Protected Nursery Aided Popularization of Jehlum – A High Yielding Rice Variety to Enhance Productivity and Profitability under Mid Altitude Temperate Conditions of Kashmir Valley

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ABSTRACT
Temperature fluctuations and lower night temperature during April and May not only pose great threat to paddy nurseries but also results in slow growth of seedlings, which delays rice transplanting in temperate Kashmir valley. The farmers of mid altitude alleviations grow traditional varieties like K-332 and Kohsar, which have low yield potential. Jehlum, a high yielding rice cultivar famous for yield potential and quality in the planes of valley is now occupying maximum area under mid altitude temperate conditions. The adaption of Modified Protected nursery, to save nursery from climatic vagaries and to simultaneously provide robust and healthy seedlings in a short period, ensures early transplanting and boost the yield potential of the variety in mid altitudes. In view of this on-farm trials on modified protected nursery (Improved practice) verses open nursery (Farmers’ practice) were conducted at Farmers’ field. In modified protected nursery the medium consisted of a 20-25 cm layer of soil, sand, organic manure and ash mixed in the ratio of 2:2:1:1, which was laid on polythene sheet. Nursery was kept covered with polythene during cloudy/rainy days and also during night hours particularly for initial 10-15 days after sowing. Seedlings under protected nursery technique were healthy and robust and ready for transplanting 8-10 days earlier compared to farmers’ practice. Yield attributes and grain yield improved appreciably in improved practice over farmers’ practice. Panicles/m²(387), grains/panicle (85) and 1000 gain weight (22.9g) were higher in protected practice as compared to farmers’ practice. An increase in the grain yield to the tune of 12 per cent with wet profit (Rs.61,240/ha) and B:C ratio (2.4:1) was recorded in the improved practice of modified protected nursery as against net returns of Rs. 53,580/ha and B: C ratio (2.1:1) in farmers’ practice.

Key Words: Protected Nursery, Jehlum, High Yielding Rice, Productivity, Profitability, Mid Altitude.

INTRODUCTION
Despite the fact that India has largest area under rice in the world, the productivity level of rice (2.2 t/ha) in the country is far below the world average of 4 t/ha (Dass and Chandra, 2012). Many biotic and abiotic factors are responsible for this. Temperature fluctuations and lower night temperature during April and May not only pose great threat to paddy nurseries but also results in slow growth of seedlings, which delays rice transplanting in temperate Kashmir valley. The farmers of mid altitude alleviations (1600-1850m a.m.s.l.) grow traditional varieties like K-332 and Kohsar, which have low grain as well as straw yield potential. Jehlum, a high yielding rice cultivar famous for yield potential and quality in the planes of valley has been successfully demonstrated for last six years. The variety has
shown a mean yield potential of 58.8 q/ha in the demonstrated fields as compared to 46.04 q/ha from the traditional varieties in south Kashmir. The variety is now occupying maximum area under mid altitude temperate conditions. The adaption of Modified Protected nursery, to save nursery from climatic vagaries and simultaneously provide robust and healthy seedlings in a short period, ensures early transplanting and boost the yield potential of the variety in mid altitudes. In view of this on-farm trials on modified protected nursery were conducted at Farmers’ field in south Kashmir.

MATERIALS AND METHODS

On-farm trials on modified protected nursery (Improved practice) verses open nursery (Farmers’ practice) were conducted at Farmers’ field during kharif seasons of 2009 and 2010 in south Kashmir. The area of raising nursery was about 1/20th of the area of the field for which seedlings were to be raised and transplanted. The nursery was well prepared, leveled and kept weeds free. In modified protected nursery the medium consisted a 20-25 cm layer of soil, sand, organic manure and ash in the ratio of 2:2:1:1 laid on polythene sheet. Beds were kept 0.75 m wide to facilitate the fixing of locally available willow sticks for making lower tunnel and simultaneously make it convenient to perform various operations like placing polythene sheets, controlled irrigation, removing weeds and spray of pesticides, etc. Water stored in the adjacent beds was applied to the nursery every day in the afternoon. Nursery area had good facilities for drainage. Polythene sheets were used over locally available willows sticks to make low tunnels temporarily covered with dry soil at edges of the polythene. Nursery was kept covered with polythene during cloudy/rainy days and also during night hours particularly. Farmers’ practice involved sowing of seed in square bed in the open nursery. All other management practices were kept similar in both the practices. Seed was sown between 5 to 7 May at different locations in both the treatments. The 18-22 d old seedlings from modified protected nursery and 30-33 d old seedlings from farmers’ practice were transplanted at different locations. Data on 50 per cent flowering, physiological maturity, yield attributes and grain yield were also recorded. Number of panicles were counted from 15 randomly selected plants from an area of 1m² at 3 random selected spots from each plot and finally converted into panicles/m². Grains from 15 randomly selected panicles were counted and calculated as filled grains/panicle¹. Weight of 1000 grains was recorded as test weight. Grain yields recorded from 5x5 m area from each plot and then calculated as per hectare yield. Owing to non significant variation in data collected from various locations, average of different growth and yield parameters were used for evaluation.

RESULTS AND DISCUSSION

Seedling growth

Seedlings under protected nursery technique were healthy and robust and ready for transplanting 8-10 d earlier than under farmers’ practice (Table 2). This was attributed to controlled temperature under protected conditions as plastic

Modified protected Nursery at Farmer’s Field

Seedlings in protected and open nursery
film allowed solar radiation to pass through it and trapped thermal radiations emitted by the material inside the poly tunnel. This technique also improves seedling growth by way of enrichment in CO₂ concentration, by trapping the CO₂ released by the plants, which in turn enhances photosynthesis. Growth of seedlings under open conditions was slow, which may be attributed to reduced metabolic activity on account of low temperature.

Yield attributes and grain yield
Modified protected nursery management technique substantially improved yield attributing character and grain yield of Jehlum variety of rice (Table 1) over farmers practice. Panicles/m² (387), grains/panicle¹ (85) and 1000 gain weight (22.9 g) were higher in crop raised from seedling under protected conditions compared to farmers’ practice. Marked improvement in gain yield (61.7 q/ha) was observed with improved practice over farmers’ practice (55.2q/ha). Increase in yield was to the tune of 12 per cent over farmers’ practice. This was attributed to earlier transplanting of healthy and robust seedlings with negligible root damage during uprooting compared to farmers’ practice, which resulted in reduction of transplanting shock period. Older seedlings usually recover slowly, and tillering ability of rice increases if younger seedlings are used (Azhiri-Sigari et al 2004). This results in higher value for yield contributing characters. Percentage of filled grains was higher under protected nursery management technique. Lower value for yield attributes and increased sterility depressed grain yield in farmers’ practice. This was attributed to delayed transplanting of older seedlings in farmers practice, which might have exposed the developmental stages of the crop to less favourable weather conditions. Similar results were also reported by Singh et al (2004).

Economics
Due to use of locally available willow sticks for making structure for poly tunnel, there was little increase in cost of cultivation (Table 2). Gross returns (Rs.86640/ha), net returns (Rs. 61240/ha) and benefit : cost ratio (2.4) were higher with crop in which seedlings were raised under protected nursery technique.
CONCLUSION

The study reveals that under mid altitude temperate conditions of Kashmir Valley unpredicted cold temperature during the sowing of paddy in nursery has an adverse effect on growth and yield potential of crop. Hence there is a great scope for increasing rice yields at farmers’ fields by adopting low cost technologies like modified protected nursery, which are easily affordable by the poor farmers.

REFERENCES


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