

Effect of weed Management on growth and yield of Rice var. Pusa Basmati-1 in Saran district of Bihar

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ABSTRACT

A field experiment was carried out to find out the effect of weed-management on growth and yield of Rice var. Pusa Basmati-1 in Saran district of Bihar. During the experimental study the **Pretilachlor**, a selective systemic herbicide, was used to control weeds in both seeded and transplanted rice fields and found that a major effect was observed.

Key words: Rice, *Oryza sativa* L., Weed, Pretilachlor, Yield, Growth

Introduction

Wetland rice (*Oryza sativa* L.) is the major cereal crop and staple food for the people of Saran district of Bihar, India. Almost 91 per cent of the people live in rural areas and are predominantly dependent upon land and agriculture for their livelihood. The hope for better nourishment of the population depends upon the development of better rice varieties and improved methods for rice production and processing (Alam and Kumar, 2015).

Weeds are at present the major biotic constraint to increased rice production worldwide. The importance of their control has been emphasized in the past by various authors (De Datta *et al.*, 1996). The occurrence of weeds has become a serious problem and they limit the yield and quality of crops. It is often stated that some weeds cause total crop failure and that weeding practices are absolutely essential (De Datta and Haque, 1982). Yield loss in rice crop due to weed range from 10-50 % (Singh and Singh, 1993).

In rice cultivation, the conventional method of weed control, i.e. hand weeding is very laborious, expensive and inefficient. Chemical weed control

can be considered as a better alternative (Singh and Singh, 1993). Chemical weeding is easier, time-saving and economical as compared to hand weeding alone (Brar and Mishra, 1989). Herbicidal weed control methods offer an advantage to save labour and money, as a result, regarded as cost effective method of weed control (Ahmed *et al.*, 2000). Herbicides gave significant control of weeds when applied one day after transplanting (Sharma *et al.*, 1994). In South Korea and China, rice is treated with herbicides by 70% and 90% respectively. Moreover, 90 % rice herbicides being applied are pre-emergence and farmer prefer granular herbicides 4-6 days after transplanting (Moody, 1982). The use of herbicides moves the agro-ecosystem to low species diversity with new problem weeds appearing, so that there is a need for an ecological approach to weed control instead of relying totally on chemical control methods (Moody, 1982). On the basis of economic easiness we have selected the Pretilachlor as an herbicide.

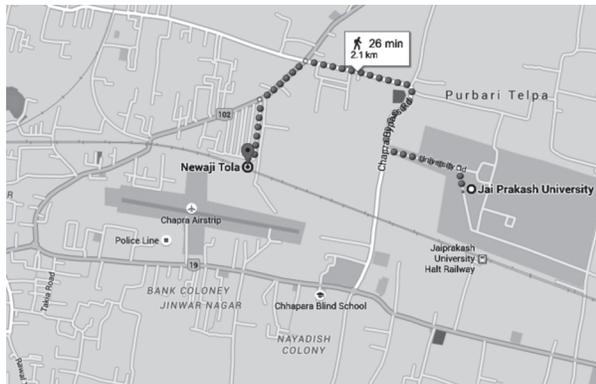
In the present research article we are discussing about the effect of weedicides on the various parameters of the rice var. Pusa Basmati-1 in Saran district of Bihar, India.

Table 1. Selected Physico-chemical parameters of the soil on the experimental site

Characteristics	Average
Soil type	Sandy loamy
EC (ds/m)	0.08-0.12
pH	7.6-7.8
Organic Carbon (%)	0.71-0.73
Available Nitrogen (kg/ha)	208.00-210.00
Available Phosphorus (kg/ha)	17.34-17.50
Available Potassium (kg/ha)	148.03-150.16
Zinc (kg/ha)	4.58-5.70

Materials and Methods

The field experiments were conducted at the Agricultural Farm in Newaji Tola in Chapra, the district head quarter of Saran district of Bihar, which is located approximately 3 km of Chapra city, at an elevation of 98 m above mean sea level at 25.97° N longitude and 81.15° E latitude.



Experimental site

Results and Discussion

The result of the present investigation, regarding the use influence of weedicides and its interaction on growth and yield of rice crop have been presented in Tables, wherever required. The result has been interpreted in the light of impact of different treatment during the experimentation. The results have been divided into the following two sub-headings:

Vegetative Growth Parameters

These parameters included plant growth, plant Height (cm), plant dry weight (g), number of tillers /m², number of effective tillers/m², crop growth rate (g/m²/day), and relative growth rate (g/g/day).

The experimental results observed for different parameters are presented in Table 2.

It was observed that in the second year of experimentation (2013) the vegetative growth against all the parameters registered slightly higher as compared to the first year (2012) at the all stages of growth, which might have been due to better agro-climatic conditions in the second year as well as nutrient uptake by the experimental field during the first year. It was observed that in the year of experimentation (2012 and 2013), the plant height, plant dry weight, tiller, effective tiller, crop growth rate, vegetative growth, length of panicle, number of grains per panicle, number of filled grains per panicle, test weight of grains, grain yield and straw yield were recorded generally higher with using weedicides as compared to the above characteristics without weedicides. But, it was observed that in the year of experimentation (2012 and 2013), the num-

Table 2. Effect of weedicides at different stage on crop of Rice (*Oryza sativa* L.) var. Pusa Basmati-1 at different intervals (2012-2013)

Factors	Plant Height (cm)				Plant dry weight (g)				Number of tillers/m ²			
	60 DAT		80 DAT		60 DAT		80 DAT		60 DAT		80 DAT	
	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013
Using weedicides	79.35	80.92	98.36	103.55	24.63	24.45	63.55	64.45	685	705	610	605
Without Weedicides	51.78	50.78	66.88	66.23	17.76	16.8	42.54	43.48	448	455	415	408

Factors	Number of effective tillers/m ²				Crop growth rate (g/m ² /day)		Relative growth rate (g/g/day)	
	60 DAT		80 DAT		61 - 80 DAT		61 - 80 DAT	
	2012	2013	2012	2013	2012	2013	2012	2013
Using weedicides	295	306	306	314	65.48	67.45	0.0435	0.0423
Without Weedicides	190	196	197	203	46.75	47.35	0.0287	0.0278

ber of unfilled grains per panicle was recorded generally lesser with using weedicides as compared to the number of filled grains per panicle without weedicides.

Table 3. Effect of weedicides at different stage on crop of Rice (*Oryza sativa* L.) var. Pusa Basmati-1 at different intervals (2012-2013)

Factors	Length of panicle (cm)		Grains per panicle		Filled grains per panicle		Unfilled grains per panicle	
	Test weight (g)		Test weight (g)		Test weight (g)		Test weight (g)	
	2012	2013	2012	2013	2012	2013	2012	2013
Using weedicides	22.65	23.35	95.44	98.52	84.40	87.98	7.90	8.05
Without Weedicides	15.42	16.14	64.73	67.97	60.15	52.92	11.42	11.92

Factors	Test weight (g)		Grain yield (q ha ⁻¹)		Straw yield (q ha ⁻¹)		Harvest index.	
	Test weight (g)		Test weight (g)		Test weight (g)		Test weight (g)	
	2012	2013	2012	2013	2012	2013	2012	2013
Using weedicides	24.15	24.52	31.48	32.15	66.48	68.92	32.58	32.47
Without Weedicides	16.88	16.92	21.44	21.97	45.62	46.95	22.45	22.31

Table 4. Cost of cultivation (common cost for all treatment)

S. No.	Particulars	Unit	Qty.	Rate/Unit (Rs)	Cost (Rs/ha)
A	Land Preparation				
	i. Ploughing with Mould Hoard Plough	Hours	3.5	150.00	525.00
	ii. Disc harrowing	Hours	2	125.00	250.00
	iii. Puddling	Hours	3	125.00	375.00
B	Nursery (100m ² ha ⁻¹)				
	i. Field preparation	Labourers	3	150.00	450.00
	ii. Cost of seeds	Kg	40	30.00	1200.00
	iii. Sowing of seeds	Labourers	1	150.00	150.00
	iv. Uprooting of seedlings	Labourers	10	150.00	1500.00
	v. Transplanting	Labourers	20	150.00	3000.00
C.	Fertilizer application				
	i. Urea	Kg	250	10.00	2550.00
	ii. Single super phosphate	Kg	375	10.00	3750.00
	iii. Muriate of Potash	Kg	60	15.00	900.00
	iv FYM	Ton	2	300.00	600.00
	v Zink	Kg	10	55.00	550.00
D.	Irrigation				
	i. Tube-well charges	Irrigation	8	200.00	1600.00
	ii. 1 Labourer per irrigation	Labourers	8	150.00	1200.00
E.	After care				
	i. Thinning and gap filling	Labourers	10	150.00	1500.00
	ii. Hand weeding – 2 (10 labourers / weeding)	Labourers	20	150.00	3000.00
G.	Harvesting and Threshing				
	i. Labourers for harvesting	Labourers	17	150.00	2550.00
	ii. Labourers for threshing and winnowing	Labourers	10	150.00	1500.00
	iii. Transportation	Labourers	10	140.00	1400.00
H.	Depreciation and repairs				200.00
I.	Rental value @ Rs. 2000 per annum				1000.00
J.	Supervision charges	Months	4	400.00	1600.00
		Sub Total			31350.00
K.	Interest @ 12% per annum for 6 months				1881.00
		Total			33231.00

Table 5. Cost of cultivation for different treatment

	Treatment	Treatment cost (Rs. ha ⁻¹)	Common cost (Rs. ha ⁻¹)	Total cost (Rs. ha ⁻¹)
T ₀	Using weedicides	600.00	33231.00	33831.00
T ₁	Without Weedicides	0.00	33231.00	32231.00

Cost of Weedicides = Rs. 400/L.

Table 6. Economics of cultivation for different treatments and cost benefit ratio

Treatment combination	Treatment	Cost of cultivation (Rs. ha ⁻¹)	Yield				Gross return (Rs. ha ⁻¹)		Net return (Rs. ha ⁻¹)		Cost benefit ratio	
			Grain (q ha ⁻¹)	Straw (q ha ⁻¹)	2012	2013	2012	2013	2012	2013	2012	2013
T ₀	Using weedicides	33831	27.30	28.31	53.59	55.68	46410	48127	12579	14296	1.37	1.42
T ₁	Without Weedicides	33231	21.24	21.99	38.37	39.67	36108	37383	2877	4152	1.09	1.12

Selling price of rice = Rs. 1700/q

Yield and yield attributes

These parameters included length of panicle (cm), number of grains per panicle, number of filled grains per panicle, number of unfilled grains per panicle, test weight (g), grain yield (q ha⁻¹), straw yield (q ha⁻¹) and harvest index.

The yield and yield attributes were recorded at the end of the vegetative growth of the crop during two years of experimentation are shown in the Table 3. It was observed that in the year of experimentation (2012 and 2013), the plant height, plant dry weight, tiller, effective tiller, crop growth rate, vegetative growth, length of panicle, number of grains per panicle, number of filled grains per panicle, test weight of grains, grain yield and straw yield were recorded generally higher with using weedicides as compared to the above characteristics without weedicides. But, it was observed that in the year of experimentation (2012 and 2013), the number of unfilled grains per panicle was recorded generally lesser with using weedicides as compared to the number of filled grains per panicle without weedicides.

Conclusion

It was observed that in the year of experimentation (2012 and 2013), the plant height, plant dry weight, tiller, effective tiller, crop growth rate, vegetative growth, length of panicle, number of grains per panicle, number of filled grains per panicle, test weight of grains, grain yield and straw yield were recorded generally higher with using weedicides as compared to the above characteristics without

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