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#98 RICE2021 TECHNOLOGY BULLETIN

DA-PHILIPPINE RICE RESEARCH INSTITUTE

Mechanical Transplanting of Rice

Rice Technology Bulletin Series

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97 Multicrop Reduced-Till Planter (for rice, corn, and mungbean)

FOREWORD

Mechanization is one of the solutions in addressing labor scarcity and high labor costs associated with manual rice transplanting. Mechanical transplanting can enhance farmers' production efficiency as it performs the task in minimal days and requires less labor.

Farmers' practice on manual transplanting includes intensive tillage and puddling, which require adequate water supply. More often, these activities are delayed owing to water unavailability. Through mechanical means, rice seedlings are transplanted after shallow tillage, which reduces high dependence on the release of irrigation water for puddling.

This technology bulletin focuses on the advantages of mechanical transplanting and discusses operational process and issues involved in the technology. This easy, step-by-step guide will also help extension workers, service providers, operators, and farmers to understand more about mechanical transplanting.

JOHN C. DE LEON
Executive Director

WHAT IS MECHANICAL TRANSPLANTING?

This farm operation involves transplanting young rice seedlings grown in a mat nursery using a self-propelled mechanical rice transplanter, which can either be walk-behind or riding-type. Operated by 1-2 persons, this machine can transplant rice in a hectare within a day (walk-behind, 4-row type) and up to 2 ha/day (6-row or 8-row, riding type). This is a significant improvement from manual transplanting, which generally requires 21 person-days to transplant a hectare (Beltran ***et al.*** 2015).

Mechanical transplanting

Manual transplanting

Advantages of mechanical transplanting

1. Transplanting of seedlings at the optimal age (14-18 days) after sowing
2. Uniform spacing and optimum plant density (26-28 hills/m^2 with 2-3 seedlings per hill)
3. Higher productivity (0.3-1t/ha yield increase) than the traditional methods
4. Transplanting shock caused by root damage is minimized resulting in early seedling vigor and uniform crop stand
5. Easier and faster operation, which lowers stress, drudgery, and health risks for farm laborers
6. Provides additional income generation opportunity for rural youth entrepreneurs through the development and provision of customized mechanical transplanting services
7. Less labor required per hectare, which addresses the problem of labor scarcity

Mechanically transplanted rice

8. Less water required per hectare relative to manual transplanting method owing to feasibility of planting with shallow tillage and synchronization of planting time
9. Increase in farmers' net income through reduced labor cost
10. Timely planting ensured

Disadvantages of mechanical transplanting

1. Tedious and elaborate seedling preparation and care (especially true to farmers new to this technology)
2. Missing hills occur in the mechanically transplanted field and this would need additional time and labor for replanting.
3. Need to maintain, store, and repair the machine
4. Need for an adequately trained, experienced, and skilled operator to properly and efficiently operate the transplanter
5. High investment and depreciation cost of the machine
6. Major repair of machine will take time and cost a lot especially if spare parts are not available locally.

SEEDLING PREPARATION

A study conducted on Region 2 showed that one of the deterrents in the adoption of mechanized transplanting is the tedious seedling preparation and if not done properly it could result in poor transplanting quality (Yadav ***et al.*** 2020). Seedling preparation is a vital activity involved in mechanical transplanting. It directly affects the planting efficiency of the machine and could delay the operation for days. To ensure the quality of transplanting and uninterrupted operation proper seedling preparation methods should be followed.

There are three methods of preparing and growing rice seedlings for mechanical transplanting. These are (1) mat-type seedling nursery or *dapog*; (2) modified mat-type nursery; and (3) mat-type seedling nursery using plastic trays.

WHAT IS MAT-TYPE NURSERY OR *DAPOG*?

A mat type nursery or *dapog* is an improved method of rice seedling preparation in which rice seedlings are raised on a thin layer of soil, and farm yard manure or compost mixture are placed on polythene sheet. The polythene sheet prevents the seedling roots from penetrating the underlying soil, which creates a dense mat. This type of seedling nursery is a pre-requisite for machine transplanting. The seedling mat can be cut into desired shapes and sizes to fit into the seedling heap of the mechanical transplanter. Seedlings area ready for planting within 14-18 days after sowing (DAS).

Advantages of *dapog*

1. Requires less area than the conventional seedling nursery (50m^2 vs. 989m^2/ha) so seedling care is maximized
2. Produces robust seedlings (18-20cm tall in about 14-18 DAS)
3. Minimizes root damage and reduces transplanting shock as seedlings are not uprooted
4. Significantly reduces labor requirement for nursery raising

Preparation of *dapog*

The availability of sunlight, water, labor, land, and agricultural implements must be considered when preparing a nursery. Preparation of *dapog* should begin 15-20 days prior to the anticipated time of transplanting.

Mat-type nursery or *dapog*

Materials required

1. High-quality seeds and water container for seed soaking (soaked for 12h, incubated for 12h)

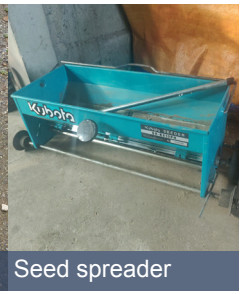
High-quality pre-germinated seeds

Container for seed soaking

2. Plastic sheet with even perforations, banana leaves, or any flexible material, which can prevent seedling roots from penetrating the bottom layer of the soil bed

Polyethylene sheet or banana leaves

Angle bar frame



Seed spreader

3. 2cm angle bar frame for a dry-bed and wet-bed nursery
4. Seed spreader to uniformly broadcast the seeds
5. Nursery bed for transplanting (50m^2/ha) or 0.5% of the field
6. Sieved soil mixture (garden soil 450-500kg/ha; carbonized rice hull 80-100kg/ha)

Soil-compost mixture

Soil sieve

Once settled, mark out plots with the same size as that of the dry bed. Raise the soil to 5-10cm in height and then level. Spaces between beds should be 20-30cm.

Preparation of wet nursery bed

Prepare 30kg of seed per hectare for areas with abundant water supply. Thoroughly puddle and level soil. Leave for 24h to settle (depending on the soil type).

Spread the plastic sheets, banana leaves, or any flexible material that will prevent the roots from entering the bottom layer of the soil bed.

Form the boundary using an angle bar frame, bamboo splits, square frame, or flat bar frame.

Fill with soil free from weeds and clods. Level the soil within the frame.

Perforate the polyethylene sheet and banana leaves.

Broadcast pre-germinated seeds on leveled soil.

Cover the nursery bed with rice straw within three days. Transplant seedlings at 14-18 days old. Do not apply fertilizer to avoid soft stems of seedlings.

Management of mat-type seedling nursery

Water management in the nursery

Water the beds for the initial three days until the seeds emerge then irrigate by flooding furrows in between beds.

Maintain bed moist through sprinkling 3 times/day for the first three days. Ensure water retention on top of the nursery bed by frequently irrigating the furrows until the seedlings are ready for transplanting.

Keep the height of levees/bunds higher than the bed so that water is retained on the top of the beds. Stop watering 12h before transplanting and drain excess water to ensure that the mat is relatively dry for cutting and transplanting. Transplant when seedlings are 18-20cm tall at 14-18 DAS.

MODIFIED MAT-TYPE NURSERY

Seedlings are established in a soil mix layer on a firm surface. The modified mat nursery uses less land and requires fewer seeds and inputs such as fertilizer and water. Nursery can be installed closer to the house; thus, reducing the labor requirement for transporting and replanting seedlings. The proximity also ensures better maintenance and monitoring.

Seed

To plant 1ha (2 seedlings/hill at 20cm x 20cm spacing), use 25-30kg high-quality seeds (>85% germination).

Note: High-quality seeds will result in higher seed rate, more uniform germination, vigorous seedlings, less replanting, fewer weeds, and 5-20% increase in yields.

Nursery area

Prepare 50m^2 seedling nursery for each hectare to be planted. Select a level area near the house and/or a water source. For areas that are not sufficiently compacted, spread a plastic sheet or banana leaves on the marked area to prevent roots from penetrating into the soil.

Soil mixture

Soil mix measuring 1m^3 is needed for each 50m^2 of seedling nursery. Mix 70-80% soil + 15-20% well-decomposed organic manure or 5-10% carbonized rice hull (CRH) or rice hull ash.

Pre-germinating seed

Soak the seeds for 12h (some varieties may need longer time to germinate). Drain and incubate (keep moist) the soaked seeds for another 12h. At this time, the seeds sprout (bud) and the first seed root grows to 1-2mm long.

Laying the soil mixture

Place a 1m long and 0.5m wide steel/wooden frame. Fill the frame up to the top with the soil mixture.

Sowing

Sow the pre-germinated seeds uniformly and cover them with a thin layer of CRH (approximately 100g seed/tray or 600g/m^2).

Soaking the seedbed

Immediately sprinkle water on the bed. Remove the frame and continue the process (fill soil mix, sow seed, cover seed, and water) until the required nursery area is completed.

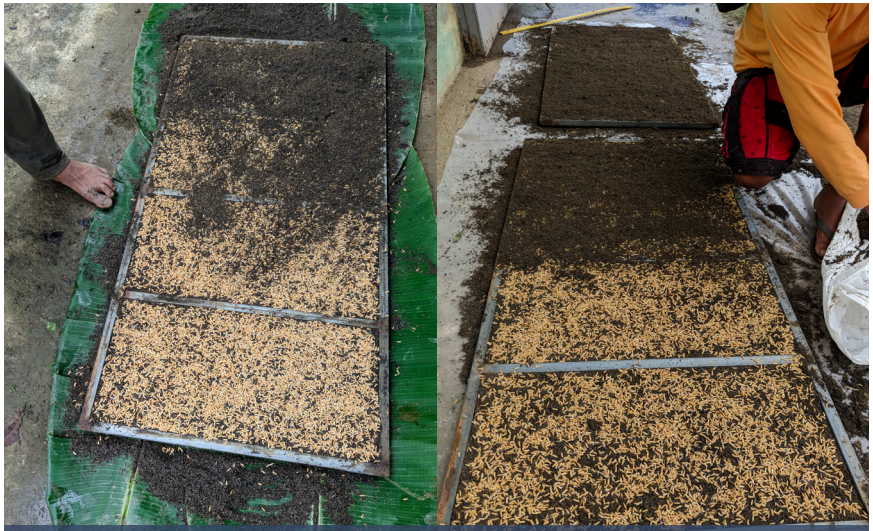
Preparation of modified mat-type nursery bed

Sieve soil to remove clods and stones.

Spread the polyethylene sheet or banana leaves then lay the iron frame.

Fill the frame with sieved soil.

Level the sieved soil.



Cover with thin layer of soil.

Spread the seeds evenly on the seedbed.

Irrigate the seedbed after covering with thin layer of soil.

Cover the seedbed with sack for 2-3 days after seeding.

Modified mat-type nursery seedbed irrigation

Management of modified mat-type seedling nursery

Watering

Water the seedling nursery as needed to keep the soil moist. Protect the seedling nursery from heavy rains especially for the first 5 DAS. If the nursery can be flooded, maintain 1cm water level around the mats at 7 DAS. Drain the water two days before removing the seedling mats for transplanting.

Lifting seedling mats

Seedlings reach sufficient height for planting in 14-18 DAS. Lift the seedling mats and transport them to the main field.

Seedling mats ready for transplant

Cutting the seedling mats

Drain the water before transplanting. Seedling mats should be cut to the required size using a sharp knife/sickle. When transporting, keep the mats moist by sprinkling water to avoid wilting.

Preparation of seedlings using plastic trays

Sieve garden soil and carbonized rice hull mixture to remove stones and large clods of soil. Fill the plastic trays with sieved soil mixture to about half of the depth of the tray.

Apply a thin layer of sieved soil mixture and water the seedling trays. Stack the seedling trays for 2-3 days then place in an open and level area then cover with net.

Spread the seeds evenly on the soil surface of the tray. This can be done manually or using a seed spreader for faster and uniform seed distribution.

Water the seedling trays at least 3 times a day. Remove the net when the seedlings reach 5 cm height. Transplant seedlings at 14-18 days old.

MECHANICAL TRANSPLANTING GUIDELINES

Prepare the field thoroughly to a depth of 3-5cm using a harrow or cultivator. Till the soil for one to two times using a harrow or cultivator. Allow the puddled fields to settle for 12-24h then plank to level (depends on the soil). Prior to transplanting, drain off any excess water.

Keep the seedling platform moist to facilitate sliding of seedling mats.

Load the mats carefully onto the transplanter.

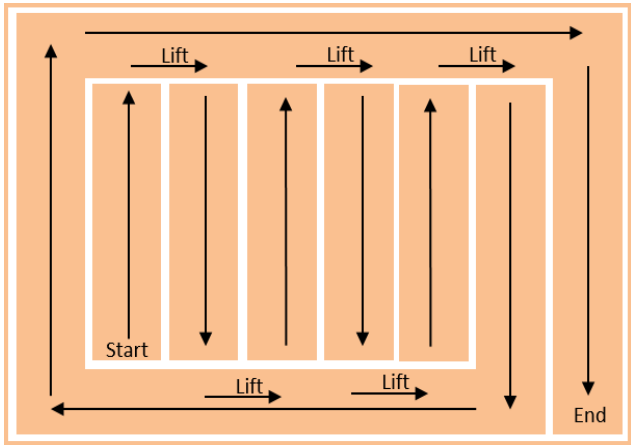
Maintain shallow water depth of 1cm during transplanting. Drain excess water. Every pass should be parallel to the previous row to maintain even distance.

Important do's:

Before operation

1. Use high-quality seeds.
2. Handle polythene sheets carefully so that they can be reused.
3. Treat nutrient deficiencies in the nursery as they appear.
4. Ensure good water management in the seedling nursery. Avoid seedling stress and maintain standing water on the beds.
5. Use the same recommendations for herbicide application as you do for manually-transplanted crops.
6. Lift the planting platform when driving over the bunds.
7. Ensure that fields are well-puddled and well-leveled.
8. Maintain standing water of 1cm during transplanting – "*sanap-sanap*" to prevent golden apple snail damage on newly-transplanted seedlings.
9. The subsurface soil layer or hard pan should be hard enough to support the transplanting machine.
10. The soil is ready when a small "V" mark written on puddled soil with a stick holds its shape. At this moisture level, the soil can hold the seedlings upright.
11. Soil should not be so dry so that it sticks to and interferes with planting parts or wheels of the transplanter.
12. Load the seedling mats onto the machine and transplant the seedlings at the desired machine setting.

During operation



Recommended field operation pattern

1. The operator should plan the way around the field and choose the positions of starting and leaving the area following the plot's shape. This will reduce idling distance travel and manually replanting zones.
2. Follow these steps after calibrating the transplanter:

   Feed mats on the seedling platform.

   Leave the area equivalent to one pass of machine on all four sides of the field before transplanting to avoid damage on the transplanted seedlings while turning at the headland.

   Start transplanting at the mark running parallel to one of the bunds.

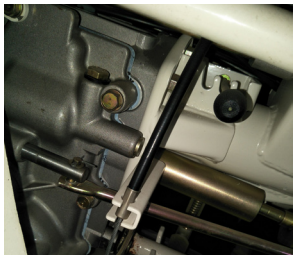
   Take a U-turn at the end of the field. Each return pass should be parallel to the last row, maintaining the desired row spacing.

   Keep feeding the seedling mats as needed during the transplanting operation.

   Replant missed hills manually.

4-ROW WALK-BEHIND MECHANICAL TRANSPLANTER

Hydraulic lifting mechanism

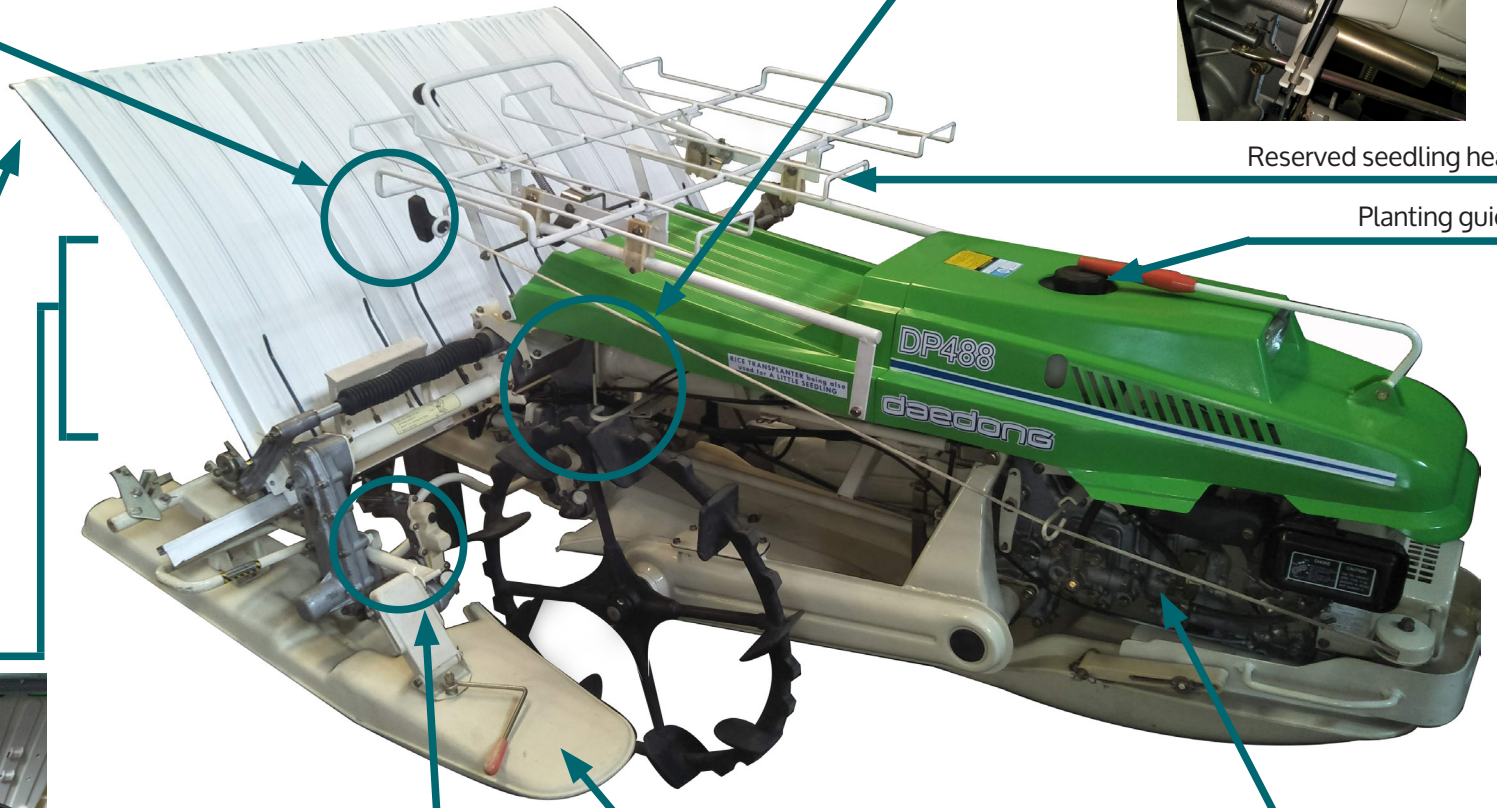


Starting lever

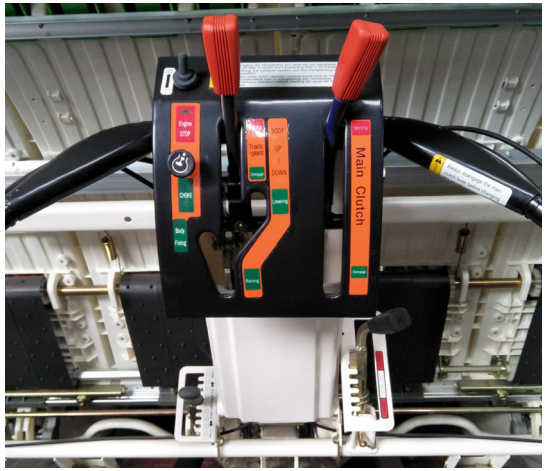
Reserved seedling heap

Planting guide

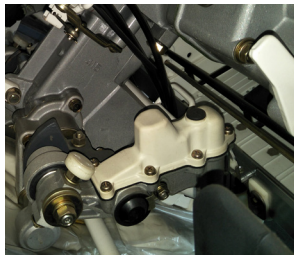
Seedling heap



Control levers



Transplanting arm

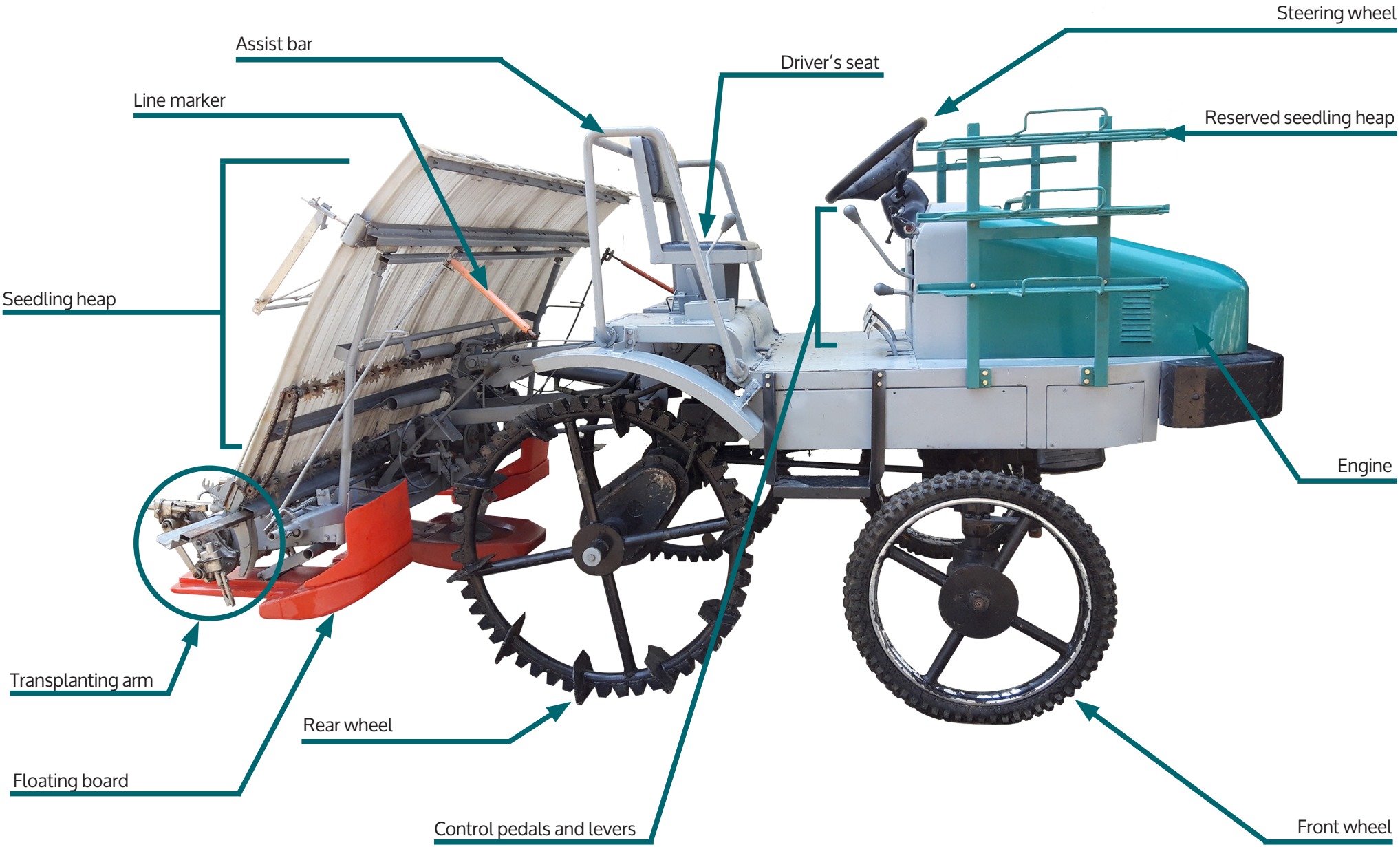


Floating board

Engine

8-ROW RIDING-TYPE MECHANICAL TRANSPLANTER

6-ROW RIDING-TYPE MECHANICAL TRANSPLANTER (PHILRICE-DEVELOPED MODEL)

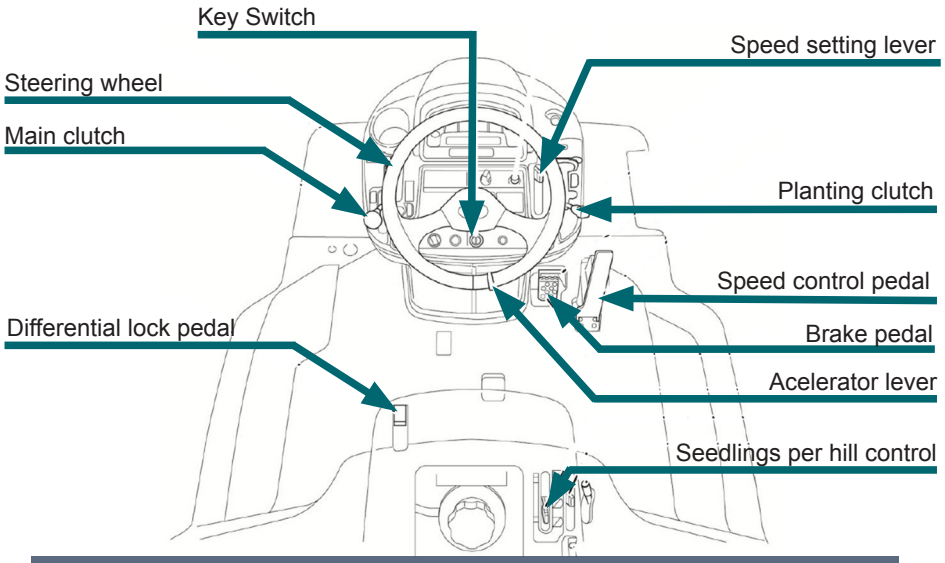


6-ROW RIDING-TYPE MECHANICAL TRANSPLANTER

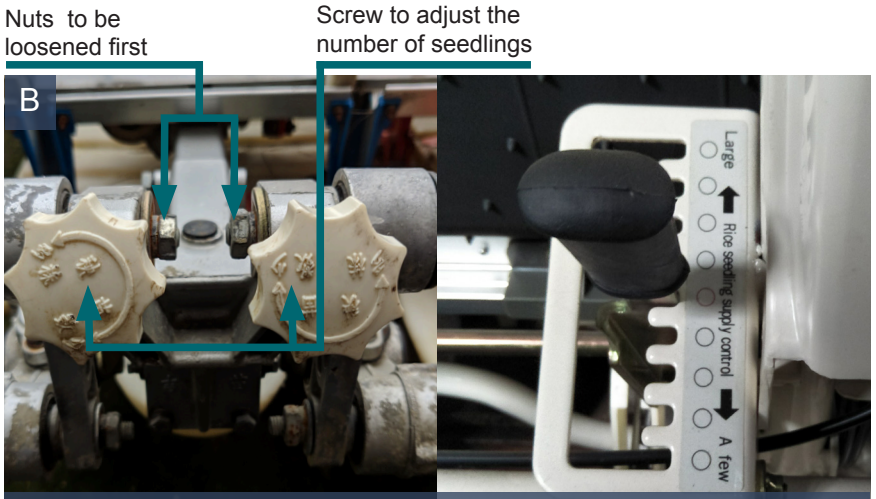
Mechanical transplanter controls and adjustments

The self-propelled mechanical rice transplanters comes in two types, walk-behind and riding type transplanters, the former being the most common for its cheaper price. Though there are different variations depending on the manufacturer the functions of its parts remain similar. Mechanical transplanters has two sections: power transmission and transport, and planting. The transport section consists of a prime mover (diesel or gasoline engine), a gear box, a lever for adjusting hill spacing or forward speed, a power take-off (PTO) shaft, a toothed steel or rubber wheel for field operation and steering mechanism, a driver's seat (riding type), and two seats for helpers (riding type). The planting section has a floating board, seedling platform, transplanting arm and fingers with screws or levers for adjusting the number of plants per hill, depth setting lever, chains or levers for height adjustment of float board, and float-lifting mechanism (hydraulic components).

A



Control layout for 6-row riding-type mechanical transplanter



Seedlings per hill adjustment for 8-row riding-type (left) and 4-row walk-behind (right) mechanical transplanter

Number of seedlings per hill control

The optimum number of plants per hill is very important to get higher productivity. Two types of systems control the number of plants per hill in different machines. The first type has a lever (Figure B, right) that reduces the number of plants per hill when pulled towards the operator and vice versa. The second type has screws operating similarly with the first type, but through clockwise rotation. Loosen the nuts (Figure B, left) before the rotating screw is set to the desired position. It is necessary that the screws are set equally so that all the fingers will pick up an equal number of seedlings. This can be achieved by positioning the nuts and bolts belonging to different screws in similar positions.

Differential lock pedal

It locks both front wheel axles together to provide more traction when the transplanter crosses areas with deep mud on the field. Differential lock pedals are only seen in riding type transplanters as shown in Figure A because of their heavier construction.

Planting depth adjustments for 8-row riding-type (left) and 4-row walk-behind (right) mechanical transplanter

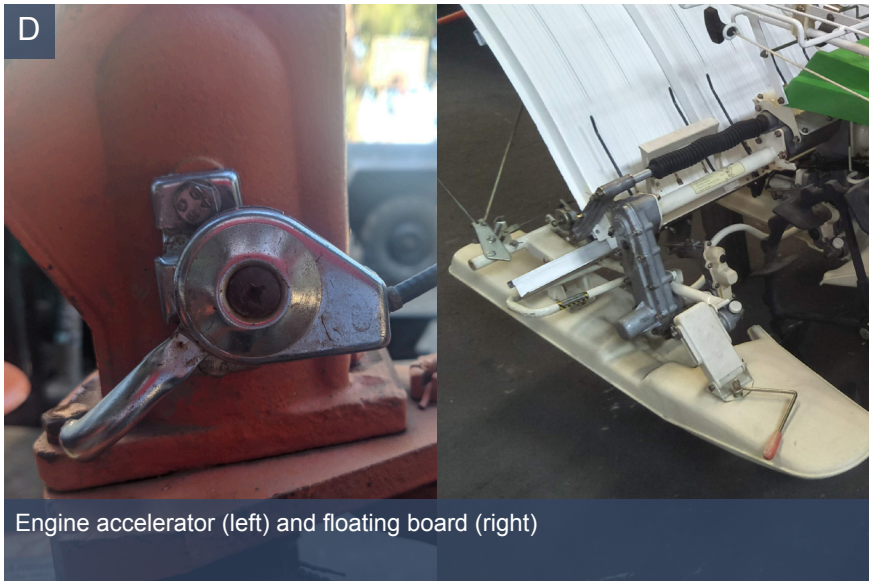
Planting depth controls

Planting depth of the seedlings should be optimal. The depth must not be too shallow to avoid uprooting of seedlings, especially during strong water flow or high wind. A deeper depth will cause the seedlings to be submerged, which can trigger rotting.

The two different types of planting depth control systems available in different machines are shown in Figure C. In the first system (right), the planting depth can be set at the desired depth simply by sliding the lever handle. The planting depth can be increased by moving the lever towards the operator and vice versa. In the second system (left), the lever needs to be rotated to set the desired depth. Counterclockwise rotation will increase planting depth.

Engine Accelerator

Accelerator (Figure D, left) is used to move the machine at the desired speed. The speed of the machine must be set as recommended by the manufacturer. The accelerator lever is placed near the operator's position.



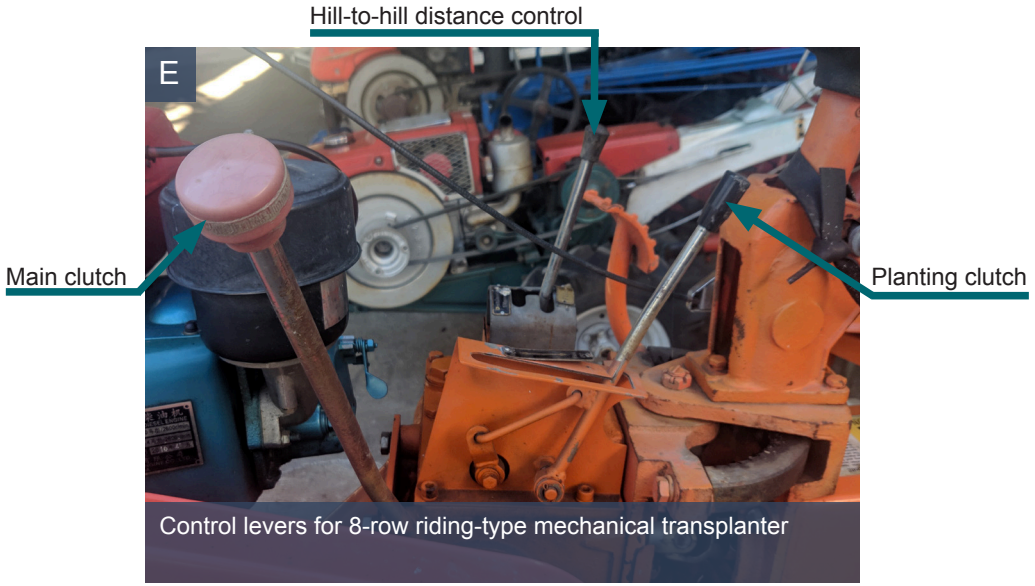
Engine accelerator (left) and floating board (right)

Floating board

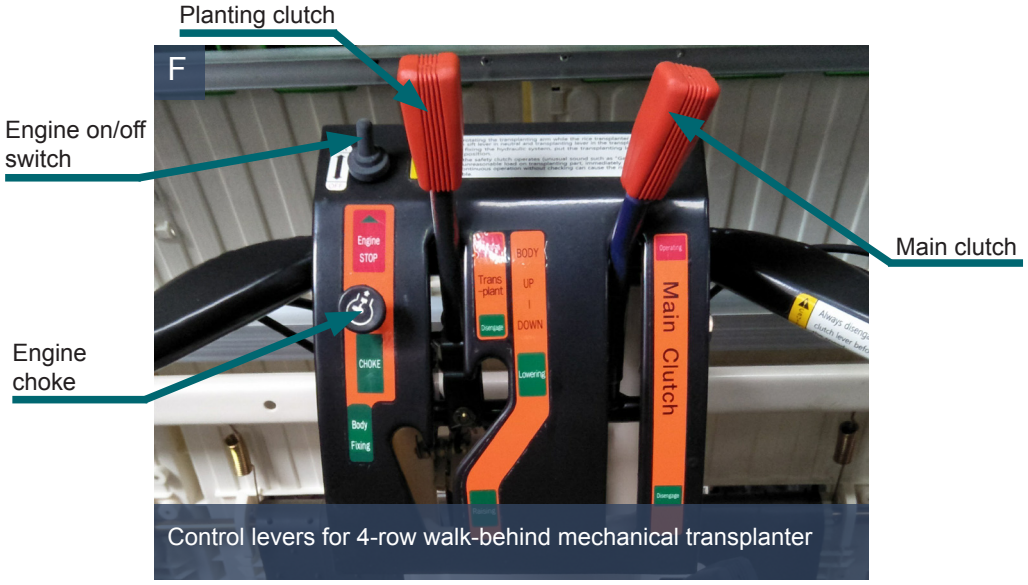
The floating board (Figure D, right) serves as a base and helps when transporting or planting with deep water in the field. In a riding-type machine, the floating board is connected to a pedal through a chain. Press the pedal to lift the board when the machine is stuck in mud or when the machine is to be transported from one field to another. In a walk-behind-type transplanter, floating board may be lifted through a lever, which actuates the hydraulic mechanism. The floating board is lifted if the lever is set to the "up" position.

Hill-to-hill distance control

The optimum hill-to-hill distance is an important parameter for achieving optimum productivity. Hill-to-hill distance can be adjusted through a lever (Figure F), which is marked on an attached plate.



Control levers for 8-row riding-type mechanical transplanter



Control levers for 4-row walk-behind mechanical transplanter

Planting clutch

The planting clutch lever (Figures E and F) is used to engage or disengage the power to the fingers. The clutch must be in the engaged position while transplanting. It must be in the disengaged position while feeding the nursery mats when operating the transplanter in transportation mode or whenever actual transplanting is not done. This is very important to avoid any breakage of fingers.

Main clutch

The main clutch (Figures E and F) is disengaged to run the engine in idle condition, while engaged to move the machine.

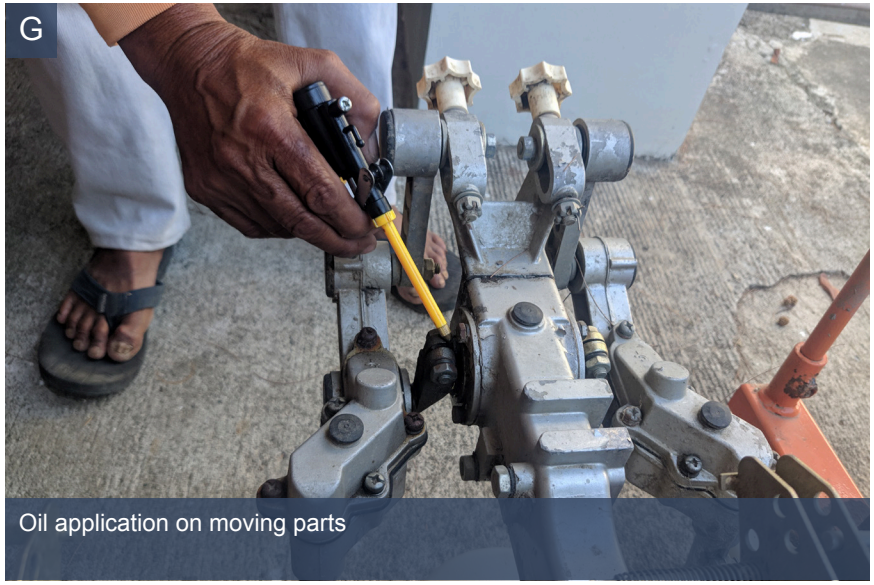
CHECKS FOR PLANTING USING THE MECHANICAL TRANSPLANTER

DESCRIPTION	FREQUENCY/SPECIFICATION
SEEDLING MATS	Mat size: 58cm x 22.5cm (8-row riding-type), 58cm x 28cm (4-row walk-behind) Seed rate: 30kg/ha Mat thickness: 1.5-2cm Seedling height before transplanting: 18-20cm Seedling age: 14-18 days
SOIL CONDITION	Field water depth: 1-2cm Subsurface soil layers should be hard enough to support the machine Field condition: Puddled and well leveled
WATER	Add permanent water 4-5 days after transplanting
WEED MANAGEMENT	Pre-emergence: Pretilachlor/Butachlor (2-3 days after transplanting in 3-5cm standing water) Hand weeding: 25-35 days after transplanting

PROPER STORAGE PROCEDURES

- Clean the transplanter with water then let it dry.
- Stop the engine and set accelerator to low speed position.
- Engage main clutch and transplanting clutch.
- Transplanting grippers/forks should be kept in the position before picking.
- Shift lever on neutral.
- Fill the oil and grease where needed (Figure G).
- If the machine has a hydraulic lift mechanism, lower it to resting position.
- Drain all fuel.

  Fuel evaporates in the fuel tank or carburetor, which can make the machine difficult to start.
- Close the fuel cock.
- To prevent rust in the cylinder, remove the ignition or spark plug (for gasoline engine), put some oil, then rotate crank shaft a few times with start lever. Reassemble the ignition or spark plug. Pull the start lever until it stops. Leave the lever to stop position.
- Do not store the machine outdoors exposing to wind, rain, and sunlight to prevent corrosion and deformation of machine parts.
- Cover the machine with plastic and store in a cool, ventilated dry storehouse (Figure H).

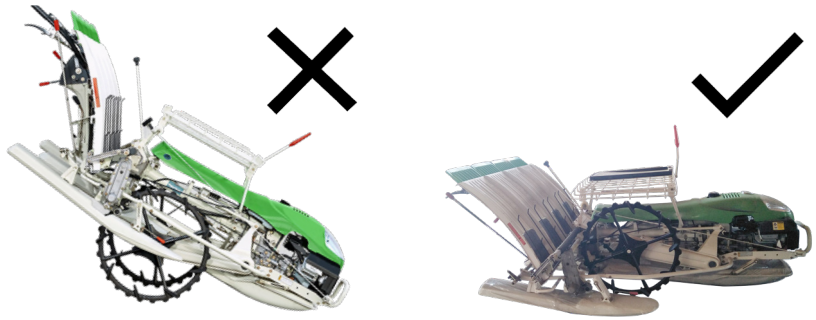


Oil application on moving parts


Covering the machine for storage

Important:

If the machine has a hydraulic lift mechanism, lower it to resting position.



CHECKS FOR MACHINE OPERATION AND MAINTENANCE

DESCRIPTION	FREQUENCY/SPECIFICATION
ENGINE OIL	Check: Daily Change: After 30h Grade: SAE30 Gasoline engine SAE40 Diesel engine
AIR FILTER	Check and clean: After 3-4 days Change: After 100h
FUEL FILTER	Check: Daily Change: After 100h
OIL FILTER	Check and clean: Daily Change: After 100h
GEAR OIL	Check: Daily Change: After 100h Grade: SAE90
PLANTING GEARBOX OIL	Check: Daily Change: after 30h Grade: SAE90
TRANSPLANTING FINGER OIL	Check: Daily Change: After 30h Grade: SAE90, grease
MISCELLANEOUS MECHANICAL CHECK	Regularly check the finger push rods for ease of movement, loose nuts and bolts, fingers wear and alignment, platform, and all moving parts

MECHANICAL TRANSPLANTER TROUBLESHOOTING

PROBLEM	CAUSE/SOLUTION
Missing hills or uneven plant spacing	Check on seedling mats for poor or uneven growth. Increase seed density in mats. Slow down the cross feed time of transplanter. Check the transplanting finger for wear.
Seedling mats collapse on seedling platform	Ensure minimum mat thickness of 1.5-2cm. Dry nursery mat to firm up. Too much organic compost was used.
Poor sliding and congestion of seedling platform	Adjust the seedling stay to increase clearance. Cut the nursery bed thickness down to 2-3cm. Wet mats before planting to improve sliding. Water the seedling platform.
Floating or moving seedlings	Drain the field (*sanap-sanap*). Allow field to settle. Reduce planting speed. Increase planting depth. Hard soil and damaged seedlings may require more watering and puddling.
Transplanter floats, sinks, or presses soil against adjoining row	Drain field and let soil surface firm up, which may mean postponing for a couple of days. Allow field to settle.
Seedlings with poor root development not established in soil	Slightly wet nursery. Reduce planting speed. Improve seedling root development through better nursery management.
Hill spacing becomes smaller especially in soft soil and deep water.	Lower the wheels to reduce wheel slip on transplanter. Drain water from field and firm up soil surface.

SIMPLE COST ANALYSIS (4-ROW WALK-BEHIND)

PARAMETERS	ASSUMPTION	COST (₱)
Total Investment Cost		565,000
Seedling tray	4,500 trays	225,000
Seeder and soil spreader		40,000
Transplanting unit		300,000
Useful life, yr		6
Salvage value	10% of machine cost	30,000
Use: days/yr		60
h/day		8
h/yr		480
Field capacity, ha/day		1.2
ha/yr		72
Fuel consumption, L/h		1
Cost of fuel, per liter	Gasoline	46
Number of workers required		4
Labor rate, per day		300
Fixed costs:		
Sheltering cost, per yr	2.5% of Investment	14,125
Depreciation, per yr		84,750
Interest, per yr		15,537.5
Total Fixed cost, per yr		114,537.5
Variable costs:		
Fuel cost, per yr		8,640.0 - 22,080.0
Oil/lubricant, per yr		662.4
Repair and maintenance, per yr	5% of Investment	28,250
Operator, per yr		72,000

SIMPLE COST ANALYSIS (4-ROW WALK-BEHIND)

PARAMETERS	ASSUMPTION	COST (₱)
Total Variable cost, per yr		22,992.4
per ha		1,708.2
Total Fixed and Variable Cost:		
per yr		237,404.9
per h		494.6
per ha		3,297.3
Seedling Preparation	300 trays/ha	
Tray prep, per ha	600 trays/day	600.0
Seedling care, per ha	Watering and tending	1,050.0
Garden Soil, per ha	3/8 truckload	1,125.0
Seedling Prep Cost, per ha		2,775.0
Total Cost of Mehanical Transplanting, per ha		6,072.3
Prevailing Cost, per ha		11,000.0
Net income, per ha		4,927.1
Net income, per yr		354,795.1
Payback Period, yr		1.6
Breakeven, ha/yr		17.6
Internal Rate of Return, %		7%

SIMPLE COST ANALYSIS (8-ROW RIDING TYPE)

PARAMETERS	ASSUMPTION	COST (₱)
Total Investment Cost		615,000
Seedling tray	4,500 trays	225,000
Seeder and soil spreader		40,000
Transplanting unit		350,000
Useful life, yr		6
Salvage value	10% of machine cost	35,000
Use: days/yr		60
h/day		8
h/yr		480
Field capacity, ha/day		1.2
ha/yr		72
Fuel consumption, L/h		0.5
Cost of fuel, per liter	Diesel	36
Number of workers required		4
Labor rate, per day		300
Fixed costs:		
Sheltering cost, per yr	2.5% of Investment	15,375
Depreciation, per yr		92,250
Interest, per yr		16,912.5
Total Fixed cost, per yr		124,537.5
Variable costs:		
Fuel cost, per yr		8,640.0
Oil/lubricant, per yr		259.2
Repair and maintenance, per yr	5% of Investment	30,750
Operator, per yr		72,000

SIMPLE COST ANALYSIS (8-ROW RIDING TYPE)

PARAMETERS	ASSUMPTION	COST (₱)
Total Variable cost, per yr		111,649.2
per ha		1,550.7
Total Fixed and Variable Cost:		
per yr		236,186.7
per h		492.1
per ha		3,280.4
Seedling Preparation	300 trays/ha	
Tray prep, per ha	600 trays/day	600.0
Seedling care, per ha	Watering and tending	1,050.0
Garden Soil, per ha	3/8 truckload	1,125.0
Seedling Prep Cost, per ha		2,775.0
Total Cost of Mehanical Transplanting, per ha		6,055.4
Prevailing Cost, per ha		11,000.0
Net income, per ha		4,944.6
Net income, per yr		356,013.3
Payback Period, yr		1.6 - 1
Breakeven, ha/yr		18.7
Internal Rate of Return, %		5%

SIMPLE COST ANALYSIS (6-ROW RIDING TYPE)

PARAMETERS	ASSUMPTION	COST (₱)
Total Investment Cost		1,015,000 - 1,115,000
Seedling tray	4,500 trays	225,000
Seeder and soil spreader		40,000
Transplanting unit		750,000 - 850,000
Useful life, yr		6
Salvage value	10% of machine cost	101,500 - 111,500
Use: days/yr		60
h/day		8
h/yr		480
Field capacity, ha/day		2
ha/yr		120
Fuel consumption, L/h		2
Cost of fuel, per liter	Diesel	36
Number of workers required		4
Labor rate, per day		300
Fixed costs:		
Sheltering cost, per yr	2.5% of Investment	25,375 - 27,875
Depreciation, per yr		152,250 - 167,250
Interest, per yr		27,912.5 - 30,662.5
Total Fixed cost, per yr		205,537.5 - 225,787.5
Variable costs:		
Fuel cost, per yr		34,560
Oil/lubricant, per yr		1,036.8
Repair and maintenance, per yr	5% of Investment	50,750 - 55,750
Operator, per yr		72,000

SIMPLE COST ANALYSIS (6-ROW RIDING TYPE)

PARAMETERS	ASSUMPTION	COST (₱)
Total Variable cost, per yr		158,346.8 - 163,346.8
per ha		1,319.6 - 1,361.2
Total Fixed and Variable Cost:		
per yr		363,884.3 - 389,134.3
per h		758.1 - 810.7
per ha		3,032.4 - 3,242.8
Seedling Preparation	300 trays/ha	
Tray prep, per ha	600 trays/day	600.0
Seedling care, per ha	Watering and tending	1,050.0
Garden Soil, per ha	3/8 truckload	1,125.0
Seedling Prep Cost, per ha		2,775.0
Total Cost of Mehanical Transplanting, per ha		5,807.4 - 6,017.8
Prevailing Cost, per ha		11,000.0
Net income, per ha		4,982.2 - 5,192.6
Net income, per yr		597,865.7 - 623,115.7
Payback Period, yr		1.6 - 1.9
Breakeven, ha/yr		19.8 - 32.9
Internal Rate of Return, %		3% - 14%

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We are a government corporate entity (Classification E) under the Department of Agriculture. We were created through Executive Order 1061 on 5 November 1985 (as amended) to help develop high-yielding and cost-reducing technologies so farmers can produce enough rice for all Filipinos.With our "Rice-Secure Philippines" vision, we want the Filipino rice farmers and the Philippine rice industry to be competitive through research for development (R4D) work in our central and seven branch stations, including our satellite stations, collaborating with a network that comprises agencies strategically located nationwide.We have the following certifications: ISO 9001:2015 (Quality Management), ISO 14001:2015 (Environmental Management), and OHSAS 18001:2007 (Occupational Health and Safety Assessment Series).

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