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Effect of Weeds (Direct Seeding Vs Transplanting) on Paddy Yield

KEYWORDS: D.S.R, T.P.R., Herbicide, Weed, Paddy Yield, Salt stress

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ABSTRACT *A field study was undertaken in 2015 and 2016 to evaluate the effects of weeds and post emergence herbicides on yield of directing seeded rice. Major weeds observed in DSR were Echinocloa sp., Dactyloctenium aegyptium, Paspalum sp among grassy and Eclipta alba, Caesulia axillaries, Commelina sp among broad leaf weeds and Cyperus defformis and C. rotundus among sedges. Pendimethaline gave good control of grasses and broad leaf weeds, however 2, 4-D controlled dense population of sedges to some extent. Pendimethalin as pre-emergence herbicide was found better to control early flush of weeds while, 2, 4-D (ester) and bispyribac sodium were equally effective in reducing post emergence weeds. Grain yield in the Direct seeded plots was 9.4% higher than that in the transplanted plots*

Introduction

Rice (*Oryza sativa* L.) is the leading cereal of the world (Ashraf et al., 2006), and more than half of the human race depend on rice for their daily sustenance (Chauhan and Johnson, 2011). It is the primary source of income and employment for more than 100 million households in Asia and Africa (FAO, 2004a).

Rice – wheat is the principal cropping system of the Districts Pratapgarh, it occupying some 13.5 million ha. Traditionally rice is transplanted in the month of July after the land has been flooded and wheat is planted in the dry season (November / December). Constraints to current system productivity include an increasing trend of shortage of agricultural labour, increasing costs of labour, relative cost of fertiliser and late sowing of wheat (partly dependent on date of rice harvest). Traditionally, rice is grown by transplanting of one-month old nursery into the puddled and continuous flooded soil condition. Puddling is done to create a hard pan below the plough-zone for reducing soil permeability. High losses of water occur through the puddling, surface evaporation, and percolation.

Under direct seeded rice (DSR) weeds are major constraints to rice production because of weeds; they are also germinating at the same time. Weeds are one of the principal biotic constraints to crop production in agriculture lands. Even at a conservative estimate of 10% average crop yield loss due to weeds in farmer, s field, weeds are expected to result in a loss of about 20 million tonnes of food grains per year in India. Weeds have reportedly reduced yield of dry seeded rice by 15-60% (Moody 1982). In rain-fed rice, for example, the yield reduction due to season long weed infestation range from 80% to compete crop failure. Timely weed control (during critical periods of weed: crop competition) allows efficient utilization of resources by the crop and maximization of crop yields.

Weedicides offer the most effective, economical and practical way of weed management. Islam *et al* (2000) compared to hand weeding with different herbicides and found Pretilachlor (500 g. *a.i.* ha^{-1}) the most successful weedicide with higher yield and cost benefit ratio. This paper presents the comparative results of the studies carried out to manage the weeds in direct seeded rice & transplanted rice.

Material and Methods:

A field experiment was conducted during 2014-2015 and 2015-16 at the Pratapgarh district in U.P. DSR technology is especially carried on those areas where irrigation facilities was assured and farmers are growing long duration variety (MTU-7029) variety, particularly in canal seepage areas where timely planting of wheat is not possible due to high soil moisture. It is as well in salt stress condition and poor hydraulic conductivity of soil effect initial seedling growth adversely.

Direct Seeded Rice during *Kharif* 2014-2015 and 2015-16 with cultivar MTU – 7029 and NDR – 359 at various locations. The crop was planted after wheat crop. Rice sowing was done after a pre-sowing irrigation and treating seeds with *Azotobactor* and PSB,sowing by Zero-till Seed cum ferti drill at a seed rate of 50 kg/ha with a basal application of DAP (18:46:0) @ 130 kg/ha. Urea was applied @ 200 kg. /ha in 4 split doses based on Leaf colour chart. Gypsum (33%) @ 15 kg. /ha. Was applied with the 1st top dressing of urea at 15 days after sowing (DAS). Weeds are the major threat in direct seeded rice therefore Pendimethaline @ 1 kg *a.i.* per ha was applied next day after sowing using 500 ml aqueous solution, it was followed by application of 2,4-D @ 0.5 kg *a.i.* per ha in 500 ml of water to control broad leaf weeds and sedges at 25 DAS. One manual weeding was also done at 35 DAS to eliminate some of the escaped weeds. Other cultural operations were similar to transplanted rice except application of Butachlore @ 1.25 kg *a.i.* per ha at 2 days after transplanting (DAT).

Weed density was recorded with the help of a quadrant (0.5 x 0.7 m^2) placed randomly at two spots in each plot. The data of actual number of weeds were transformed by angular transformation for statistical analyses. Grain yield data were recorded in 1 m^2 area at 5 places of each plot and expressed in tons ha^{-1} having 14-16% moisture.

Result and Discussion:

Good seedling emergence was observed in direct seeded rice at 7 DAS however few gaps were observed at 15 DAS which were filled at 1st irrigation 20-25 DAS by uprooting extra seedling from areas having dense plant population, thus maintaining good planting geometry. Major weeds observed in DSR were *Echinocloa sp.*, *Dactyloctenium*

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aegyptium, Paspalum sp among grassy and *Eclipta alba, Caesulia axillaries, Commelina sp* among broad leaf weeds and *Cyperus defformis* and *C. rotundus* among sedges (Table-1). Pendimethaline gave good control of grasses and broad leaf weeds, however 2,4-D controlled dense population of sedges to some extent. Pendimethalin as pre-emergence herbicide was found better to control early flush of weeds while, 2,4-D (ester) and Bispyribac sodium 10 EC were equally effective in reducing post emergence weeds.

Hand weeding is also required to control the weeds, particularly at the most rapid tillering stage of rice crop. A combination of two post-emergence herbicides like 2, 4-D and Bispyribac sodium 10 EC provides an encouraging result to control all kinds of weeds viz., grasses, sedges and broad leaf weeds. Broad leaf weeds were relatively higher than the sedges.

Table – 1: Weed Comparison between District Seeded and Transplanted Rice

Item	Direct Seeded Rice 2014-15	Transplanted Rice 2014-15	Direct seeded Rice 2015-16	Transplanted Rice 2015-16
Echinocloa sp	1	3	1	2
Dactyloctenium aegyptium	0	2	1	2
Paspalum sp	1	3	0	3
Eclipta alba	0	2	1	4
Caesulia axillaries	1	4	2	3
Commelina sp	2	3	1	4
Cyperus defformis	3	6	4	9
C. rotundus	2	3	2	4

The yield of DSR was higher than transplanted rice at all locations in both the cultivars with an average yield 5.3 t/ha. However, the yield of transplanted rice was 4.8 t/ha thus a yield increment of 9.4% was observed due to this technology.

Table – 2: Grain yield and other parameters of rice crop

Treatments	Plant ht.(cm)	Panicles (m-2)	Panicle Length (cm)	Grains (panicle -)	Yield (q/ha^{-1})
Direct Seeded Rice (DSR)	111.6	198.7	26.1	110	53.0
Transplanted Rice (TPR)	98	140	22.7	75	48.0

Conclusion:

It can be concluded from the study that effective control of both grass and broad leaf weeds and higher grain yield of dry seeded rice could be attained by application of either Bispyribac sodium 10 EC (80 ml/acre) at 21 DAS (2-3 leaf stage of weeds), or Pendimethalin (1 kg *a.i.* ha) applied as pre emergence and one post emergence application of 2, 4-D @ 0.5 kg a.i./ha at 25-30 DAS. Selection of weed control measures based on the weed flora in dry seeded rice would enable farmers to control weeds at lower cost. These results suggested that herbicide application can help to control weed flora in dry-seeded rice fields. Weed management in rice will only be improved if farmers take into consideration the ecology of major weeds and their interaction with rice. Extension workers and farmers should be trained in these aspects within the ongoing IWM programmes on rice. Policy-makers need to pay more attention to the problems posed by weeds in rice as an important - if not the main - issue affecting rice productivity.

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