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Nursery management for boro rice

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ABSTRACT

The effect of nursery management treatments on seedling health and their subsequent effect on crop yield of boro rice were studied. Results revealed that integration of different components of nursery management techniques i.e., addition of organic manure @ 1.5 kg m^{-2}, dusting of ash on seedling leaves at weekly interval, shaking off dew drops from the seedling tips every morning, placement of polyethylene sheet above the seedling at night and foliar spray of multi nutrients solution (multiplex) produced vigorous seedling growth and subsequently higher grain yield compared with non-treated control.

Key words: *Boro rice, nursery management, seedling growth, grain yield*

Boro rice is generally grown during November to May in waterlogged low-lying areas or in medium lands with irrigation facility (Singh and Singh, 2000). It has more yield potential than the wet season rice because, during the dry season or winter season, the weather condition generally remains cloud free. This leads to higher interception of solar radiation resulting in accumulation of more photosynthets and favorable rising temperature during ripening stage (Singh, 2003). One of the major constraints of boro rice production is nursery management due to temperature fluctuations and long cold spells during nursery stage in Eastern Uttar Pradesh sub regions. Appropriate nursery management technique is important to improve the productivity of boro rice. Therefore, the present study was aimed for nursery management against cold injury and subsequent effect on crop yield of boro rice.

An investigation was carried out at the Agricultural Research Farm, Institute of Agricultural Sciences, Banaras Hindu University, BHU, Varanasi, under agro-climatic condition of eastern Uttar Pradesh consecutively for 3 years during dry seasons of 2001-02 to 2003-04. The experiment was conducted in randomised complete block design (RCBD), with three replications. Gautam, a prominent variety of boro rice was used. The treatments were, T_1- addition of organic manure @ 1.5 kg m^{-2} (OM), T_2- dusting of ash on seedling at weekly intervals (AD), T_3-Shaking off dew drops from seedling tips every morning (SD), T_4-placement of seedlings with polyethylene sheet during night (PS), T_5-foliar spray of nutrients, NPK (Multiplex) at fortnightly intervals (FS), T_6 – OM + AD, T_7- OM + AD + SD, T_8- OM + AD + SD+ PS, T_9 – OM + AD+SD+PS+FS and T_{10} control. The sprouted seeds were sown in 1st week of November @ 100g m^{-2} on puddled seedbed with broadcasting method in a low-lying field near irrigation source. 100 kg N, 50 kg P_2O_5 and 50 kg K_2O was applied to the nursery bed. Observations at nursery stage were recorded for cold tolerance by visual rating seedling shoot and root growth, seedling density, and seedling dry weight. The transplanting of seedling was done in the last week of January in a lowland field having residual moisture at a spacing of 20 x 10 cm. The crop was harvested during 1st weak of May. The mean maximum and minimum temperature fluctuations during nursery stage of crop were 23.7 and 12.0, respectively.

Maximum seedling shoot and root growth, seedling density and dry weight, under T_9 (Table 1), were statistically at par with T_8 and T_7 but significantly superior to rest of the treatments. The highest cold tolerance of seedlings (71%) was also recorded with T_9. The reason for the better performance under T_9 might be due to nutrient supplying capacity of organic manure and ash, reduction in cold effect by removal of dewdrops from seedling tips and higher temperature

Table 1. Effect of nursery management treatments on cold tolerance, shoot growth, root growth, density and dry weight of rice seedlings in boro season (pooled data of 3 years)

Treatments	Cold tolerance (%)	Seedling height (cm)	Seedling root growth (cm)	Seedling density (in 0.25 m^2)	Seedling dry weight (g)
T_1- Addition of organic manure (OM)	65.1	19.1	15.8	353.0	0.62
T_2- Dusting of ash (AD)	65.1	18.7	15.4	352.0	0.55
T_3- Shaking off dewdrops (SD)	63.3	17.5	14.6	338.0	0.43
T_4- Placement of Polyethylene Sheet (PS)	65.0	18.1	15.0	344.7	0.53
T_5- Multiplex spray (FS)	65.0	17.9	14.9	343.7	0.46
T_6 - (OM+AD)	67.7	19.1	16.0	355.7	0.63
T_7- (OM+AD+SD)	68.3	19.7	16.5	358.0	0.63
T_8- (OM+AD+SD+PS)	68.3	20.4	17.0	358.3	0.70
T_9- (OM+AD+SD+ PS+ FS)	71.0	20.5	17.5	361.3	0.76
T_{10}- Control	60.0	16.4	14.1	316.0	0.50
CD (P = 0.05)	-	0.80	0.91	12.30	0.10

Table 2. Effect of different nursery management treatments on growth, yield attributes and yield of boro rice (pooled data of 3 years)

Treatment	Plant height at harvest (cm)	Tillers m^{-2}	Effective tillers(m^{-2})	Effective tillers ($hill^{-1}$)	Panicle length (cm)	Grains $panicle^{-1}$	1000-grain weight (g)	Grain yield (t ha^{-1})	Straw yield (t ha^{-1})
T_1- Addition of organic manure (OM)	82.7	408.0	391.0	13.7	22.4	96.8	20.2	5.55	5.98
T_2- Dusting of ash (AD)	82.0	402.0	386.2	13.6	22.1	96.7	20.1	5.53	5.97
T_3- Shaking off dewdrops (SD)	80.5	408.0	368.1	11.8	21.7	93.9	19.8	4.46	4.75
T_4- Placement of Polyethylene Sheet (PS)	82.4	440.0	376.6	12.8	22.0	95.8	20.0	5.52	5.78
T_5- Multiplex spray (FS)	80.9	402.0	371.5	12.6	21.9	95.7	19.9	5.33	5.40
T_6 - (OM+AD)	82.6	432.7	391.3	13.7	22.1	98.4	20.5	5.53	5.98
T_7 - (OM+AD+ SD)	82.5	436.7	412.5	14.1	22.3	101.0	20.5	5.55	6.01
T_8 - (OM+AD+ SD+PS)	83.5	440.0	420.3	14.2	22.4	105.1	20.5	6.01	6.40
T_9 - (OM+AD+ SD+ PS+ FS)	84.2	488.5	423.2	14.2	23.1	105.6	20.7	6.03	6.42
T_{10}- Control	76.6	337.3	351.9	11.0	21.1	82.9	19.7	4.44	4.67
CD (P=0.05)	1.65	20.1	34.6	1.35	1.25	7.35	0.73	0.56	0.61

under polyethylene sheet. Similar result was also reported by other researchers (BRRI, 1975).

Crop growth, yield attributes and yields were affected significantly by different treatments (Table 2) and the highest panicles m^{-2}, grains $panicles^{-1}$, spikelet fertility percentage, test weight, grain yield (6.03 t ha^{-1}) and straw yield (6.42 t ha^{-1}) were recorded under T_9 (OM + AD + SD +PS +FS) as compared to control. Integration of different components of nursery management techniques produced relatively vigorous seedlings and subsequently higher grain yield over control.

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