SHORT COMMUNICATION

EFFECT OF FYM AND WEED MANAGEMENT ON WEED DYNAMICS AND YIELD OF DIRECT SEEDED RICE (*ORYZA SATIVA* L.) UNDER MINIMUM TILLAGE

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Abstract: Results revealed that, FYM @ 5 t ha^{-1} (F1) has significant impact on total tillers m^{-2} and effective tillers m^{-2}. Hand weeding twice at 25 & 45 DAS (W7) produced significantly highest number of effective tillers $meter^{-2}$, test weight (g). Highest grain yield (4.21 t ha^{-1}) , straw yield (5.52 t ha^{-1}) and harvest index (51.54 %) was recorded under hand weeding twice at 25 & 45 DAS (W7), followed by Chemical weeding with bispyribac Sodium @ 20 g ha^{-1} 25 DAS (W1), which gave grain yield (4.03 t ha^{-1}), straw yield (5.25 t ha^{-1}) and harvest index (51.37 %) . The lowest was recorded under unweeded check (W8). In the experimental field, *Commelina benghalensis* L., *Cyanotis axillaris* Schult. F., *Cyperus difformis* L., *Echinochloa colona* (L.) Link, *Monochoria vaginalis (Burm.f.) Kunth* were dominant weeds. The lowest weed density, weed dry matter production and relative weed density were recorded under hand weeding twice at 25 & 45 DAS (W7), followed by Chemical weeding with bispyribac Sodium @ 20 g ha^{-1} 25 DAS (W1).

Keywords: *Oryza sativa*, Weed management, Yield

INTRODUCTION

Rice is the most important cereal food crop of India, which occupies about 24 per cent of gross cropped area of the country. It contributes 42 per cent of total food grain production and 45 per cent of total cereal production of the country. Rice accounts for 35 to 75 per cent of the calories consumed by more than 3 billion Asians (Kumar *et al*., 2006) and is planted to about 154 millions hectare annually or on about 11 per cent of the total world's cultivated land. The FYM is common source of nutrients to the farmers, which can be prepared easily and contains substantial amount of plant nutrients. Incorporation of organic sources viz., FYM along with chemical fertilizers is effective in alleviating the nutrient deficiency in soil and enhance the yield potential as well. Line sowing coupled with application of herbicide may prove to be very promising on farmer's field. Most of the field experiments and on farm researches have established that direct seeded rice, if properly managed, can yield as high as transplanted rice (Singh and Bhatacharya, 1987). Change in the method of crop establishment from traditional *biasi* or manual transplanting of seedlings to direct line seeding has occurred in many Asian countries in the last two decades in response to rising production costs, especially for labour and water. Weeds are foremost barrier in enhancing yield of direct seeded rice. The extent of yield reduction of rice crop due to weeds is estimated from 15 to 95 per cent (Gogoi *et al.*, 1996). Weeds compete for moisture, nutrients, light and space and a consequence, weeds infestation in direct seeded rice (DSR) to the tune of 30 to 90 % yield loss, reduces grain quality and enhance the cost of production (Singh *et al*., 2009). Similarly weeds demand high lobour inputs for control (Labrada, 1998). Stale seedbed, tillage practices for land leveling, choice of competitive rice cultivars, mechanical weeders, herbicides and associated water management are component technologies essential to the control of weeds in DSR. Herbicides, in particular, are an important tool of weed management, but hand weeding is either partially or extensively practiced in India. Mechanical weeder can reduce the time required for weeding and the corresponding cost involved compared to hand weeding.

MATERIAL AND METHOD

The experimental site was located at Instructional cum-Research Farm, College of Agriculture, IGKV, Raipur (C.G.) during *kharif*, 2012 where adequate facilities for irrigation and drainage existed. Raipur is situated in central part of Chhattisgarh and lies at latitude, longitude of 21°16' N, 81°26' E, respectively and 290.20 meters above mean sea level. Climatologically, Raipur is classified as slightly moist hot zone. It receives an average annual rainfall of 1326 mm (based on 80 years mean). The soil of the experimental field was clay loam in texture *(Alfisols)* locally known as *"Dorsa"* soil. The soil was neutral in reaction (pH 7.41). It had low available nitrogen (220.00 kg ha^{-1}), medium available phosphorus (18.10 00 kg ha^{-1}) and potassium contents (313.00 kg ha^{-1}). The experiment was laid out in Factorial randomized block design (F-RBD) and treatments were replicated thrice. The treatments comprised of two fertility (FYM) level and eight weed management practices. Fertility level consists of FYM, 0 t ha^{-1} and FYM, 5 t ha^{-1}. Weed management consist of Chemical weeding with bispyribac sodium @ 20 gm ha^{-1}, 25 DAS (W1), Mechanical weeding 25 DAS (W2), Mechanical weeding 25 DAS + hand weeding 45 DAS (W3), Hand weeding 25 DAS (W4), Hand weeding intra row 25 DAS + hand weeding 45 DAS (W5), Mechanical weeding inter row followed by hand weeding intra row 25 DAS (W6), Hand weeding 25 &

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45 DAS (W7) and unweeded check (W8). Rice variety "MTU-1010" was grown as test crop. FYM was applied manually @ 5 ton ha^{-1} after layout of the field then incorporated manually. Hebicide was sprayed with the help of knapsack sprayer and mechanical weeding was done with the help of ambika paddy weeder. Recommended dose of N; P_2O_5 and K_2O i.e. 80:40:30 kg ha^{-1} was applied through urea, Di-ammonium phosphate and Muriate of potash, respectively, The whole amount of P_2O_5 & K_2O was applied as basal, while nitrogen was applied in three splits *viz.* 50% as basal , 25% at 25 and remaining 25% at 45 DAS. Seeds rate was taken @ 80 kg ha^{-1} and treated with Carbendazim @ 2g kg^{-1} seeds and then sown at the depth of 4-5 cm. keeping the row distance of 20 cm on 12 july, 2012. The crop was harvested on 19 November, 2012. The data on pre harvest crop observations *viz.* Plant height (cm), , Number of total tillers (m^{-2}), Dry matter accumulation (g) were recorded at 20, 40, 60, 80 DAS and at harvest. Leaf Area (cm^2) was recorded up to 60 DAS. The data on weed density and weed dry matter production were recorded at 25, 30, 45 and 50 DAS from randomly selected two places from each net plot by using quadrate of 0.25 m^2 size and they were subjected to square root transformation before statistical analysis. The average values of weed control index for different weed management practices falling in particular fertility level were obtained by following standard method.

RESULT AND DISCUSSION

Effect of FYM and weed management on Weeds

Predominant weed species observed in the experimental field were *Commelina benghalensis, Cyanotis axillaris, Cyperus difformis, Echinochloa colonum* and *Monocharia vegenalis.*

FYM @ 5 t ha^{-1} produced higher weed density and dry weight.At 50 DAS, , the lower total weed density and total weed dry matter production was observed under hand weeding 25 & 45 DAS (W7), mechanical weeding 25 DAS + hand weeding 45 DAS (W3) and hand weeding intra row 25 DAS + Hand weeding 45 DAS (W5) than others. The highest total weed density was observed under unweeded check (W8). Among different weed management practices, hand weeding twice was effective in reducing weed dry matter production up to 50 DAS. Mechanical weeding 25 DAS+ hand weeding 45 DAS(W3) and hand weeding intra row 25 DAS+ hand weeding 45 DAS(W5) were also effective in reducing weed dry matter production up to 50 DAS because of complete removal of weeds. Mechanical weeding at 25 DAS was not effective in reducing weed dry matter production because some weeds were left in between rows and weeds were incorporated in inter row spaces, which can grow and multiply again and increase in dry matter production . While hand weeding in 25 DAS (W4) was effective in reducing dry matter production up to 45 DAS because of completes removal and uprooting of weeds at 25 DAS. Mechanical weeding 25 DAS and hand weeding intra row 25 DAS were not sufficient in reducing dry matter production at 30 DAS. While mechanical weeding 25 DAS + hand weeding 45 DAS (W3) and hand weeding intra row 25 DAS+ hand weeding 45 DAS (W5) were effective in reducing weed dry matter production up to 50 DAS. When mechanical weeding weeding 25 DAS was supported by hand weeding 25 DAS (W6) it was effective in reducing dry matter production up to 45 DAS.

		Total weed density No. m^{-2}	**Total weed dry weight g m^{-2}**	**Weed Control Efficiency (%)**
	Treatments	**50 DAS**	**50 DAS**	**50 DAS**
	Fertility level			
F0	FYM @ 0 t ha^{-1}	4.80 (22.56)	2.60 (6.24)	60.49
F1	FYM @ 5 t ha^{-1}	6.18 (37.72)	3.22 (9.88)	52.77
	SEm±	**0.48**	**0.05**	
	CD 0.05	**0.33**	**0.16**	
	Weed management			
W1	Chemical weeding Bispyribac Sodium @ 20 g ha^{-1} 25 DAS	7.36 (53.60)	3.53 (11.96)	71.38
W2	Mechanical weeding 25 DAS	9.91 (97.80)	6.26 (38.64)	37.56
W3	Mechanical weeding 25 DAS + Hand weeding 45 DAS	0.71 (0.00)	0.71 (0.00)	80.38
W4	Hand weeding 25 DAS	8.51 (71.84)	5.09 (25.40)	27.90

W5	Hand weeding intra row 25 DAS + Hand weeding 45 DAS	0.71 (0.00)	0.71 (0.00)	80.38
W6	Mechanical weeding inter row followed by Hand weeding intra row 25 DAS	7.12 (50.24)	4.77 (22.28)	32.04
W7	Hand weeding 25 & 45 DAS	0.71 (0.00)	0.71 (0.00)	80.38
W8	Unweeded check	14.30 (204.00	7.43 (54.64)	-
	SEm±	**0.23**	**0.11**	
	CD0.05	**0.67**	**0.32**	

*Original data are given in parenthesis

Effect on Yield Attributes and Yield

Among different weed management practices, hand weeding twice 25 & 45 DAS (W7) gave highest panicle length over other weed management practices. Chemical weeding with bispyribac sodium @ 20 g ha^{-1} 25 DAS (W1), mechanical weeding 25 DAS + hand weeding 45 DAS (W3), hand weeding 25 DAS (W4), hand weeding intra row 25 DAS + hand weeding 45 DAS (W5) and mechanical weeding inter row followed by hand weeding intra row 25 DAS (W6) were at par with the hand weeding twice 25 & 45 DAS (W7). The smallest panicles were observed under unweeded check (W8). Hand weeding twice 25 & 45 DAS (W7) increased effective tillers, total no. of grains $panicle^{-1}$ and filled grains $panicle^{-1}$ and found significantly superior over other weed management practices but it was at par with chemical weeding with bispyribac sodium @ 20 g ha^{-1} 25 DAS (W1), mechanical weeding 25 DAS + hand weeding 45 DAS (W3), hand weeding intra row 25 DAS + hand weeding 45 DAS (W5), and mechanical weeding inter row fb hand weeding intra row 25 DAS (W6). The lowest total no. of grains $panicle^{-1}$ was recorded under unweeded check (W8). Hand weeding twice 25 & 45 DAS (W7) proved significantly superior over rest of the other weed management practices in producing higher test weight, but it was found at par to chemical weeding with bispyribac sodium @ 20 g ha^{-1} 25 DAS (W1) . Hand weeding twice 25 & 45 DAS (W7) proved significantly superior over rest of the other weed management practices in producing higher grain yield and straw yield but it was found at par to chemical weeding with bispyribac sodium @ 20 g ha^{-1} 25 DAS (W1), mechanical weeding 25 DAS + hand weeding 45 DAS (W3), and hand weeding intra row 25 DAS + hand weeding 45 DAS (W5). Higher grain yield under these treatments was due to the weed managed at critical period of weed-crop competition and early crop growth, higher dry matter accumulation, high growth in terms of tiller numbers, which resulted in higher production of photo synthesis, and acts as a source and greater translocation of food materials to the reproductive parts resulted in superiority of yield attributing characters (tillers, filled grains $panicle^{-1}$, test weight) and ultimately high yield. Lower weed density and higher weed control efficiency also resulted in higher grain yield. The lowest grain yield was observed under unweeded check (W8). Nagappa and Biradar, (2002), have also reported the higher grain yield under two hand weedings. Saha *et al* (2005) also found the highest grain yield (2.92 t ha^{-1}) under hand weeding twice. The lowest straw yield were observed under unweeded check (W8) due to the less dry matter accumulation of rice, less CGR, high weed infestation and high competition during critical periods, which does not allow the crop to grow their potential, and vice versa. Dhawas *et al* (1992) also reported the highest grain and straw yield under hand weeding twice.

		Effective tillers (no m^{-2})	**Filled grains $panicle^{-1}$ (no.)**	**Grain yield (t ha^{-1})**	**Test weight (g)**	**Harvest index (%)**	**Weed Index (%)**
	Treatments						
	Fertility evel						
F0	FYM @ 0 t ha^{-1}	235.10	97.83	3.47	24.3	43.69	17.57
F1	FYM @ 5 t ha^{-1}	236.45	105.64	3.63	23.5	44.02	13.77

	SEm±	**6.77**	**3.043**	**0.10**	**0.1**	**1.13**	-
	CD (0.05)	**NS**	**NS**	**NS**	**0.2**	**NS**	-
	Weed management						
W1	Chemical weeding (Bispyribac sodium @ 20 g ha^{-1} 25 DAS)	259.15	102.7	4.03	25.3	51.37	4.27
W2	Mechanical weeding (25 DAS)	226.65	97.46	3.31	23.5	37.96	21.37
W3	Mechanical weeding (25 DAS) + hand weeding (45 DAS)	249.60	102.53	4.01	24.8	47.37	4.75
W4	Hand weeding (25 DAS)	200.40	99.9	3.39	23.6	41.46	19.47
W5	Hand weeding intra row (25 DAS) + hand weeding (45 DAS)	243.75	101.9	3.69	23.8	46.48	12.35
W6	Mechanical weeding (inter row) followed by hand weeding (intra row) (25 DAS)	245.40	100.07	3.59	23.6	45.50	14.72
W7	Hand weeding (25 & 45 DAS)	266.65	115.93	4.21	25.6	51.54	-
W8	Unweeded check	194.60	93.4	2.16	23.1	29.16	48.69
	SEm±	**13.54**	**6.09**	**0.20**	**0.1**	**2.26**	-
	CD(0.05)	**39.10**	**17.58**	**0.59**	**0.3**	**6.54**	-

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