# IRRI Running Farm Machinery, Equipment and Tools: P1: Overview

## Seedbed preparation -

Power tiller - IRRI current and past activity-Wet Soil

PT-5 Power

PT-3 Power

| **Description**: | **PT-5 Power tiller**<br>Wake-behind controlled Power tiller/hand tractor | **PT-3 Power tiller**<br>Floating tiller for secondary wet tillage. |
|---|---|---|
| **Features:** | **Simple construction.**<br>**Light and easy operation**: is equipped with idler clutch and throttle controls for simple and easy operation.<br>**Rugged design**: Heavy-duty sprocket and chain transmission for reliable performance.<br>**Versatile**: Tiller can be used for plowing and harrowing and, with the 1.0 meter reaper attachment; it can also be used for harvesting. The tiller can accept either gasoline of kerosene engine.<br>**Fuel economy**: Tiller uses a 5 hp engine for lower fuel consumption.<br>**Low maintenance**: Fewer moving parts, sealed transmission with oil bath lubrication for service periods. | **Fewer Tillage Passes**: Due to rotavating/puddling action and uniform tillage a, result of pontoon tunnel body combination, only 2-3.<br>**Versatility**: Excels for both normal and extreme field condition having deep mud and/or water; also incorporate green manure crops.<br>**Ease of operation**: Pontoons were designed specifically to solve maneuverability problems of existing tillers, while also providing more uniform puddling without furrows.<br>**Simple fabrication and repair**: Designed for low-cost fabrication and repair in small shops using commonly available tools and materials.<br>**Economical**: Due to the above features, the hydro-tiller is more economical than traditional tillage equipment.<br>**Limitations:** Only for flooded fields.<br>**Remarks:** Alternative Engine: 6.5 hp diesel engine (not greater than 50 kg). |
| **Dimension (L x W x H), mm** | 1820 x 1290 x 990 | 2360 x 1300 x 1240 |
| **Labor requirement** | 1 | 1 Up to 2 |
| **Weight , kg** | 88 | 200 |
| **Field capacity, ha/day** | 1 | 1 |

## Seedbed preparation-

Rotavators- IRRI current and past activity-Wet Soil

**Photo by Chris Quintana/IRRI**

**Rotavator in IRRI**

## Seedbed preparation

Rotavators - IRRI current and past activity-Dry Soil

Example of rotavators used in in IRRI Farm: Howard selectatilth

Specification:

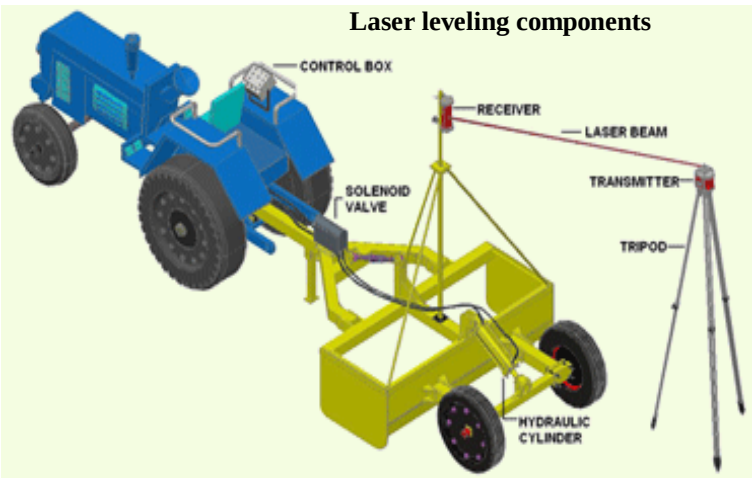
- Suitable digging width
- Designed for various Tractors hp
- 540 /1000 rpm PTO speed
- Category 2 linkage
- Selectatilth gearbox

**Rotary tilling using Rotavator** ⟹

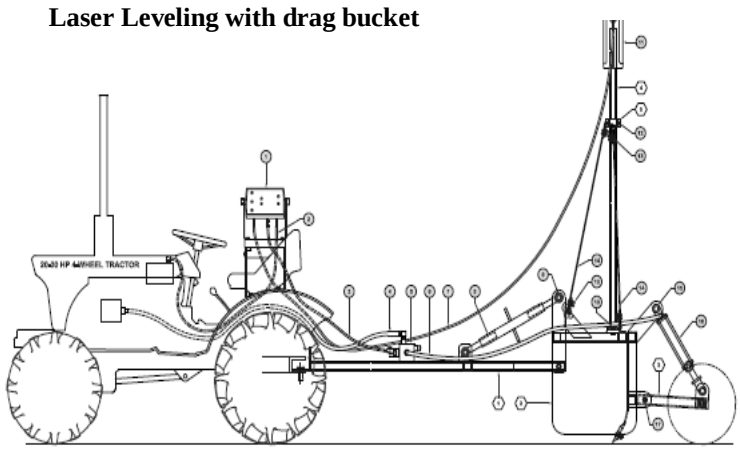
**Different type of rotavators available and to be driven with wide range of tractors, specifications is similar wit capacity differences.**

## Laser Leveling - IRRI current and future activity - Wet / Dry Soil

Laser leveling is a process of smoothing the land surface (± 2 cm) from its average elevation using laser-equipped drag buckets. This practice uses large horsepower tractors and soil movers that are equipped with global positioning systems (GPS) and/or laser-guided instrumentation so that the soil can be moved either by cutting or filling to create the desired slope/level. This technique is well known for achieving higher levels of accuracy in land leveling and offers great potential for water savings and higher grain yields.






| **Description** | |
|---|---|
| **Horsepower required** | 4 wheel tractors with around 60 hp |
| **Width of coverage:** | 1.8 and more |
| **Field capacity:** | depends on initial condition of field |
| **Drag bucket**: for laser assisted leveling using four wheel tractors, the bucket is pulled by the tractors draw bar and Uses an external hydraulic ram for height adjustments. It is therefore easier to connect to the hydraulic system of the tractor compared to 3-point linkage mounted buckets. | |

## Crop Establishment - Planting

Drum Seeder - IRRI Past/current activity – Wet Soil

8 –rows Drum Seeder

12 –rows Drum Seeder

| | |
|---|---|
| **Description and Features (8 – rows Drum Seeder )** | Row seeding of pre-germinated paddy on puddled soils. This machine seeds paddy in neat rows which can be conveniently weeded with push type mechanical weeder. This machine permits uniform seeding at fairly low seed rates of 50-150 kg/ha.<br>Saves seed: Can save 50 to 70% of seeds compared to manual broadcast seeding.<br>Adjustable seed rate: Can apply 60, 90, and 150 kg/ha seed rate with simple adjustment.<br>Low power requirement: Easy to pull, requires only 9 kg. of pulling force to operate.<br>Simple design: Easy fabrication, operation, and maintenance. Made of light weight tubing and sheet metal. Row spacing can be adjusted between 18 to 25 cm.<br>Low cost: Economical to operate and maintain.<br>Remarks: Designs available for 8 and 12 row model. Seed capacity is 8 kg/hopper. |
| **Capacity** | 1ha/day |
| **Weight , kg** | 11 |
| **Labor requirement** | 14 man hrs/ha |

Mechanical transplanter

Rice transplanter - Kubota – spw-48c - IRRI future and current activity – Wet Soil

Rice survivor, wet season, 2013

Cont…… Mechanical transplanter

Rice transplanter - Kubota – spw-48c - IRRI future and current activity – Wet Soil

| **Description** | |
|---|---|
| **Overall length**, mm | 2140 mm |
| **Overall Width**, mm | 1590 |
| **Overall Height**, mm | 910 |
| **Engine** | Air-cooled 4.3 horsepower (gasoline). |
| **Wheel Adjustment** (Upward/Downward) | Hydraulic pressure method |
| **Planting** | Walked behind ,4-rows @ 30cm, hill space(cm): 12, 14, 16, 18 and 21 |
| **Planting Capacity**, ha/day | 1 – 1.5. |
| **Weight** | 160 kg |

Seedling trays for transplanters

Materials and recommendation used to prepare seedlings trays (as recommended by CESD Scientists):

1- Each tray should prepare by 250 to 280 gram of rice (using balance to adjust the quantity),
2- Adjust number of trays to be at least 250 Trays (250 plastic trays)/ ha.
3- Seeds (70 kg is recommended and may little vary according to rice variety)
4- Soil mixture with Coconut husk (75% soil + 25% ground coconut husk mixture)
5- Very little amount of NPK to be added to in the soil-coconut husk mixture
6- Irrigation will be daily and keep always saturated soil and away from dry. Just
7- When the seedlings had got to two leaf stage placing the trays in a water bath.
8- Transplant your seedlings from 14-19 days.

**Rice survivor, wet season, 2013 - IRRI**

## Kds-600 Bokto Seeder – Adjusting before use- IRRI past activity – Wet/Dry Soil

- Hill Seeding
- Precious seeding function due to V hole type(Dry soil) and U hole type(Wet soil)
- Planting density (Interrow spacing and Intraplant spacing) adjustment function
- Auto leveling (Front↔Back and Left ↔Right) functions due to hydraulic system
- Precision land leveling by screw system
- Deep and side banded function of chemical fertilizing
- Precious sowing amount connected by the speed of tractor wheels
- Tractor attachment with small, medium, large Horse Power and seeding work up to 4:7 ha per day

## Till-seeder - Duncan T760 - IRRI current and future activity –Dry Soil

| **Description** | |
|---|---|
| **Width**, mm | 1965 |
| **Length**, mm | 1460 |
| **Height**, mm | 1470 |
| **Weight**, kg | 505 |

| | |
|---|---|
| **Solid tire size**, | 4.00 x 8 |
| **Row spacing**, mm | 155 |
| **Box capacity**, per box | 0.218 $m^3$ (6 bushels) |
| **Linkage type** | Category II |
| **Ideal operating speed** | 5.6-8.8 km/h |

Zero Till Drill - Dasmish mechanical works, SD-11- IRRI current and future activity –Dry Soil



| **Description** | |
|---|---|
| **Overall Width** ,mm | 2159 |
| **Row spacing**, mm | 196 |
| **Weight**, kg | 310 |
| **Hitch Type** | Category - II |
| **Seed Capacity**, kg | 95 |
| **Fertilizer Capacity**, kg | 90 |
| **No. of Tines** | 11 |
| **Type of Tines** | Inverted T type furrower opener |
| **Seed Metering Device** | Aluminium Type Fluted Roller |
| **Fertilizer Metering Device** | Cell type |
| **Metering Device Drive** | Metering Device Drive is from front mounted ground wheel with spring loaded chain |
| **Ground Wheel** | One 15 inch Diameter spiked roller with spring to maintain contact with ground. |
| **Seed Drilling Depth**, mm | 50-100 |

Happy seeder (HS): IRRI current and future activity –Dry Soil


**Specification of HS**

| | |
|---|---|
| **Type** | Tractor mounted |
| **Power required** (hp) | > 40 |
| **Transmission system** | Tractor power take-off to right angled gearbox then via jack<br>shaft and V-belts and pulleys |
| **Gear box** | Bevel crown wheel and pinion, ratio 1.8:1 |
| **Working width** (mm) | 1800 |
| **Total width** (mm) | 2370 |
| **Mounting category** | Cat I and II |
| **Manufacturer** | Dasmesh Mechanical Works, Amargarh, Punjab, India |
| **Rotor shaft material** | High-pressure steel pipe |
| **External diameter** (mm) | 145 |
| **Thickness** (mm) | 5 |
| **Transmission shaft diameter**, (mm) | 50 |
| **Blade type** | Gamma flail |
| **Straw cut** | Partial |
| **No. of blades** | 18 (high-speed steel) |
| **Blade working diameter** (mm) | 485 |
| **Working** rpm | 1,200–1,400 |
| **Peripheral tip speed** (m/second) | 30.5–35.5 |
| **Blade mounting** | Hinged (high-tensile bolt) |

| | |
|---|---|
| **Cutting height** (mm) | 50 |
| **Straw conveying technique** | Not required |
| **Biomass size reduction** | Partial size reduction |
| **Working conditions** | Very low dust formation, works in wet and dry straw |
| **Blade working width** (mm) | 50 |
| **Strip tillage rotor** | Absent |
| **No. of tool bars** | 1 |
| **No. of furrow openers** | 9 in a row |
| **Type of furrow openers** | Inverted T-type with curved J shape |
| **Row spacing** | 200 mm (adjustable |
| **Sowing depth** (mm) | 40–50 |
| **Seed metering device** | Fluted feed rollers |
| **Fertiliser metering device** | Fluted feed rollers |
| **Seeded row condition** | Seeded row remains clear from straw mulch |

Wintersteiger- Plotseed – IRRI current and future activity –Dry Soil- Recommended for experimental purpose

The Plotseed was specially designed for minimum and no-till seeding of trial plots. A variety of distribution systems makes it possible to distribute the seed for a plot over multiple rows. The particularly robust frame allows for the use of heavy no-till openers in combination with coulters and fertilizer openers, as well as combinations of multiple distribution systems. The modular system with its various options allows you to customize the planter for almost any application

**Specification**

Machine Attachment options: 3-point hydraulic system on tractor
Row numbers: 2 - 12 rows
Row spacing: From 12.5 cm
Track width: 1250 - 1900 mm, adjustable
Tires 7.60-15 Impl-R 8PR

## Mechanical weeding

Cono-Weeder, Push-Type, Single Row - IRRI current and future activity -


| | |
|---|---|
| **Description:** | Manually operated weeder with a pair of conical shaped rotors for burying weeds.<br>The IRRI Cono-Weeder utilizes conical shaped rotors which create horizontal back & forth movement in the top 3 cm of the soil layer, where most of the weeds grow. It can weed satisfactorily in a single pass without a back and forth movement. Power requirements are low, as only a small quantity of soil is worked during weeding. This cono-weeder is about twice as fast to operate than conventional rotary weeders. The machine can be easily operated by women and children. |
| **Features:** | The main characteristics of this tool are:<br>Dual weeding action: Two conical rotors are mounted in tandem with opposite orientation. Smooth and serrated blades, alternately mounted on the rotors, uproot and bury weeds and provide uniform weeding. A skid in front of the rotor provides floatation in soft paddies.<br>Low power requirement: Pushing force is about half that required by conventional rotary weeders. Can be operated by women and children.<br>Adjustable: Can be set for crop planted in 15 to 22.5 cm row spacing, by offsetting the two motors. Handle height can be adjusted to suit operator's preference.<br>High weeding capacity: About twice as fast to operate than conventional rotary weeders. Average pushing force : 4.4 kg<br>Construction : All steel, tubular frame & sheet rollers |
| **Capacity** , ha/day | 0.18 |
| **Labor requirement** | 7 pers-day/ha |
| **Weight**, kg | 4 |

## Chemical Sprayers

MudMasterTM- Multi-Purpose Sprayer - IRRI current activity

- Liquid cooled, high torque, 4-cylinder diesel engine for maximum machine performance.
- Features two high efficiency hydraulic pumps.
- The frame is designed to handle torsional stress and heavy loads. The center hinge articulates for steering, oscillates to keep all four wheels on the ground at all times, and features bronze bushings for durability.
- No chains, belts, or gears, routine servicing only requires daily greasing of two pivot fittings and periodic oil and filter changes.
- Minimal Crop Damage, Tall, narrow tires provide plenty of ground clearance and are adjustable in width to match your row crop spacing.
- Quick Fill-Up, Simply plug the chemical supply hose from the optional transport/nurse trailer into the sprayer's inlet for quick and easy refills.

- Hydraulic lift mounts to MudMaster front or rear toolbar interchangeably. If desired, front and rear hydraulic lifts may be used at the same time. Exceptional Height Range. 50 in range, from 30 to 80 in above ground (without attachments).

Trailer Sprayers

- Designed for a wide-range of spraying requirements
- Equipped with diaphragm pumps and engines
- Furnished with liquid-filled pressure gauge, poly tanks, high pressure agitators and flotation tires.

## Combine harvester

Kubota ER323 - IRRI Future and current activity

| Specification | |
|---|---|
| **Total length**, mm | 3470 |
| **All width**, mm | 1690 |
| **Overall height**, mm | 1980 |
| **Weight,** kg | 2800 |
| **Engine** | water cooled 4-stroke 3 cylinder vertical diesel |
| **Engine Output**, kW (PS)/rpm | 49.3 (67) / 2700 |
| **Fuel** | Diesel |
| **Fuel tank capacity**, L | 24 |
| **Cutting width**, mm | 1225 |
| **Blade width**, mm | 1150 |
| **Suitable crop length** , mm | 550:1300 |
| **Tank capacity** , L (bag) | 650 ( 13) |
| **Work efficiency** , a / h (min) / 10a | 27-9 (23-67) |

**Combine harvester -** IRRI Future and current activity

CLASS- CROP TIGER 30 TERRA TRAC - IRRI Future and current activity

**Specification**

Tangential Axial Flow (TAF) is unequalled for harvesting versatility – it used in IRRI for Rice and other crops

Engine: (BS-III emissions standard) with 76 HP and plenty of torque in reserve

Cutter bar with crop lifters as standard

Cleaning system: Forced air-cleaning fan, 2 speeds, 1200 and 1500 rpm, controlled by fan shutter

Cleaning area: 1.24 sq. m (upper and lower sieves)

Grain tank capacity 1700 l

Unloading system: Universal joint type with speed unloading (30 l/s)

Fuel tank capacity 100 l

Overall Dimensions

Weight, kg: 4270

Length (including cutterbar), mm: 5855

Width, mm: 2620

Height, mm: 2905

Ground clearance body frame, mm: 380

Ground clearance hydraulic motor, mm: 240

## Balers / straw collection

Class - Rollant 250 Roto Feed- IRRI Future and current activity



- Steel baling chamber with the unique MPS chamber layout guarantees extra bale density and high core compaction.
- MPS for extra compaction.
- Drive chains are designed to cope with heavy situations with plenty of stamina for long term reliability.
- Easy to handle and stack as well.
- Equipped with the well-known assister feed rake behind the pick-up, this additional rake transfers the crop from the pick-up and feeds it evenly to the baling chamber.
- Round balers and are around. 2.10 metres diameter.
- Optimum wrapping security with the use of an original CLAAS ROLLATEX.

**Specifications**

Pick-up widths:  2.10 m - Pick-up guide wheels: Castor - Feed system: ROTO FEED rotor - No. of Knives: nil - No. of compression rollers: 16 - MPS Yes - Baling chamber diameter: 1.25 m - Width: 1.2:  - Bale tying: Net - Tires: 15.0/55-17 10 PR, Optional 19.0/45-17 10 PR

## Postharvest equipment and machines

Thresher - IRRI current activity

**TH-8 Axial Flow Thresher**

**TH12 Axial Flow Thresher**

| Thresher | TH-8 Axial Flow Thresher/ IRRI Modified Thresher | TH12 Axial Flow Thresher |
|---|---|---|
| **Description:** | A throw-in type Axial flow thresher-cleaner. | A throw-in type Axial flow thresher-cleaner for small to medium scale operations. Ideal for contractors. |
| **Features:** | **High output**: Up to one ton hour when threshing paddy.<br>**Low horsepower requirement** : 10 hp engine<br>**Low labor requirement**: Three to four persons to feed, thresh, and bag grain.<br>**Easy to operate**: Simple design reduces operation and maintenance problems.<br>**Threshing and winnowing combined** : Throw-in threshing combined with air and double screen cleaning system<br>**Highly mobile**: Can be pulled by a power tiller, light truck, or animal.<br>**Other data:**<br>**Field capacity** : 800-1000 kg/h (rough rice)<br>**Grain breakage** : less than 4%<br>**Separation recovery** : 98% (weight basis)<br>Threshing cylinder : (open type) (pegteeth) 39.4 cm O.D. x 11 cm length<br>**Construction** : All steel<br>**Component speeds**:<br>Cylinder : 540-600 rpm<br>Fan : 800 rpm<br>Oscillating screen : *(frequency) 340 cycles/min<br>Oscillating screen : (stroke) 3.2 mm<br>**Adjustable** : Blower, shutter, and angle of | **High output** : Up to 1.5 tons per hour when threshing paddy<br>**Low horsepower requirement** : 12 hp (9 kW) gasoline engine<br>**Low labor requirement** : 3-4 men to feed, thresh & bag grain<br>**Ease of operation** : Simple straightforward design is easy to operate and maintain<br>**Threshing & winnowing combined** : Throw-in type threshing combined with single oscillating screen and winnower cleaning system<br>**Highly mobile** : Can pulled either power tiller, light vehicle, or animal<br>**Versatile**: Aside from rice, can thresh wheat & shell corn.<br><br>**Other data:**<br>**Engine** : Power 12hp gasoline or 10 hp diesel engine<br>**Field capacity** : 1000-1500 kg/h (rough rice)<br>**Grain breakage** : less than 4%<br>**Separation recovery** : 99.5% (weight basis)<br>**Threshing cylinder** : (including pegteeth) 51 O.D x 1.11 m<br>**Construction** : All steel<br>**Component speeds** :<br>Cylinder 520-560 rpm<br>Fan 1350 rpm<br>**Adjustable** : Blower shutter and angle of wind board |

| | | |
|---|---|---|
| | wind board | |

Rice Straw Briquetting machine - IRRI current and future activity

Brikettierpresse Typ MPP 130 S

| Specification | | | | | |
|---|---|---|---|---|---|
| **Series** | **Performance, kg/h** | **Briquet Ø , mm** | **Motor performance, kw** | **Dimensions, l x w x h, mm** | **Weight, kg** |
| MPP 130 | 50 - 130 | 65 | 7,5 | 2200x1100x1500 | 1000 |

Moisture meter and grain quality sets - IRRI current and future activity


**Grain Quality kit**


**Moisture testers**

**Rice quality kit is used for measuring; grain shape, size and weight, moisture content, bulk density, milling degree, chalkiness, surface temperature, percentage of broken grains**