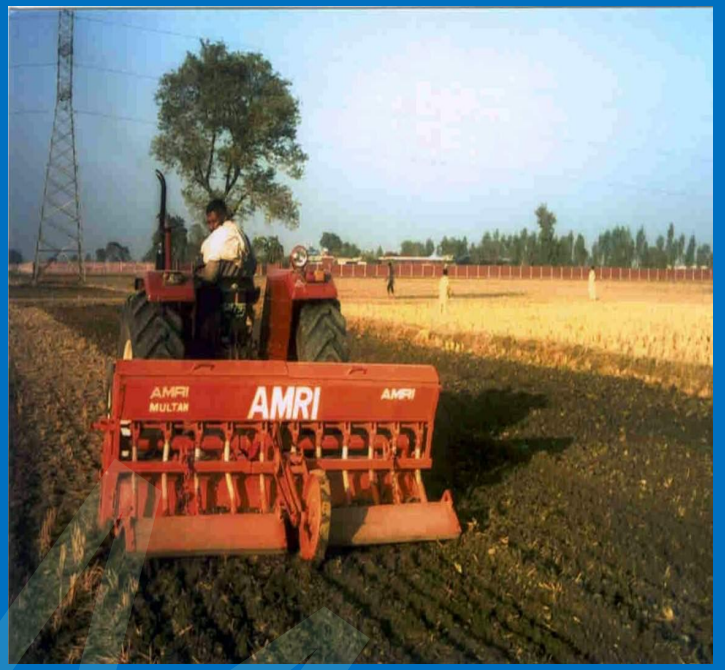
- Tractor pto or 2.0 hp electric motor operated.

## Specifications

| | |
|---|---|
| Output capacity | 0.5 ton/h |
| Seed hopper capacity | 80 kg |
| Cleaning efficiency | >98% |
| No. of sieves | 3 |

# Rota Drill

- Consists of rotavator and drill
- Used for wheat sowing in manually harvested paddy fields.
- Seedbed preparation and sowing is done in a single pass.
- Saves time, energy and cost of production.
- Coulter tines are fitted which cuts the crop residue and ensure continuously dropping of seed




**Specifications**

| | |
|---|---|
| Field capacity | 0.4 ha / hr |
| Power requirement (Tractor) | 48 kW (64 hp) |
| Seed box capacity | 125 kg |
| Row to row spacing | 225 mm |
| Effective width | 2.30 m |
| No. of blades | 36 |
| Now of rows | 10 |
| Seed metering system | Fluted Roller |

# *Air-Assisted Boom Sprayer (Foldable Boom)*

- Enhances field work rates and treatment timing.
- The blower is operated by hydraulic motor which is driven through tractor's hydraulic pump.
- This spray machine is to reduce the spray drift, minimize wind dependency and pesticide doses.

## Specifications

| | |
|---|---|
| Field capacity | 2.50 ha/h |
| Power requirement(Tractor) | 48 kW (64 hp) |
| Effective boom swath | 10.7 m (20 Nozzles) |
| No. of nozzles / Nozzle spacing | 20 / 510 mm |
| Hydraulic Pump pressure | 60 bar |
| Tank material | Fiber glass |
| Tank capacity | 450 L |
| Pump output @ 3.0 bar | 80 L/min |

# *Orchard Sprayer (Cannon Type)*

- The air stream assists in breaking up the liquid into small particles, acts as a diluents to prevent the drops from coalescing and serves as the vehicle to carry these fine droplets to the surface to be treated.

SPECIFICATIONS

| | |
|---|---|
| Field capacity | 2.50 ha/h |
| Power requirement (tractor) | 48 kW(64hp) |
| Tank material | Fiber glass |
| Tank capacity | 450 liters |
| Pump output @ 3.0 bar | 60 L/min |
| Effective swath | 40 m |

# *Liquid Fertilizer Applicator*

- Used for applying liquid fertilizer, which is injected directly to the crop root zone
- Improves the application efficiency
- **Specifications**
  - Field capacity — 0.75 ha/h
  - Power requirement — 37 kW (50 hp tractor)
  - Tank capacity — 500 lit.
  - Nos. of discs — 4
  - Nos. of injectors — 4
  - Row to row distance — 762 mm

# Sugarcane Ridger

- Tractor rear mounted 2 rows with fertilizer attachment
- Used for making ridges for manual planting of sugarcane crop
- Also used for earthing up of sugarcane crop along with weeds eradication

Specifications

| | |
|---|---|
| Field capacity | 0.4 ha/h |
| Power requirement | 45 kW (60 hp or above) |
| Row spacing | 1220 mm |
| Fertilizer box capacity | 100 kg |

# THANKS