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RESEARCH PAPER

Yield of direct seeded upland rice (*Oryza sativa* L.) as influenced by different weed management practices under Tripura condition

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Abstract : A field experiment was conducted during the *Kharif* season of 2013 and 2014 at KVK, South Tripura to evolve effective weed management practices for upland direct seeded rice. The experiment consisted of 12 treatments laid out in Randomized Complete Block Design with three replications. The predominant weed flora observed in the experimental field were *Amaranthus viridis, Oldenlendia corymbosa, Spilanthes acmella, Ludwigia parviflora, Cleome rutidosperma, Malvestrum coromondalianeum* among the broad leaf weed, *Digitaria sanguinalis* among grasses and *Cyperus iria* among sedges. The result of the experiment reveals that weed free treatment recorded lowest weed dry weight for all types of weed and higher yield and yield attributing parameters of upland rice followed by pendimethalin + one hand weeding. All other treatments were significantly superior to weedy check in all respect.

Key Words : Weed management, Direct seeded rice, Yield

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INTRODUCTION

Rice is the staple food for more than half of the world population providing 21 per cent of global human per capita energy. About 90 per cent of world's rice is grown and produced (143 million ha of area with a production of 612 million tons of paddy) in Asia (FAO, 2009). In Asia rice is commonly grown by transplanting seedlings into puddle soil (Land preparation with wet tillage). However, in addition to adverse effects of puddling on soils physical properties, puddling and transplanting require large amount of water, labour, both of which are becoming increasingly scarce and expensive, making rice production less profitable. Also the drudgery involed in transplanting-a job largely done by women-is of serious concern. The increase in production cost, shortage of labour and increased wages, decreased water availability resulted in to shift from transplanting to direct- seeding. Weeds are the major impediment to direct seeded rice production through their ability to compete for resources and their impact on product quality (Rao and Nagamani, 2007). The risk of crop yield loss due to competition from weeds by all seeding methods is higher than for transplanted rice

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because of absence of size differential between crop and weeds and concurrent emergence of competitive weeds along with rice seedlings. The yield loss due to weed is as high as 40 to 100 per cent in direct seeded rice (Choubey *et al.*, 2001). Success of direct seeded rice depends largely on effective weed control method. Hence, the present investigation was taken on rice to evolve an effective weed management practices for upland rice.

MATERIAL AND METHODS

A field experiment was conducted at Krishi Vigyan Kendra, South Tripura during the *Kharif* (wet) season of 2013 and 2014 to evaluate the efficacy of different weed management practices on weed growth and productivity of upland direct seeded rice. Twelve treatments *viz.,* pendimethalin at 1.0 kg ha^{-1} at 2 DAS (T), pendimethalin at 1.0 kg ha^{-1} + one manual weeding at 30 DAS (T), pendimethalin at 1.0 kg ha^{-1} at 2 DAS + bispyribac sodium at 25 g ha^{-1} at 20 DAS (T), fenoxaprop at 60 g ha^{-1} + ready mix formulation of metsulfuron-methyl and chlorimuron-ethyl (Almix) at 4 g ha^{-1} at 15 DAS (T), bispyribac sodium at 25 g ha^{-1} at 20 DAS (T_5), metsulfuron-methyl and chlorimuron (Almix) at 4 g ha^{-1} at 10 DAS followed by bispyribac sodium at 20 g ha^{-1} at 20 DAS (T), pyrazosulfuron ethyl at 25 g ha^{-1} at 3 DAS followed by bispyribac sodium at 20 g ha^{-1} at 20 DAS (T_7), stale seed bed + smoother crop (cowpea) (T_8), stale seed bed + one hand weeding at 30 DAS (T_9), Sesbania (broadcast) + 2,4-D at 500 g ha^{-1} at 25 DAS (T_{10}), three hand weeding at 20, 30 and 45 DAS (T_{11}) and unweeded control (T_{12}) were assigned in a Randomized Block Design replicated thrice. Rice variety NDR-97 was direct-seeded in the experimental field with recommended package of practices. The upland rice was fertilized as per package of practices recommended. Ten tonnes of farm yard manure was applied at the time of field preparation. Chemical fertilizers were applied to meet 60 kg nitrogen in the form of urea, 40 kg phosphorus in the form of single superphosphate and 40 kg potassium in the form of muriate of potash.

Weed counts at different stages (15, 30, 60 and at harvest stage) was taken by placing quadrat at random three sites in each plot and calculating the average. Weed sample from any of the quadrat is taken, grouped into grasses, broad leaved weed and sedges, dried and weighed. Weed dry matter was expressed category wise in g/sqm. Yield and yield attributing characters were also studied. The data generated from the experiment were subject to analysis of variance (ANOVA) as applied to Randomized Block Design describe by Cochran and Cox (1965).

RESULTS AND DISCUSSION

The experimental findings obtained from the present study have been discussed in following heads :

Effect on weeds :

The common weed flora found in the experimental field were *Amaranthus viridis, Oldenlendia corymbosa,*

Table 1 : Dry weight of grassy weeds at 15, 30 DAS, 60 and 100 DAS (g/sqm)

Treatments	15 DAS		30 DAS		60 DAS		100 DAS	
	2013	2014	2013	2014	2013	2014	2013	2014
T_1	0.81(0.49)	0.81(0.15)	1.87(3.03)	1.81(2.81)	76.91	76.02	76.90	76.29
T_2	0.81(0.46)	0.80(0.15)	1.86(3.01)	1.72(2.46)	28.39	27.21	27.96	26.73
T_3	0.81(0.16)	0.80(0.15)	1.06(0.63)	1.05(0.61)	33.53	29.51	33.16	30.83
T_4	1.28(1.14)	1.28(1.13)	1.11(0.74)	1.08(0.68)	82.44	81.88	82.34	81.37
T_5	1.83(2.84)	1.74(2.55)	2.80(7.34)	2.73(6.98)	95.69	95.08	95.77	95.07
T_6	1.33(1.28)	1.30(1.19)	3.22(9.89)	3.17(9.61)	88.81	88.29	89.32	88.41
T_7	0.89(0.29)	0.86(0.25)	2.43(5.43)	2.39(5.26)	78.70	77.94	79.05	78.28
T_8	0.89(0.29)	0.88(0.28)	2.78(7.24)	2.77(7.17)	117.16	115.51	117.07	115.44
T_9	0.92(0.34)	0.89(0.29)	2.54(6.05)	2.51(5.89)	92.95	92.03	97.40	96.45
T_{10}	1.37(1.37)	1.35 (1.31)	3.79(13.85)	3.76(13.63)	113.14	112.87	114.42	112.96
T_{11}	0.71(0)	0.71(0)	0.71(0)	0.71(0)	24.89	24.12	25.21	24.02
T_{12}	1.91(3.15)	1.87(2.98)	4.29 (17.87)	4.23(17.43)	141.09	140.27	142.85	141.74
C.D. (P=0.05)	0.05	0.05	0.34	0.32	8.06	7.69	6.72	6.75

Data in parenthesis show the original value

Table 2 : Dry weight of broad leaved weeds at 15, 30, 60 and 100 DAS (g/sqm)

Treatments	15 DAS		30DAS		60DAS		100DAS	
	2013	2014	2013	2014	2013	2014	2013	2014
T_1	0.81(0.16)	0.81(0.15)	0.98(0.46)	0.97(0.43)	39.49	38.95	39.88	38.31
T_2	0.80(0.14)	0.80(0.14)	0.98(0.46)	0.92(0.35)	23.55	22.90	23.31	21.58
T_3	0.82(0.17)	0.81(0.15)	1.02(0.55)	0.98(0.46)	27.73	26.19	28.92	28.25
T_4	0.88(0.28)	0.88(0.27)	1.46(1.65)	1.43(1.55)	40.74	39.84	41.74	40.84
T_5	0.88(0.28)	0.87(0.26)	1.48(1.69)	1.45(1.60)	43.90	43.22	43.59	42.55
T_6	0.78(0.11)	0.80(0.14)	1.06(0.63)	1.03(0.57)	43.33	43.05	43.73	43.05
T_7	0.83(0.19)	0.82(0.17)	1.17(0.91)	1.15(0.85)	37.39	37.15	37.95	36.88
T_8	1.02(0.54)	1.00(0.51)	1.35(3.99)	1.32(1.24)	40.44	39.44	41.45	40.59
T_9	1.0 (0.49)	0.99(0.48)	1.36(1.35)	1.35(1.33)	41.89	40.88	42.41	41.74
T_{10}	1.15(0.82)	1.13(2.34)	1.46(1.63)	1.42(1.52)	37.18	36.38	37.86	37.33
T_{11}	0.71(0)	0.71(0)	0.71(0)	0.71(0)	18.99	18.13	18.77	17.91
T_{12}	1.36(4.04)	1.35(1.34)	4.15(16.74)	4.10(16.34)	67.67	67.16	69.02	68.48
C.D. (P=0.05)	0.04	0.04	0.15	0.16	4.03	3.93	3.65	3.79

Data in parenthesis show the original value

Table 3 : Dry weight of sedges at 15, 30 DAS, 60 and 100 DAS (g/sqm)

Treatments	15 DAS		30 DAS		60 DAS		100 DAS	
	2013	2014	2013	2014	2013	2014	2013	2014
T_1	1.92(3.20)	1.91(3.16)	2.75(7.16)	2.71(6.80)	29.17	28.15	29.71	29.12
T_2	1.99(3.47)	1.93(3.21)	2.41(5.30)	2.33(4.92)	9.39	8.49	8.93	7.97
T_3	1.94(3.28)	1.92(3.19)	2.11(3.97)	2.08(3.85)	9.58	10.82	13.42	12.57
T_4	1.99(3.45)	1.96(3.34)	1.73(2.52)	1.70(2.39)	15.90	14.85	12.54	15.13
T_5	1.99(3.46)	1.97(3.39)	1.97(3.42)	1.93(1.33)	9.09	8.47	9.47	8.90
T_6	1.81(2.78)	1.78(2.68)	1.64(2.18)	1.60(2.05)	8.89	8.38	9.36	8.17
T_7	1.94(3.28)	1.92(3.12)	2.27(4.66)	2.25(4.52)	16.77	16.08	17.24	16.46
T_8	1.67(2.3)	1.63(2.17)	2.31(4.88)	2.31(4.83)	30.40	29.72	30.66	29.70
T_9	1.75(2.57)	1.74(2.54)	2.38(5.18)	2.34(4.99)	23.76	23.19	23.22	22.68
T_{10}	1.94(3.27)	1.92(3.18)	2.33(4.92)	2.30(4.77)	29.76	29.30	30.00	29.42
T_{11}	0.71(0)	0.71(0)	0.71(0)	0.71(0)	5.14	4.84	5.90	4.87
T_{12}	2.13(4.04)	2.10(3.91)	3.12(9.23)	3.12(9.22)	42.81	42.51	44.01	43.03
C.D. (P=0.05)	0.12	0.106	0.26	0.25	3.37	3.53	3.57	3.28

Data in parenthesis show the original value

Table 4 : Yield and yield attributing characters of upland rice as effected by different weed management practices

Treatments	No. of panicles/plant		No. of grains/panicles		Yield(t/ha)		Harvest Index(%)	
	2013	2014	2013	2014	2013	2014	2013	2014
T_1	9.51	11.27	69.95	77.99	2.15	2.36	35.62	35.80
T_2	16.55	17.68	118.23	127.00	3.30	3.60	39.63	40.57
T_3	14.37	15.11	107.26	113.44	2.94	3.01	38.08	37.81
T_4	6.21	7.99	59.16	67.48	1.89	1.98	33.06	33.18
T_5	6.90	7.48	54.03	62.02	1.74	1.79	32.31	32.63
T_6	5.91	7.89	55.12	63.19	1.82	1.99	32.87	33.25
T_7	8.54	8.55	77.01	85.06	2.04	2.23	33.56	35.15
T_8	6.15	7.58	62.18	70.16	1.86	2.01	32.89	33.35
T_9	7.21	8.09	67.31	75.47	1.81	2.10	32.78	35.13
T_{10}	7.51	8.25	63.07	71.15	1.86	1.93	33.14	34.10
T_{11}	16.95	17.94	120.05	128.61	3.45	3.69	40.11	40.48
T_{12}	3.12	3.50	42.65	49.84	0.58	0.60	16.56	18.41
C.D. (P=0.05)	2.33	2.04	4.93	5.51	0.16	0.17	1.57	1.62

Spilanthes acmella, Ludwigia parviflora, Cleome rutidosperma, Malvestrum coromondalianeum among the broad leaf weed, *Digitaria sanguinalis* among grasses and *Cyperus iria* among sedges. The effect of various weed management practices on dry weight of grasses, broad leaved weeds and sedges showed highly significant differences at 15 DAS, 30 DAS, 60 DAS and harvest stage. There was not remarkable changes in weed dry weight of all types of weeds like grasses, broad leaved and sedges between two years. It is evident from the data that, in both the year weed dry weight of grassy, broadleaved weed and sedges was highest in weedy check (T_{12}) treatment in comparison to other treatment tested. Unchecked weed growth exploited the available nutrients and water, resulting in better growth and dry matter production. Similar observation have been made by Sunil *et al.* (2010) who reported that un weeded check recorded significantly higher weed population and weed dry weight. Data in Tables 1, 2, 3 also revealed that dry matter accumulation increased drastically in weedy check with advancing crop age. The lowest weed dry weight was recorded with T_{11} treatment (three hand weeding at 20,30 and 45 DAS). This was closely followed by T_2 (pendimethalin at 1.0 kg ha^{-1} + one manual weeding at 30 DAS) and T (pendimethalin at 1.0 kg /ha at 2 DAS + bispyribac sodium at 25 g ha^{-1} at 20 DAS. The result is in conformity with the findings of Bhurer *et al*. (2013).

Effect on yield and yield parameters :

It was clear from the data presented in Table 4 that different weed management practices did have a positive role in determining the yield and other yield attributing character of upland rice. Among different treatments T_{11} (three hand weeding at 20, 30 and 45 DAS) recorded highest number of panicles per plant, number of grains/panicle, yield/ha and harvest index during both the years. This treatment was at par with T_2 (pendimethalin at 1.0 kg ha$_{-1}$ + one manual weeding at 30 DAS). The efficacy of pendimethalin in combination with hand weeding was reported effective in controlling weed in dry direct seeded rice by Ramamoorthy *et al*. (1998) and Singh *et al*. (2005).

Conclusion :

Based on the results, yield, yield attributing parameters and weed dry weight were greatly influenced by different weed management practices. Overall manually weeded weed free plots performed better in producing higher yield and yield attributing parameters and lowest weed dry weight followed by pendimethalin + one hand weeding in comparison to other treatments. These two treatments were significantly at par with each other. However, manually weeding is tedious, time consuming, highly labour intensive and expensive. In addition, during peak period, the availability of labour is becoming a serious problem. So, application of pre-emergence pendimethalin + one hand weeding found the best way of obtaining higher yield and controlling weeds effectively in dry direct seeded rice.

REFERENCES

Bhurer, K.P., Yadav,D.N., Ladha, J.K., Thapa, R.B. and Pandey, K.R. (2013). Efficacy of various herbicides to control weeds in dry direct seeded rice (*Oryza sativa* L.). *Global J. Biol., Agric. & Health Sci.,* **2** (4) : 205-212.

Choubey, N.K., Kolhe, S.S. and Tripathy, R.S. (2001). Relative performance of cyhalofop-butyl for weed control in direct seeded rice. *Indian J. Weed Sci.,* **33**(3&4):132-135.

Cochran, W.G. and Cox, G.M. (1965). *Experimental design*. John Willey and Sons, Inc. New York.

Mishra, J.S. and Singh, V.P. (2007). Integrated weed management in zero till direct seeded rice (*Oryza sativa)* L.)-wheat (*Triticum aestivum*) cropping system. *Indian J. Agron*., **52** (3) : 198-203.

Ramamoorthy, K., Arokiaraj, A. and Balasubramanian, A. (1998). Effect of irrigation and chemical weed control on crop yield and nutrient uptake by upland rice and associated weeds under rice-blackgram intercropping system. *Oryza,* **33** : 264-268.

Rao, A.N. and Nagamani (2007). Available technologies and future research challenges for managing weeds in dry seeded rice in India. In.Proc.of the 21st Asian Pacific Weed Science Society Conf. 2 to 6th October 2007, Colombo, Sri Lanka, pp.391-400.

Singh, S., Bhusan, L., Ladha J.K., Gupta, R.K., Rao, A.N. and Sivprasad, B. (2005). Weed management in dry seeded rice (*Oryza sativa* L.) cultivated in the furrow-irrigated raised-bed planting system. *Crop Protec.*, **25** (5) : 487-495.

Sunil, C.M., Shekara, B.G., Kalyanamurthy, K.N. and Shankaralingappa, B.C. (2010). Growth and yield of aerobic rice as influenced by integrated weed management practices. *Indian J. Weed Sci.*, **42** (3&4) : 180-183.