Karnataka J. Agric. Sci., 22(4) :(889-891) 2009

Effect of nutrient and weed management on weed growth and productivity of *kharif* maize under rainfed condition

Maize ranks third in the world production being surpassed only by rice and wheat, but in productivity it surpass all cereals. It is well known that maize is a heavy feeder for both nutrients and soil moisture due to its high productivity. On one' hand, use of costly chemical fertilizers may form the major contributing factor for higher agriculture production, but continuous application of only these might have some deterious effects on soil properties, which in turn reflects on yield. On the other end, cannot meet huge nutrient requirement of maize, if used alone. An application of inorganic fertilizers with organic manures maintains the soil fertility and also improves the productivity of maize (Panwar, 2008). The low yield of maize under Indian conditions may be attributed by number of factors, among them weeds rank as prime enemy. Lal and Saini (1985) gave an estimate on crop weed competition and suggested that the reduction of 40 % in yield can occurs due to weed infestation. In the near future, agricultural labour will become scarce and expensive, as the drift from the village to cities unlikely to be reversed. Therefore it is necessary to develop cheaper method of weed control with either herbicides or their combinations with mechanical methods. Taking into account above points, it was felt necessary to conduct the experiment entitled "Studies on nutrient and weed management in maize under rain fed condition"

A field experiment was conducted in plot A-7 during *kharif* season of 2007-08 at College Farm, Department of Agronomy, Marathwada Agricultural University, Parbhani. The soil of the experimental plot was clayey in texture, low in available nitrogen (11.2 kg/ha), low in available phosphorus (12.88 kg/ha) and high in available potassium (443.50 kg/ha) and slightly alkaline in reaction (pH 7.95). The experiment was laid out in Factorial Randomized Block Design with three replications. There were 18 treatment combinations of three nutrient source viz. N_1-50 % RDF + 50 % N through FYM, N_2-75 % RDF + 25 % N through FYM, N_3-100 % RDF and six weed management practices viz. W_1- Atrazine @ 1 kg a.i./ha PE, W_2- Atrazine @ 0.75 kg a.i./ha PE fb 1 HW at 45 DAS, W_3- Intercropping of Maize + Soybean (1:1), W_4 -Intercropping of Maize + Soybean (1:1) + Pendimethalin @ 0.75 kg a.i./ha PE, W_5- Weed free check, W_6- Unweeded check. The recommended dose of fertilizer and spacing for maize was 120:60:60 NPK kg/ha and 60cm x 30cm respectively.

At 30 and 60 DAS lowest weed count was observed with application of 75 % RDF + 25 % N through FYM and 50% RDF + 50% N through FYM, both were on par and recorded significantly lowest weed count as compared to application of 100% RDF . However, 90 DAS weed count was not reach to the level of significance. At all the dates of observations weed count in un weeded check was significantly more (54.331 m^2) as compared to rest of the treatments. At 30 DAS, the pre-emergence application of atrazine @ 1 kg a.i./ha, application of atrazine @ 0.75 kg a.i./ha PE fb 1 HW at 45 DAS and pre-emergence application of pendimethalin @ 0.75 kg a.i./ha in intercropping of maize + soybean (1:1) were on par and recorded lower weed

Table 1. Total weed count and dry weed weight as influenced by various treatments

Treatments	Weed count (per m^2)			Dry weed weight (g) at		
	30 DAS	30 DAS	60 DAS	90 DAS	60 DAS	90 DAS
Nutrient management						
N_1- 50% RDF + 50 % N through FYM	20.83	14.83	22.33	20.99	28.66	25.66
N_2- 75 % RDF + 25 % N through FYM	23.16	11.77	23.17	21.32	27.33	25.49
N_3- 100% RDF	20.94	16.34	23.17	22.33	31.66	26.83
SEm	0.44	0.56	0.63	0.58	0.64	0.60
CD at 5%	1.21	1.55	NS	NS	1.77	NS
Weed management						
W_1- Atrazine @ 1 kg a.i./ha PE	7.55	5.38	10.33	16.60	13.00	14.33
W_2- Atrazine @ 0.75 kg a.i./ha PE fb 1 HW at 45 DAS	9.00	6.71	4.33	4.00	5.00	6.33
W_3- Intercropping of Maize + Soybean (1:1)	22.37	15.71	25.33	14.33	29.00	12.67
W_4- Intercropping of Maize + Soybean (1: 1) + Pendimethalin @ 0.75 kg a.i./ha PE	10.67	8.87	25.67	14.67	30.00	12.33
W_5- Weed free check	20.66	17.76	10.0	7.33	12.00	8.68
W_6- Unweeded check	59.62	31.47	61.67	72.40	86.33	101.65
SEm	0.62	0.79	0.89	0.82	0.91	0.85
CD at 5%	1.71	2.19	2.47	2.27	2.51	2.36
Interaction (N x W)						
SEm	1.07	1.37	1.54	1.42	1.57	1.48
CD at 5%	2.95	3.79	NS	NS	4.34	4.09
General mean	2.64	14.32	22.89	21.55	29.22	25.99

count over rest of the treatments. At 60 and 90 DAS pre-emergence application of atrazine @ 0.75 kg a.i./ha fb 1 HW at 45 DAS and weed free check recorded significantly lowest weed count (5/ m^2) as compared to rest of the treatments. Data in table 2 revealed that, at all the observation dates more or less sigruficantly lowest weed count per m^2 was recorded in case of 100 % RDF and 75% RDF + 25% N through FYM with pre-emergence application of atrazine @ 1 kg a.i./ha alone or with one hand weeding at 45 DAS and weed free check

At 30 DAS, there were significant differences due to nutrient management on weed dry matter. The application of 100 % RDF (16.34 g/m^2) and 50% RDF + 50% N through FYM were on par and recorded significantly more dry weed weight than application of 75 % RDF + 25 % N through FYM (11.77 g/m^2). Treatment differences due to nutrient management were non significant at 60 and 90 DAS. At 30 DAS significantly lowest weed dry matter was recorded by pre-emergence application of atrazine @ 1 kg/ha observed (5.38 g/m^2) and which was on par the pre-emergence application of atrazine @ 0.75 kg a.i./ha fb 1 HW at 45 DAS (6.71 g/m^2) and both these treatments recorded significantly lowest weed dry matter compared to rest of the treatments. At 60 and 90 DAS, significantly lowest weed dry matter was recorded by atrazine @ 0.75 kg a.i./ha fb 1 HW at 45 DAS over rest of the treatments. Data in table 2 revealed that at 30 DAS, application of 75 % RDF + 25 % N through FYM with pre-emergence application of atrazine @ 1 kg a.i./ha (N_2 x W_2)

Table 2. Weed count and weed dry weight as influenced by interaction of nutrient management x weed management practices

Treatment	Weed count (per m^2)									Weed dry weight (g)		
	30 DAS			60 DAS			90 DAS			30 DAS		
	N_1	N_2	N_3	N_1	N_2	N_3	N_1	N_2	N_3	N_1	N_2	N_3
W_1	9.0	8.0	5.6	16.0	12.0	11.0	17.0	10.0	16.0	5.33	4.66	6.16
W_2	11.0	9.0	7.0	4.0	5.0	6.0	7.0	6.0	6.0	8.66	5.33	6.13
W_3	20.7	21.7	24.7	36.0	14.0	37.0	14.0	12.0	12.0	19.53	8.20	19.40
W_4	12.0	13.0	7.0	28.0	28.0	34.0	13.0	12.0	12.0	9.67	6.66	10.26
W_5	20.0	22.0	20.0	8.0	16.0	12.0	6.3	9.3	10.3	17.13	18.13	18.13
W_6	51.2	64.7	60.5	80.0	89.0	90.0	96.6	103.6	104.6	28.67	27.66	38.07
SEm		1.07			1.57			1.48			1.37	
CD at 5%		2.95			4.34			4.09			3.39	

was found significantly superior over weed free check and un weeded check. Thind et al. (1984) and Shah and Koul (1990) reported that that maize given 46-60 kg N/ha and application of attrazine 0.5-1.25 kg/ha significantly decreased the populations and dry weight of weeds

At 30 DAS, highest weed control efficiency was found with application of 100% RDF and 75% RDF+ 25% N through FYM and both were at par with each other and recorded significantly higher WCE over 50% RDF+50% N through FYM (58.01 per cent). In case of 60 and 90 days after sowing, WCE did not reached to the level of significance. At 30 DAS, the significantly highest weed control efficiency was recorded by pre-emergence application of atrazine @ 1 kg a.i./ha which was on par with Atrazine @ 0.75 kg a.i./ha PE fb 1 HW at 45 DAS and intercropping of Maize + Soybean (1:1) + Pendimethalin @ 0.75 kg a.i./ha PE, and recorded significantly superior WCE over rest of the treatments. At 60 and 90 DAS, emergence application of atrazine @ 0.75 kg a.i./ha fb 1 HW at 45 DAS was recorded significantly superior WCE over rest of the treatments except application of attrazine @ 1 kg a.i./ha and weed free check. Kolge et a1. (2004) found that the maximum weed control efficiency was observed in weed free check followed by application of attrazine @ 1 kg/ha and PE application of attrazine 0.5 kg/ha fb one hand weeding at 30 DAS.

Interaction effects on weed control efficiency were significant at 30 and 90 days after sowing. The data is presented in table 3 revealed that at 30 DAS significantly highest weed control efficiency was recorded with of 100 % RDF with pre-emergence application of atrazine @ 1 kg a.i./ha (N_3 x W_1) which was significantly superior over rest of the treatments except N_3 x W_2 and N_3 x W_4. At 90 DAS significantly highest weed control efficiency was recorded in case of application of 100 % RDF with pre-emergence application of atrazine @ 0.75 kg a.i./ha fb 1 HW at 45 DAS (N_3 x W_2) which was superior over rest of the treatments.

Lowest weed index was recorded with 100% RDF and 75% RDF + 25 % N through FYM. However, it was highest in application of 50% RDF + 50% N through FYM. In case of weed

Table 3. Weed control efficiency (%) as influenced by interaction of nutrient management x weed management practices at 30 and 90 DAS

	At 30 DAS			At 90 DAS		
Treatments	N_1	N_2	N_3	N_1	N_2	N_3
W_1	81.53	82.90	83.82	75.10	81. 92	73.92
W_2	69.57	80.38	83.81	92.65	94.60	95.78
W_3	32.37	70.16	48.99	82.74	83.59	82.41
W_4	66.06	75.98	72.81	82.79	82.23	82.31
W_5	40.53	30.27	49.94	91.37	89.16	89.26
W_6	-	-	-	-	-	-
SEm		4.38			1.39	
CD at 5%		12.66			4.03	

management treatments, lowest weed index (2.11 %) was recorded by weed free check treatment followed by pre-emergence atrazine @ 1 kg a.i./ha (7.43 %),however, highest weed index was noticed in of unweeded check treatment (85.08 %).

Profound influence of nutrient management was observed on grain yield of maize (Table 4). The application of 100 % RDF and 75 % RDF + 25 % N though FYM were on par and recorded significantly higher grain fodder and maize equivalent yield as compared to application of 50% RDF + 50% N through FYM (52.80 q/ha). All the weed control treatments were found to be significantly superior over the unwedded check. Application of atrazine @ 0.75 kg a.i./ha PE fb 1 HW at 45 DAS (71.18 q/ha) was at par with weed free check and application of atrazine @ 1 kg a.i./ha and recorded significantly higher grain, fodder and maize equivalent yield over rest of the weed control treatments. Khot and Umrani (1992), and Paradkar and Sharma (1993) reported the that application of application of RDF and RDF + 20 t FYM gave comparable maize grain yield. Mundra et al. (2003) found that the PE application of attrazine @ 0.5 kg/ha + intercultivation at 35 DAS tended to increase mean grain yield. by 92.84 per cent over weedy check.

Table 4. Weed index, weed, control efficiency and grain, podder and maize equivalent yield as influenced by different treatments

Treatments	W_1 (%)	Weed control efficiency (%)			Grain yield (q/ha)	Fodder yield (q/ha)	Maize; equivalent yield (q/ha)
		30 DAS	60 DAS	90 DAS			
Nutrient management							
N_1- 50% RDF + 50% N through FYM	34.8	58.01	52.80	64.39	57.73	70.99	84.93
N_2- 75% RDF + 25% N through FYM	19.2	67.94	59.17	70.18	65.19	75.20	86.30
N_3- 100% RDF	18.6	67.87	59.98	71.97	65.09	77.29	84.73
SEm	-	1.95	1.74	2.07	1.71	1.99	0.62
CD at 5%	-	5.66	4.80	5.73	4.77	NS	NS
Weed management							
W_1- Atrazine @ 1 kg a.i./ha PE	7.43	82.75	66.26	80.13	66.26	83.27	76.98
W_2- Atrazine @ 0.75 kg a.i./ha PE fb 1 HW at 45 DAS	-	77.92	71.18	85.09	71.18	93.06	94.34
W_3- Intercropping of Maize + Soybean (1:1)	50.5	50.50	47.28	56.07	61.68	58.60	82.91
W_4- Intercropping of Maize + Soybean (1: 1) + Pendimethalin@ 0.75 kg a.i./ha PE	47.6	71.62	48.22	57.10	63.82	58.27	82.44
W_5- Weed free check	2.11	40.24	69.71.	83.16	69.71	79.28	89.93
W_6- Unweeded check	85.0	-	38.46	47.00	38.46'	-	-
SEm		2.52	2.45	2.93	2.43	2.58	0.80
CD at 5%		7.31	6.79	8.11	6.75	7.45	2.32
Interaction (N x W)							
SEm		4.38	4.26	5.07	4.22	4.46	1.39
CD at 5%		12.66	NS	NS	NS	NS	4.03
General mean	33.1	57.42	57.07	68.34	62.12	66.22	75.84

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(Received: August, 2008)

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