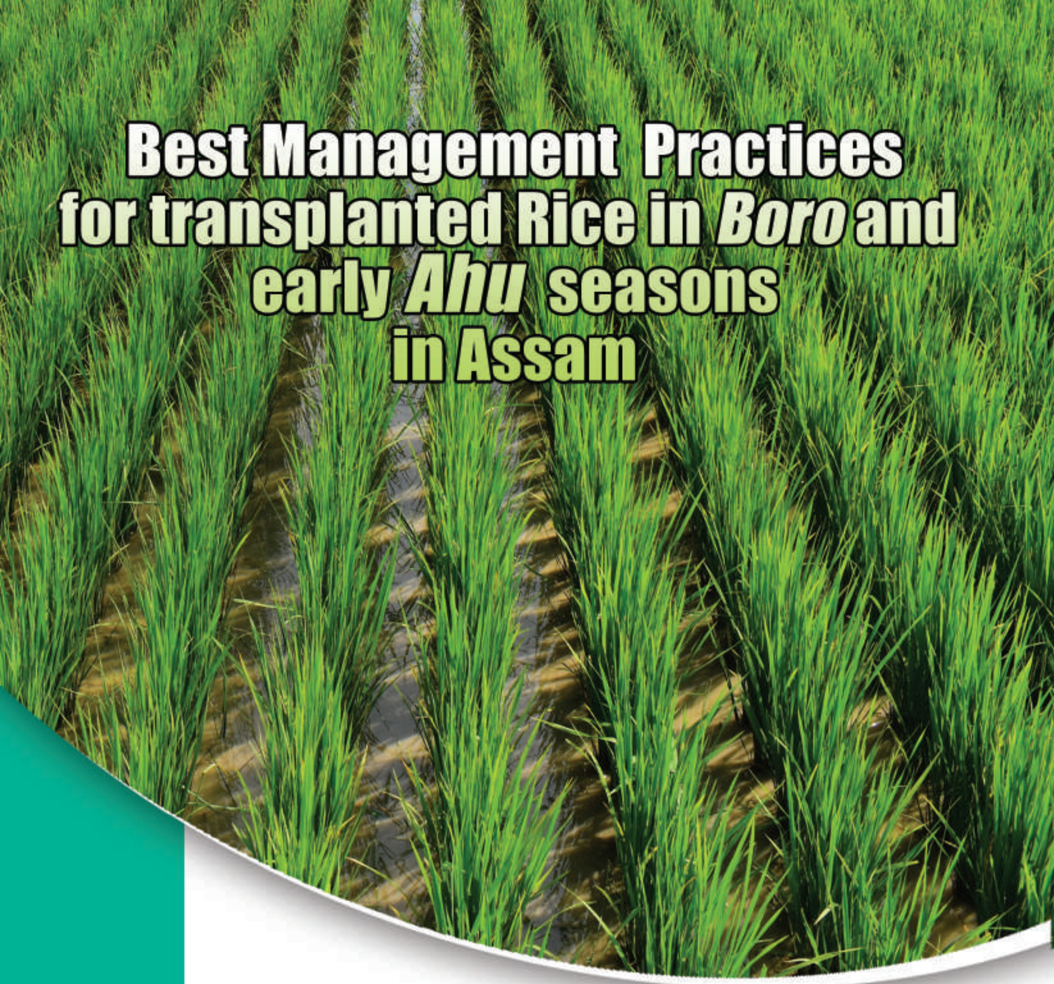
Best Management Practices for transplanted Rice in *Boro* and early *Ahu* seasons in Assam



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Varieties :

Rice varieties for different growing situations are listed below along with their brief characteristics description.

Name of variety	Days to maturity	Grain type	Plant height (cm)	Yield (t/ha)	Salient features
BINA Dhan 11	135 in *Boro* and 125-130 in early *Ahu* season	Medium slender	107-115	5.5-6.0	Suitable for medium-shallow land, short to medium duration, tolerant to submergence upto 2 weeks
DRR Dhan 44	115-120	Long slender	100-105	5.0-5.5	Suitable for medium or upland, drought-tolerant
Joymati	175	Medium Slender	120	5.1	Long duration variety, suitable for early nursery planting in November-December
Dinanath	160-165	Medium Slender	90-95	6.3	Moderately resistant to blast and sheath blight
Swarnabh	160-165	Medium Slender	85-90	6.2	Resistant to blast and moderately resistant to sheath blight
Kanaklata	165-175	Medium Slender	115-120	5-5.5	Long duration variety, suitable for early nursery planting in November-December

Seed quality and treatment

Seed quality: Quality seed is clean (contains no stones, soil particles, weed seeds), genetically pure (contains grains of only one variety) and healthy (full big grains of the same colour, without cracks, and no obvious disease or pest damage).

Seed treatment method

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

Seed treatment: Seed treatment is done by using two methods; one is chemical and second is biological treatment. Once the selection process is done, the seeds should be soaked directly in one of the following fungicidal suspensions for 12 hours. Treat the seeds with recommended fungicides only. One litre of fungicidal solution is required to treat one kg of seeds. Treated seeds should be kept in incubation for 48-72 hours.

Fungicide (choose only one)	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	

Biological method : As an alternative to chemicals, seeds may be treated with *Trichoderma harzianum*@ 10 g /kg of seeds, a night before or 6 hrs before sowing to avoid damping off, wilt and root-rot in the seedling stage. The *trichoderma* powder is spread and mixed with seed after moistening the seed. Then the seed is spread on a mat in a thin layer and it is allowed to dry in shade for 30 minutes. This biological treatment helps to increase root length and provides longer disease control throughout the season.

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

Nursery raising

Time of sowing

***Boro* season:** November–December is the most appropriate time for raising nursery for targeting transplanting in the last week of January to first week of February when the seedlings are at 5-6 leaf stage.

Early *Ahu* season : Second fortnight of January is the most appropriate time for raising nursery to target the transplanting by 2nd fortnight of February preferably with short to medium duration varieties, when the seedlings are at 5-6 leaf stage.

Seed rate : 40-45kg per hectare

Nursery-bed size: For one hectare area of the main field, the nursery size varies from 750-1000 m^2, but ideally it should not be more than $1/10^{th}$ of the main-field size. Land is thoroughly puddled and seedbeds of 50 m length, 1.5 m breadth and 15 cm height are prepared keeping a 60 cm gap in between the beds. The length of the beds may vary according to convenience and availability of space.

Low temperature management: Low height poly-tunnel on bamboo structure (height-75cm, width-150 cm and length as per bed size) may be used for raising seedlings during cold periods (mid-Dec to first week of Jan), for advancing the transplanting.

After five days of sowing, the seed-bed should be covered with a polyethene sheet/poly-tunnel to moderate the micro-climate. This will help increase the temperature inside the poly-tunnel. Before transplanting in the main field, the nursery is acclimatized by retrograding to exposure beginning from 7 days prior to transplanting, for an hour at 8.00-9.00 AM on the first day, then steadily increasing the exposure on each successive day (8.00-10.00 AM, 8.00 AM-12.00 AM, 8.00 AM-2.00PM), and thus reaching the exposure for whole day (8.00AM to 4.00PM) on the 5th day, then finally keeping the nursery completely exposed for 2 days before transplanting the seedlings in the main field.

Irrigation: Apply irrigation as per the requirement to maintain saturated seed-bed. Maintain 2-3 cm standing water 2-3 days prior to uprooting.

Plant protection: Adopt plant protection measures in the standing nursery as per standard package of practices.

Nursery fertilizer: Use 3-1-2 g of N-P_2O_5-K_2O + 2 kg manure per m^2 that is equivalent to 3-1-2 kg N-P_2O_5-K_2O +2 tons manure for 1000m^2 of nursery area.

When?	What?	How much? g/m² or Kg/1000 m²		Application method
		Through DAP	Through SSP	
Basal (At sowing)	Manure	2000	2000	Soil incorporation
	Urea	6	7	
	DAP	2	-	
	SSP	-	6	
	MOP	3	3	

Main field Preparation

For preparation of the main plot, the following points should be kept in mind -

- Field should be prepared thoroughly by ploughing with *desi* plough 4 to 5 times, followed by harrowing and laddering.
- Ploughing should be started at least 2-3 weeks ahead of transplanting so that weeds are dried up/decayed.
- Alternatively, one pass of mouldboard plough followed by one or two passes of modified helical blade puddler are sufficient for obtaining good quality puddled soil.

- The ploughing intervals should be spaced such that the weeds germinating after the first round of ploughing are ploughed up in the next round.
- If available, apply compost or manure @10 t/ ha(15q/bigha) uniformly prior to field preparation and mix it well with soil.
- Repair the bunds to reduce water losses from the field during the cropping season.
- Field should be levelled well, better maintaining a thin water layer.
- The basal fertilizer dose is applied to the field (see fertilizer section below).

Transplanting

Seedling age: Always use 5 to 6 leaf stage seedlings to transplant for better yield

Spacing: Transplant at a distance of 20-25 x 15 cm (8-10 x 6 inches)

Seedling density: 2-3 seedlings per hill

Depth of seedling: 4-5 cm

Fertilizer management

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

Time of fertilizer application	Name of fertilizers	Fertilizer dose				Application Method
		(Kg/ha)		(kg/bigha)		
		Through DAP	Through SSP	Through DAP	Through SSP	
Basal	Urea	18	43	2	6	Broadeast & incorporate in soil at the time of field preparation
	DAP	65	-	9	-	
	SSP	-	187	-	25	
	MOP	50	50	7	7	
	$ZnSO_4$	25	25	-	3	
Tillering, after first weeding	Urea	44	44	6	6	Top dressing
Panicle initiation, after second weeding	Urea	44	44	6	6	Top dressing

Note:

- Stop urea broadcast, in case bacterial leaf blight (BLB) symptoms appear
- Apply $ZnSO_4$ in soils deficient in zinc, once in 3 years
- As far as practicable, drain out standing water before fertilizer application

Weeding: Keep the field weed-free especially in the early stage of the crop, as the weeds harm the crop in the early crop stage, but later control is also important to prevent seed setting by the weeds. First weeding is done manually or mechanically with paddy weeder or power weeder or hoe at 3 weeks after transplanting, and the second weeding is done at 6 weeks after transplanting.

Herbicide application:

Equipment : Given their superior effectiveness, herbicides should only be applied using multi-nozzle booms fitted with flat-fan nozzles. While spraying, the new spray-swath should always overlap 25% of the previous spray-swath margin to ensure uniform application.

Pre-emergence (PE) herbicides : Most PE herbicides require moisture on the soil surface at the time of application. Without sufficient moisture, the PE herbicides will not be much effective.

PE herbicides can be sprinkled by splash method in 3-5 cm standing water in the field preferably within 2-3 days after transplanting (DAT).

PE herbicides supplemented with one hand weeding may 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 20-25 DAT when weeds attain 3-4 leaf stage. Ensure that there is no standing water in the field; however, the field should have moisture at time of PoE application. Wait for water to subside till the weeds are exposed, if draining out water is a problem.

Spray volume- Use spray volume of 300-350 litres/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, shoes, 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 given below-

Table: Herbicides, their doses, time of application and type of weed flora they kill in paddy field

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	25	Narrow leaf (sedges)	Some broadleaf	2-3 DAT	187.5 ml	25 ml
	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	20-25 DAT	250 g	33 g
	Chlorimuron ethyl 10%WP + Metsulfuron methyl 10% WP	25	Broad leaf	Some sedges	20-25 DAT	20 g	3g
	Pyrazosulfuron Ethyl 10% WP	25	Narrow leaf (sedges)	Some broadleaf	20-25 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 timing and doses .

- 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

Irrigation: During the *Boro* as well as early *Ahu* season, in the absence of rain, application of 5-cm irrigation water 3 days after disappearance of ponding water is recommended in medium and heavy soils. Alternatively, follow Alternate Wetting and Drying (AWD) technique of irrigation using field water tubes.

Plant protection measures: It is applied if the threshold level of pest is present in the field. Follow plant protection measures as per the State recommendations.

Harvest and post-harvest:

- Harvest when 80-85% of the grains attain physiological maturity i.e. visually straw coloured.
- Minimize the time during which the harvested plants remain in the field, and avoid field drying. Make sure that the panicles stay dry.
- Thresh and dry within two days after harvesting. In the absence of mechanised drying, alternatively follow sun drying on a mat or plastic sheet, keeping the thickness of the grain layer at 3 to 5-cm.
- Clean the grain thoroughly by winnowing. Store the rice in a cool, dry and clean area.

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