APART

OPERATIONAL MANUAL

MECHANICAL TRANSPLANTING OF RICE

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GOVERNMENT OF ASSAM

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Assam Rural Infrastructure and Agricultural Services Society

ASSAM AGRICULTURAL UNIVERSITY
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IRRI

OPERATIONAL MANUAL OF MECHANICAL TRANSPLANTING OF RICE

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CROPSHOW
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Date: 02.06.2022
Location: Hakama
KRISHI VIGYAN KENDRA, DHUBRI
IRRI

Preparation of MAT type nursery
On Sali Paddy
IRRI


IRRI

Introduction

Transplanting of rice in Assam is usually done manually by hired or family labourers. Transplanting of uprooted seedlings by labourers in semi-curved body posture is the most arduous operation in rice cultivation. While transplanting, a person puts 2-3 seedlings into a hill in the puddled soil at a depth of 3-5 cm and goes on moving backwards in bending posture with his/ her feet bogged into puddled soil. If a worker, on an average, can transplant 0.04 ha/day, then by planting 30 hills/ square meter he/she must insert his/ her fingers 3,00,000 times into puddled soil to transplant one hectare of land. Besides, this exercise is highly monotonous, labour-intensive, entailing non-uniform planting of seedlings, and results in low plant density leading to lower yield. Moreover, due to the scarcity of labour during peak season, transplanting is usually delayed, causing a decrease in rice yield. Random placement of seedlings in manual transplanting forbids mechanical weeding also.

This manual highlights the benefits of mechanical transplanting of rice and discusses some of the operational and management issues that need to be addressed. It will help agricultural extension workers, service providers, farmer producer companies and farmers to use mechanical transplanting with or without puddling with an easy, step-by-step guide.

Manual transplanting of rice

Mechanical transplanting of rice

What is mechanical transplanting of rice?

Mechanical transplanting of rice is the process of transplanting young rice seedlings which have been prepared in a mat-type nursery, using a self-propelled rice transplanter.

In conventional manual transplanting practice, 20-30 labourers are required to transplant one hectare. However, if a self-propelled rice transplanter is used, five persons can transplant 1.5 – 2.0 ha in a day.

Advantages of mechanical transplanting

- ✓ Transplanting of rice seedlings at the optimal age (14-18 days for *Sali* season and 20-25 days for late *Boro*/early *Ahu* season when seedling height is 18-20 cm)
- ✓ Uniform spacing and optimum plant density (16-28 hills/m^2 with 2-3 seedling per hill)
- ✓ About 0.5-1.0 t/ha more productivity than traditional methods where plant spacing, and density may not always be consistent
- ✓ Less transplanting shock, early seedling vigour and uniform crop stand
- ✓ Lower stress, drudgery and health risks for farm labourers
- ✓ Better employment opportunities for rural youth through transplanting as a service provision
- ✓ Addresses the problem of labour scarcity
- ✓ Increases farmers' net income

What is mat-type nursery?

In a mat-type nursery, the seedlings are raised on a thin layer of soil placed on a perforated polythene sheet. The polythene sheet prevents the seedling roots from penetrating into the underlying soil, creating a dense mat. This type of nursery is a prerequisite for machine transplanting. The nursery-mat can be cut into cakes of desired shapes and sizes to fit into the trays of the transplanter. Preparation of mat-type nursery should begin 15-20 days prior to the anticipated time of transplanting during *Sali* season and 25-30 days before *Boro* season. The nursery can be established in either a wet or dry bed.

Advantages of mat-type nursery

- Uses less area (75 m^2) as compared to conventional nursery (750-1000 m^2) for one hectare.
- Production of healthy and robust seedlings of 18-20 cm height in 14-18 days for *Sali* season and in 20-30 days for *Boro* season.
- Minimum root damage as seedlings are not uprooted, thereby transplanting shock is reduced.
- Lower cost of inputs (fertilizer, water) in nursery

Requirements for growing mat-type nursery

Good quality seed: To plant one hectare, use good quality seed at a rate of 15-20 kg/ha for hybrids (1-2 seedlings/hill) and 40 kg/ha for inbred varieties (2-3 seedlings/hill, having >80% germination. Good quality seed requires lower seed rate, and results in more uniform germination, vigorous seedlings, less chances of replanting, fewer weeds, and 5–20% increase in yield.

Nursery area: For raising seedlings to transplant one ha, a gross 75 m^2 (1.5 m wide x 50 m long) area is required.

Polythene sheet: Polythene sheet of 1.5 m width and 50 m length is commonly available. Fold it in 8-10 layers and make small holes randomly with ice prick/screw driver, big enough to allow passage of water but not roots of seedlings.

Soil cleaning sieve: To get clean soil free from stones, twigs and other unwanted materials, dry soil is sieved and used for preparation of dry mat-type nursery.

Soil mixture: Soil mixing requires only availability of soil & FYM in the ratio of 4:1.

Watering can: Watering can is required for irrigation up to 2-3 days as flood irrigation may disturb the seed at the initial stage until the seeds emerge and roots establish.

Iron frame: An iron frame is required to maintain a uniform depth of the soil layer.

- 1.2 m wide x 1.2 m long x 1.25 cm (0.5-inch) thick for wet mat-type nursery preparation.
- 1.2 m wide x 2 m long x 1.5-2.0 cm (0.6-0.8-inch) thick for dry mat-type nursery preparation.

- Improved iron frame: Iron frame can also be divided into 8-10 sections, each section having dimension (for self-propelled riding type Redland paddy transplanter: 60 cm x 23 cm; for VST paddy transplanter: 60 cm x 23.8 cm; and for walk-behind type Kubota/ Yanmar/ Mahindra paddy transplanter: 60 cm x 30 cm). In this type of frame, mat is not required to be cut.

- **Gunny bag**: For soaking of seeds and to cover imbibed seed to facilitate sprouting.
- Sickle/sharp knife for cutting mats.

Preparation of dry nursery bed

Bed preparation

For a one-hectare field, a nursery bed 1.5 m wide, 50 m long and 10-15 cm thick should be prepared on a levelled field. Between beds, there should be a furrow/water channel of 50 cm width. If possible, establish the nursery near an irrigation facility or water source as frequent irrigation will be required to maintain a good nursery.

Using the polythene sheet

Spread a polythene sheet of the required size on each bed. Before spreading the sheet, perforate the sheet evenly to improve drainage and aeration.

Soil mixture

Take soil from a weed-free field and pass it through a mesh sieve. Prepare a mixture of sieved soil and farm yard manure (FYM)/compost in a 4:1 ratio (soil: FYM).

Spreading the soil mixture

After thorough mixing, spread the mixture uniformly on the polythene sheet. This layer should not be more than 1.5-2.0 cm thickness. To ensure an even depth, place a frame that is 1.5-2.0 cm high on the plastic sheet and fill it with the soil mixture.

Preparation of wet nursery bed

Bed preparation

The size of bed for a wet-bed nursery is same as dry-bed nursery. However, the bed preparation is different. In the *Sali* season, when there is a large amount of rainfall, a wet-bed nursery becomes inevitable. Before preparing the nursery, the field should be ploughed, puddled and levelled. After puddling, leave the field to settle for 24 hours. Once the soil is settled, prepare a raised bed 50 m long, 1.5 m wide and 10-15 cm high to raise seedlings for one hectare main field area. Leave the bed to settle for 36-48 hours. Afterwards, settle the bed with a plank.

Using the polythene sheet

Spread a polythene sheet of the required size on each bed. Before spreading the sheet, perforate the sheet evenly to improve drainage.

Spreading the soil

Take wet soil from between the beds and spread it over the polythene sheet in a 1.25 cm thick layer, using a 1.25 cm (0.5-inch)-thick iron frame. The soil should be clean and clod-free. Once the soil is spread over the polythene sheet within the iron frame, level the soil using a plank and remove extra soil.

Management of mat-type nursery

Seed rate: To plant one hectare with 23-36 hills/m^2 in self-propelled riding type and 16-28 hills/m^2 in walk-behind type, a seed rate (>80% germination) at 40 kg/ha for inbred varieties (2-3 seedlings/hill) and 15-20 kg for hybrids (1-2 seedlings/hill) is used.

Seed quality: Quality seed is clean (contains no pebbles, soil particles, weed seeds), genetically pure (contains only grains of one variety) and healthy (well filled, of the same color, without cracks, and no obvious disease- or pest-damage).

Seed selection: Seeds are immersed in plain water and stirred well. Seeds, those sink down are selected, and those float are rejected.

Adopt seed treatment with recommended fungicides only. Once the selection process is done, the seeds should be soaked directly in one of the following fungicidal suspensions for 12 hours. One liter of fungicidal solution with only 1.5-2.5 g of listed fungicide in table is required to treat one kg of seed. Treated seeds should be kept in incubation for 48-72 hours.

Fungicide	Dose (g/kg seed / liter of water)	Use
Chlorothalonil 75% WP	2	To avoid damping off, wilt and root-rot in seedling stage
Carboxin	2.5	
Trifloxystrobin 25% WP	1.5	

Safety precaution: Plastic gloves should be used while handling chemicals to avoid ill-effect on health.

Sowing

Spread the pre-germinated seeds evenly on the bed. After spreading the seeds, cover the bed with a thin layer (0.5 cm) of the already prepared soil mixture. Cover the bed with a thin layer of rice straw or banana leaves, which should be removed after 2-3 days.

Irrigation

Irrigate the beds by sprinkling water using a watering can for the initial 2-3 days until the seeds emerge, and then irrigate beds by flooding furrows between the beds. Keeping the bed moist may require water to be sprinkled 2-3 times/day for the first 3-4 days. Thereafter, apply irrigation as and when required. Ensure water retention on the top of the nursery-bed by frequently irrigating the furrows until the seedlings are ready for use. Keep the height of levees/bunds higher than the bed height so that water can be retained on the top of the beds. Replace the water with fresh water when water during day-time becomes hot. Stop watering 12 hours before transplanting and drain excess water to ensure the mat is dry for cutting and transplanting. Transplant when the seedlings are 18-20 cm tall, which is usually 14-18 days after establishment in *Sali* season and 20-30 days in *Boro* season.

Nutrient supplement

The nutritional requirement of the nursery is generally met by the mixture of soil and FYM/ vermicompost. However, it is advisable to apply 250 g DAP after one week of sowing for one-hectare nursery bed. When nutrient deficiencies (yellowing) occur, apply a foliar spray of 0.5% zinc sulphate (21%) and 2.5% urea. If symptoms re-appear, it should be repeated after 5-7 days. In case symptoms of iron deficiency are visible, foliar application of 0.5% solution of ferrous sulphate is recommended.

Cutting mats

When the nursery is ready for transplanting, drain the water 12 hours prior to transplanting. Mats should be cut to the required size, using a sharp knife/ sickle. If mats need to be transported, they should be kept moist by sprinkling water to avoid wilting.

Transplanting method

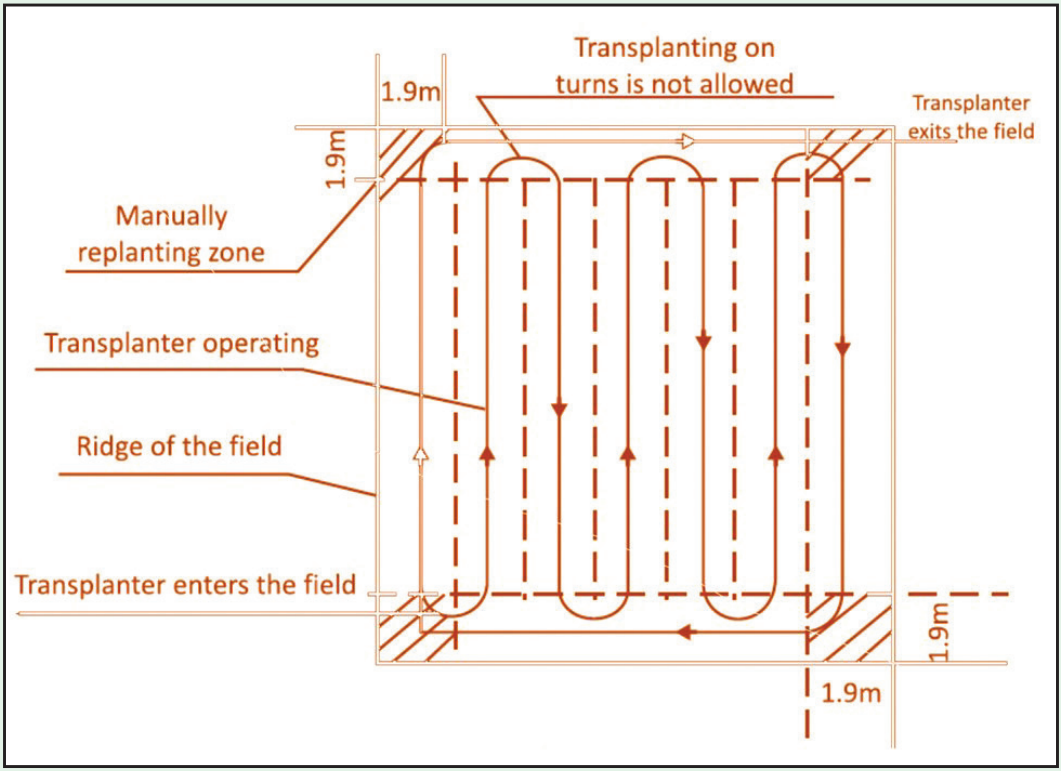
Mechanical transplanting is done through a self-propelled riding type or walk-behind type transplanter. In Assam condition, walk-behind type transplanter is suited due to presence of higher bund heights.

- **Spacing:**

  i. Single wheel riding type: Row to row = 23.8 cm (fixed); hill to hill= optional (adjustable to 12, 14, 16, or 19 cm)

  ii. Walk-behind type: Row to row = 30 cm (fixed); hill to hill= optional (adjustable to 12,16,18 or 21 cm)

- Feed nursery mats onto the seedling platform.
- Leave the area equivalent to one pass of machine on all four sides of the field before starting transplanting to avoid damage to the already-transplanted seedlings while turning the machine.
- 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.
- Where there are gaps, fill them manually.
- After seedling establishment, follow management practices for water, weed, nutrients and pest control as recommended for conventional transplanted rice.

Important do's

- Use good quality seed and put to germination test.
- Treat the seed with recommended fungicide.
- Handle the polythene sheets carefully so that they can be re-used.
- Irrigate nursery using a watering can for the first 2-3 days.
- Treat nutrient deficiencies in the nursery as they appear.

- Ensure good water management in the nursery. Avoid stress and maintain standing water on the beds.
- Transplant into a well-prepared level field only. To test field soil conditions, drop a golf ball sized soil clod from 1 m height onto the prepared surface. If the clod sinks below the surface, the soil is too wet. If the clod sits on top, it's too hard. Ideally, the clod should penetrate to its own depth.
- Maintain 1-2 cm of standing water on the field while transplanting and up to 4-5 days after planting.
- Use the same recommendations for herbicide application as you would for manually transplanted crops.
- Lift the planting platform when driving over the bunds.

Operation of machine transplanter

As discussed earlier, the transplanter is of two types - riding type and walk-behind type. In this section, we will discuss walk-behind type transplanter as it fits to Assam conditions.

The walk-behind type paddy transplanter consists of prime mover (petrol engine), transmission wheel, float, planting wheels, fender rod, planting marker, central row marker, seedling platform with pressing rod, seedling tray, tray shifter and pick up fingers. The safety clutch mechanism is important that prevents the breakdown of the planting device from the impact of any stones or debris in the field. The planting section has transplanting fingers with push rod at the back of finger and levers for different adjustments. The hydraulic system in this type of transplanter helps for ease in taking the machine from one field to another field having high bund height.

Machine controls

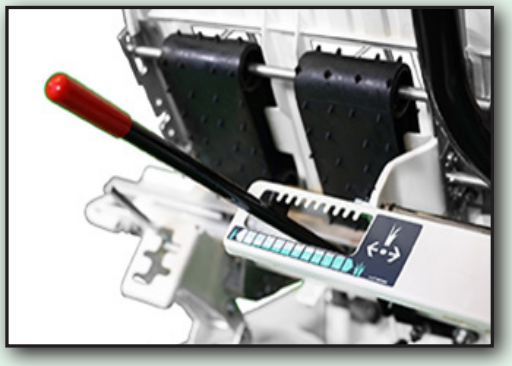
1. Planting depth control

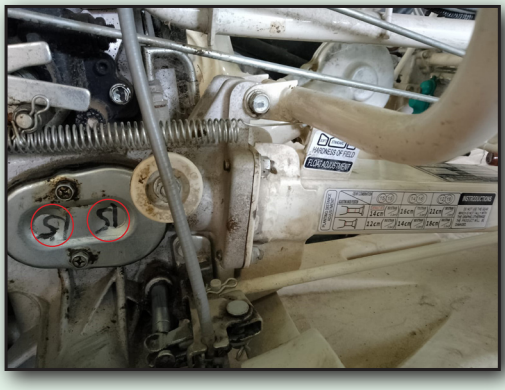
The optimum depth of planting of the seedlings is very important. Shallower depth will result in the uprooting of seedlings even with mild flow of water

or wind, while a deeper depth will result in submergence of the planted seedlings, thereby creating the risk of rotting. 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.

2. Number of plants per hill control

The optimum number of plants per hill is very important to get higher productivity. The control system has a lever that reduces the number of plants per hill when pulled towards the operator and vice-versa.





3. Hill-to-hill distance control

The optimum hill-to-hill distance is an important parameter for achieving optimum productivity. The transplanting distance i.e., hill to hill distance can be adjusted by changing the gear. The machine has provision of 3-sets of gear i.e., 15:15 for 12-14 cm plant to plant distance, 14:16 for 14-16 cm plant to plant distance and 12:18 for 18-21cm plant to plant distance. The upper and lower level of distance can be adjusted by push/pull button provided just near to the gear box.

4. Straight planting marker

One of the major benefits of mechanical transplanting is establishing the crop in

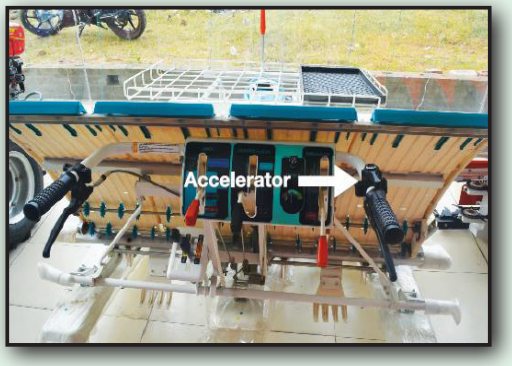
straight rows. For that purpose, every return pass should be parallel to the previous one. This can be achieved with the help of a marker that is attached to the machine. The machine should be operated forward in the return pass in a manner so that the marker is above the last row of the previous path.

5. Planting clutch

The planting clutch lever 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, operating the transplanter in transportation mode or whenever actual transplanting is not done. This is very important to avoid any breakage of fingers.

6. Main clutch

The main clutch is disengaged to run the engine in idle condition, and engaged to make the machine ready to move for work.

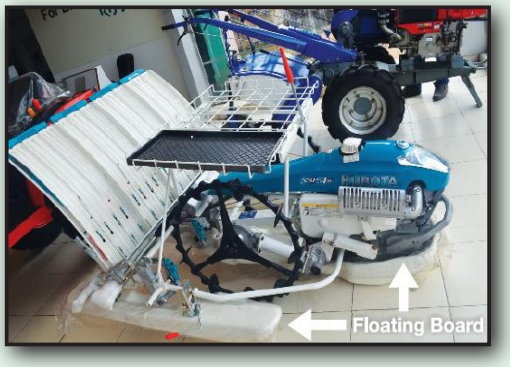


7. Accelerator

Accelerator is used to move the machine at the desired speed. The speed of the machine must be as recommended by the manufacturer. The accelerator lever is placed near the operator's position.

8. Floating board

The floating board serves as a base and helps when transporting or planting with deep water in the field. In a walk-behind type transplanter, floating board may be lifted through a lever, which actuates the hydraulic mechanism for that purpose. The floating board is lifted if the lever is set to the "up" position.



Checks for machine operation and maintenance

Parts / Sector	Time
Engine oil	
Check	Daily
Change	After 30 hours
Grade	SAE 20/40
Air filter	
Check & clean	After 3-4 days
Change	After 100 hours
Gear oil	
Check	Every day
Change	After 100 hours
Grade	SAE 90
Planting gearbox oil	
Check	Every day
Change	After 30 hours
Grade	SAE 90
Transplanting finger oil	
Check	Every day
Change	After 30 hours
Grade	SAE 90, grease
Miscellaneous mechanical regularly check	Check movement
	Loose nuts and bolts
Finger push rods	Fingers wear and alignment
	Platform
	All moving parts

Checks for planting using the transplanter

A. Seedling mat cake size

Height: 60 cm; width: 23 cm (VST)/ 30 cm (Kubota/Mahindra)

Seed rate: Hybrid 15-20 kg/ha, inbred varieties 40 kg/ha

Mat thickness: 1.25 cm for wet-bed and 1.5-2.0 cm for dry-bed

Seedling height before transplanting: 18-20 cm

Seedling age: 14-18 days in *Sali* and 20-30 days in late *Boro*/ early *Ahu*

Seed treatment if required: Carboxin (2.5 g/kg or label rate), Chlorothalonil 75% WP (2.0 g/kg), Trifloxystrobin 25% WP (1.5 g/kg)

B. Soil condition

Water depth in field: 1-2 cm

Soil condition: Puddled and non-puddled

Field condition: Levelled, well puddled field

C. Water

Add water 3-4 days after transplanting

D. Weed management

Weeding: Keep the field weed-free, especially during the early phase of crop growth. Weeds cause maximum damage in the early phase of the crop growth. But the later control is also important to prevent seed-setting by the weeds. Two weeding are done manually or mechanically (using paddy weeder or power weeder); first at 3 weeks after, and second at 6 weeks after transplanting.

Herbicides: Herbicides should be selected based on the presence of weed flora and considering even previous weed pressure in the field.

Herbicide application

- **Equipment:** Given their superior effectiveness, herbicides should only be applied using multi-nozzle boom fitted with flat-fan nozzles. While spraying, the new spray-swath should always overlap 30 % of the previous spray-swath margin to ensure uniform application.
- **Pre-emergence (PE) herbicides:** Most PE herbicides require moisture at the soil surface at the time of application. Without sufficient moisture, the PE herbicide will not be that much effective.
- Pre-emergence herbicides can be used by splash method in 3-5 cm standing water in the field, preferably within 0-3 days after transplanting.
- Pre-emergence herbicides supplemented with one hand-weeding will be more effective to take care of the germinated weeds, and the weeds emerging later in the season.
- **Post-emergence (PoE) herbicides:** PoE herbicides, if required, should be applied at 15-25 DAT when weeds attain 2-4-leaf stage. Ensure that there is no standing water in the field; however, the field should have moisture at the time of PoE application.
- **Spray volume:** Use spray volume of 300 liters/ha in all herbicide applications.

Herbicide safety

- ✓ Read the label prior to use to understand both the toxicity level and the safety measures required.
- ✓ Plastic gloves, goggles or face-shield, and full clothing should be worn by the person while mixing, and during application of the herbicides.
- ✓ Post-application, all clothes need to be washed separately from the family laundry.

Select suitable and need based herbicide(s) from the table

When does it kill weeds	Chemical Name	Dose (ai, g/ha)	Type of weeds it kills		When to apply	Commercial dose (g or ml/ha)	Commercial dose (g or ml/*bigha*)
Pre-emergence	Pretilachlor 50% EC	750	Narrow leaf	Some broadleaf	2-3 DAT	1500 ml	200 ml
	Pyrazosulfuron Ethyl 10% WP	18.8	Narrow leaf (sedges)	Some broadleaf	2-3 DAT	187.5 g	25 g
	Oxadiargyl 80% WP	100	Narrow leaf	Some broadleaf	2-3 DAT	125 g	16.6 g
Post-emergence	Bispyribac-sodium 10% EC	25	Narrow leaf (grasses + sedges)	Some broadleaf	15-25 DAT	250 g	33 g
	Chlorimuron ethyl 10%WP+ Metsulfuron methyl 10% WP	4 (2+2)	Broad leaf	Some sedges	15-25 DAT	20 g	3 g
	Pyrazosulfuron Ethyl 10% WP	25	Narrow leaf (sedges)	Some broadleaf	15-25 DAT	250 g	33 g

DAT= Days after transplanting.

Given below are some of the recommended herbicide-combinations. Depending on weed-flora, follow the application timings and doses as per above table:

- Pretilachlor (PE) *fb* Bispyribac-Sodium (PoE)
- Pretilachlor (PE) *fb* Bispyribac-sodium + Pyrazosulfuron (PoE)
- Pretilachlor (PE) *fb* Bispyribac-sodium + Pyrazosulfuron (PoE) *fb* Spot hand weeding

fb: followed by

Fertilizer management

Sali season

For transplanted rice, fertilizer recommendation per hectare is 60-20-40-5 kg of N-P_2O_5-K_2O-Zn. The base nitrogen dose is split into 3 equal applications - 1/3rd as basal, 1/3rd at tillering, and 1/3rd at panicle initiation. Under submerged condition, additional 20 kg N and 20 kg K_2O is applied 5-7 days after recession of flood to facilitate regeneration, and boost recovery from flood-shock. The detailed schedule and method of applying all nutrients is given in the table below:

The detailed schedule and method of applying all nutrients

Stage of fertilizer application	Name of fertilizer	Fertilizer dose				Application Method
		(kg/ha)		(kg/bigha)		
		Through DAP	Through SSP	Through DAP	Through SSP	
Basal	Urea	23	40	3	6	Broadcast & incorporate in soil at the time of field preparation
	DAP	44	-	6	-	
	SSP	-	125	-	17	
	MOP	67	67	9	9	
	$ZnSO_4$	25	25	3	3	
Maximum tillering after 1st weeding	Urea	45		6		Top dressing
Panicle initiation after 2nd weeding	Urea	45		6		Top dressing
5-7 days after flood recedes	Urea	45		6		Top dressing
	MOP	33		4.5		

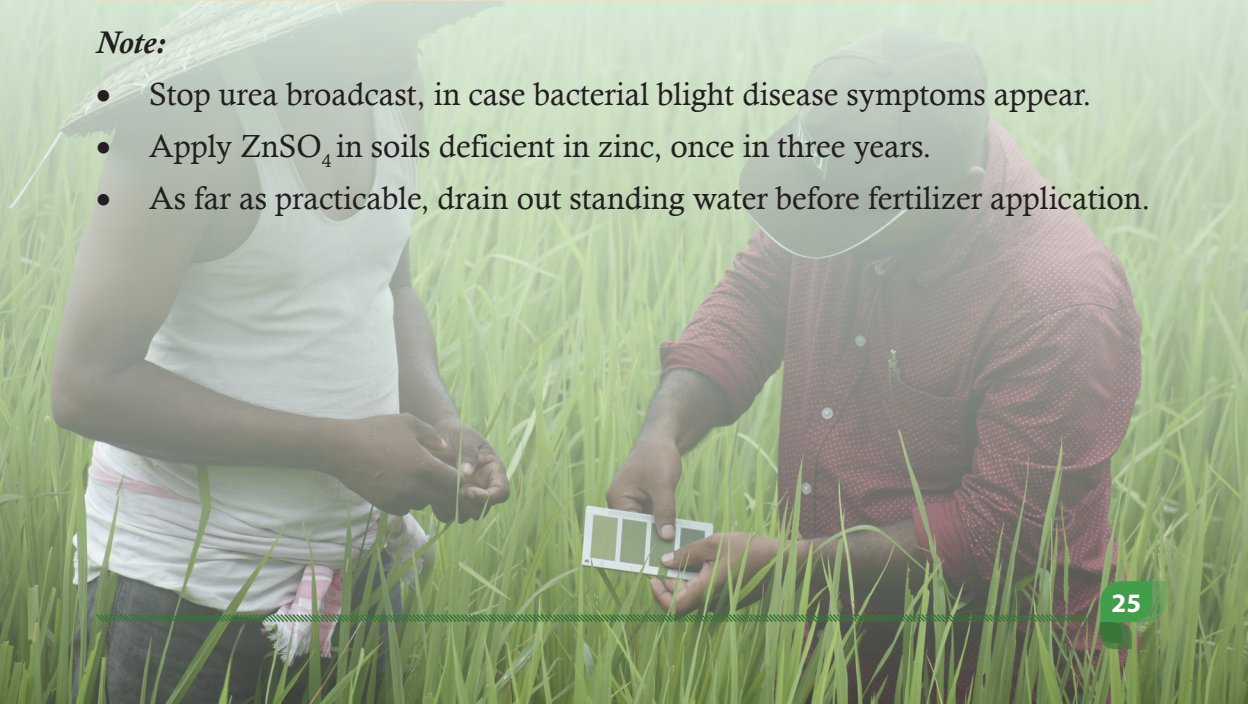
Boro/ early *Ahu* season

For transplanted rice, fertilizer recommendation per hectare is 60-30-30-5 kg of N-P_2O_5-K_2O-Zn. The nitrogen dose is applied in 3 splits - 1/3rd as basal, 1/3rd at tillering, and 1/3rd at panicle initiation. The detailed schedule and method of applying all nutrients are given in the table below:

Time of fertiliser application	Name of fertilisers	Fertilizer dose				Application method
		(kg/ha)		(kg/bigha)		
		Through DAP	Through SSP	Through DAP	Through SSP	
Basal	Urea	18	43	2	6	Broadcast & incorporate in soil at the time of field preparation
	DAP	65	-	9	-	
	SSP	-	188	-	25	
	MOP	50	50	7	7	
	$ZnSO_4$	25	25	3	3	
Maximum tillering after 1st weeding	Urea	43	43	6	6	Top dressing
Panicle initiation after 2nd weeding	Urea	44	44	6	6	Top dressing

Note:

- Stop urea broadcast, in case bacterial blight disease symptoms appear.
- Apply $ZnSO_4$ in soils deficient in zinc, once in three years.
- As far as practicable, drain out standing water before fertilizer application.



Pest management

Major insect-pests of rice and their control

Insect-pest	Management
Stem borer (*Scirpophaga incertulas*)	1. Chlorantraniliprole 0.4% G @ 10 kg/ha 2. Flubendiamide 20% WG @ 125 g/ha 3. Cartap hydrochloride 50% SP @ 2 g/L of water
Swarming caterpillar (*Spodoptera Mauritia*)	1. Chlorantraniliprole 18.5% SC @ 150 ml/ha 2. Flubendiamide 39.35% SC @ 50 ml/ha
Caseworm (*Nymphula depunctalis Stagnalis)*	1. Chlorantraniliprole 18.5% SC @ 150 ml/ha 2. Flubendiamide 39.35% SC @ 50 ml/ha
Hispa (*Dicladispa armigera)*	1. Chlorantraniliprole 0.4% G @ 10 kg/ha 2. Flubendiamide 20% WG @ 125 g/ha
Gundhi bug/Ear head bug (*Leptocorisa acuta*)	1. NSKE @ 1500 ppm @ 3-5 ml/L of water 2. Neemazal 1% @ 2-3 ml/L of water
Brown plant hopper (*Nilaparvata lugens)*	1. Thiamethoxam 25% WG @ 0.2 g/L of water 2. Dinotefuran 20% SG @ 0.4 g/L of water 3. Flonicamid 50% WG @ 0.3 g/L of water
Leaf folder (*Cnaphalocrocis medinalis)*	1. Chlorantraniliprole 0.4% G @ 10 kg/ha 2. Flubendiamide 20% WG @ 125 g/ha 3. Cartap hydrochloride 50% SP @ 2 g/L of water

Major diseases of rice and their control

Diseases	Management
Blast (*Pyricularia grisea)*	Tricyclazole 75% WP @ 0.6 g/L or Isoprothiolane 40 EC @ 1.5 ml/ L of water
Brown spot (*Helminthosporium oryzae)*	Propineb 70% WP @ 3-4 g/L, Chlorothalonil 75% WP @ 2 g/L of water and the second spray may be given after 10 days.
Sheath blight (*Rhizoctonia solani)*	Hexaconazole 5% EC @ 1 ml/L or Validamycin 3% L @ 4 g/L of water
Bacterial leaf blight (*Xanthomonas oryzae pv. Oryzae)*	Streptomycin sulphate 90% + Tetracyclin hydrochloride 10% SP @ 4 g/10 L of water for seedling root dip treatment
Sheath rot (*Sarocladium oryza)e*	Azoxystrobin 23% SC @ 1 ml/L of water at boot leaf stage and 15 days after first application.
Stem rot (Sclerotium oryzae)	Azoxystrobin 23% SC @ 1 ml/L or of water
False smut (*Ustilaginoidea virens)*	Chlorothalonil 75% WP @ 2 g/L or Azoxystrobin 23% SC @ 1ml/L or of water
Rice tungro disease – Rice tungro virus (RTSV, RTBV)	Thiamethoxam 25% WG @ 0.2 g/L, Flonicamid 50% WG @ 150 g/ha

Troubleshooting for the mechanical transplanter

Troubleshooting is a systematic approach to problem-solving that is often encountered with complex machines, electronics, computers and software systems. The first step in troubleshooting is gathering information on the issue, such as an undesired behaviour or a lack of expected functionality. While using paddy transplanter in field, operator often faces problems. There are many causes of non-uniform transplanting in rows with gaps, which results in yield losses. Major causes and their solutions are mentioned below:

Problem	Cause	Troubleshooting
Missing hills or uneven plant spacing	• Poor or uneven growth of seedlings • Low seed density in mats • Wear and tear of transplanting fingers	• Use healthy mat-type nursery / cakes • Always maintain optimum seed density in mats • Slow down the cross-feed time on transplanter • Check the transplanting fingers
Seedling mats collapse on seedling platform	• Inappropriate mat thickness • High moisture content in mat • Wider gap between seedlings	• Ensure minimum mat thickness of 0.75 inch • Dry the nursery to firm it up • Decrease the distance between seedling trays and seedlings to prevent collapsing
Poor sliding and congestion on seedling platform	• Improper clearance of seedling tray • Width of cakes is more • Sticking of cakes on seedling tray	• Adjust the seedling tray to increase clearance • Cut the nursery bed width down to 2-3 cm • Sprinkle water on cakes before planting to improve sliding
Seedlings not released from planting claw especially in clay soils	• Mud gets stuck to the claws as water level is low in the field • Mats are wet	• Add 1-2 cm water to field to help clean planting claws • Keep the nursery mats a little drier

Problem	Cause	Troubleshooting
Floating and moving seedlings	• More water depth • High planting speed • Less planting depth • Improper field preparation and hard soil	• Decrease water depth to 1-2 cm • Reduce planting speed • Increase planting depth • Apply irrigation to moisten the soil and or re-puddle
Transplanter floats, sinks or presses soil against adjoining row	• Improper levelling of the field • Excessively puddled field (muddy)	• Level the field • Reduce water level and let soil surface firm (transplanting may be postponed for a couple of days).
Seedlings unable to get transplanted in soil	• Poor root development • Dry nursery is being used • High planting speed • Foreign materials in the seedbed	• Improve seedling root development by better nursery management • Slightly wet the nursery • Reduce planting speed • Use cakes free from foreign materials • Remove foreign materials before initiating nursery seedbed preparation
Hill spacing becomes smaller, especially in soft soil and deep water	• Excess water in the field • Slippage of transmission wheel	• Drain out excess water from field • Lower the wheel to avoid wheel slippage
Transmission wheel clogs; restricts forward movement	• Transmission wheel attached in reverse direction • Improper field preparation	• Check whether transmission wheel attached is in correct direction or not • Remove the washer from the 3-point hub present in larger pulley • Check the soil condition. Use transplanter with optimum water level

Knowledge Management Committee

Sl. No	Name	Designation	Department
Assam Agricultural University			
1	Dr. Ashok Bhattacharyya	Director	Directorate of Research (Agri.), AAU, Jorhat
2	Dr. Mrinal Saikia	Assoc. Director of Research	Directorate of Research (Agri.), AAU, Jorhat
3	Dr. Rupam Borgohain	Principal Scientist and Nodal officer	Directorate of Research (Agri.) and OPIU_AAU Jorhat
4	Dr. Debanand Das	Principal Scientist and Alternate Nodal officer	Directorate of Research (Agri.), AAU, Jorhat
5	Dr. Ranjit Kr. Saud	Assoc. Director of Extension Education (P&I)	Directorate of Extension Education, AAU, Jorhat
6	Dr. Ramani Kanta Thakuria	Principal Scientist	Horticulture Research Station, Kahikuchi, AAU, Jorhat
7	Dr. Kalyan Pathak	Professor and Head	Department of Agronomy, AAU, Jorhat
8	Dr. Kulendra Nath Das	Professor	Department of Soil Science, AAU, Jorhat
9	Dr. Bipul Deka	Principal Scientist	AICRP on Water Management, Department of Soil Science, Soil Science, AAU, Jorhat
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12	Dr. Sanjay Kumar Chetia	Chief Scientist	RARS, Titabor, AAU
13	Dr. Pulin Patgiri	Principal Scientist	AICRP on Post-Harvest Technology, Department of Agriculture Engineering, AAU, Jorhat

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16	Mr. Manash J Barooah	Assistant Professor	AICRP on Farm Implements and Machinery, Department of Agriculture Engineering, AAU Jorhat
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International Rice Research Institute			
19	Dr. Kanwar Singh	Senior Associate Scientist II - Precision Agronomist & Resident Project Coordinator	
20	Dr. Virendar Kumar Yadav	Consultant	
21	Dr. Suryakanta Khandai	Associate Scientist (Post harvest & Rice Value Chain)	
22	Ms. Suranjana Bhaswati Borah	Senior Specialist - GIS & Remote Sensing	
23	Mr. Jyoti Bikash Nath	Specialist - Agriculture Research & Development (Agriculture Extension)	
24	Mr. Vipin Kumar	Specialist - Agriculture Research & Development (Crop & Natural Resource Management)	
25	Mr. Vivek Kumar	Specialist - Agriculture Research & Development (Agriculture Extension)	
26	Dr. Lisa Mariam Varkey	Specialist: Socio-Economics	
27	Dr. Rahul Priyadarshi	Specialist - Agriculture Research & Development	
Assam Rural Infrastructure and Agricultural Services (ARIAS) Society			
28	Mr. Baljeet Singh	Market Analyst cum Operations Specialist	
29	Dr. Pranab Mahanta	Agri Adviser, APART	
Department of Agriculture, Govt. of Assam			
30	Mr. Madhuram Patiri	Nodal Officer, APART, DoA	


IRRI
Exposure Visit of Farmers
At Gorukhuti Land Development Project, Sipajhar, Darrang
Date: February 24, 2022

The Government of Assam (GoA) through Government of India (GoI) has received a loan from the World Bank for implementation of Assam Agribusiness and Rural Transformation Project (APART). The ARIAS Society is the main coordinating agency for the project. APART would lay special focus on value addition in the production and post-harvest segments of selected agricultural commodity value-chains; facilitate agribusiness investments through inclusive business models, that provide opportunities to small farmers as well as stimulate the establishment of new small & medium agribusiness enterprises; and support resilience of agriculture production systems in order to better-manage the increasing production and risks associated with climate change, in the targeted districts.