

## Studies on Nutrient and Weed Management in Kharif Maize under Rainfed Conditions

L. S. Deshmukh, R. S. Jathure and S. K. Raskar

Department of Agronomy  
Marathwada Agricultural University, Parbhani-431 402 (Maharashtra), India

Maize ranks third in the world production being surpassed only by rice and wheat, but in productivity it surpasses 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/ pesticides may form the major contributing factor for higher production, but continuous application of only these might have some deleterious effects on soil properties, which in turn reflects on yield. On the other hand, huge nutrient requirement of maize cannot be met if used alone. An application of inorganic fertilizers with organic manures maintains soil fertility and also improves the productivity of maize (Panwar, 2008). The low yield of maize under Indian conditions may be attributed to 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 could occur due to weed infestation. In the near future, agricultural labour will become scarce and expensive, as the movement 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 the above points, it was felt necessary to conduct the experiment entitled "Studies on nutrient and weed management in maize under rainfed condition"

A field experiment was conducted 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 a factorial randomized block design (FRBD) with three replications. There were 18 treatment combinations of three nutrient sources viz.,  $N_1$ -50% RDF

(Recommended dose of fertilizer)+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/ha PE,  $W_2$ -Atrazine @ 0.75 kg/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/ha PE,  $W_5$ -Weed free check and  $W_6$ -Unweeded check. The recommended dose of fertilizer and spacing for maize were 120 : 60 : 60 NPK kg/ha and 60 x 30 cm, respectively.

### Weed Control Efficiency

At 30 DAS, highest weed control efficiency was found with the application of 100% RDF and 75% RDF+25% N through FYM (Table 1) and both were at par with each other and recorded significantly higher WCE over 50% RDF+50% N through FYM (58.01% ). In case of 60 and 90 DAS, WCE did not reach to the level of significance. At 30 DAS, highest weed control efficiency was recorded by pre-emergence application of atrazine @ 1 kg/ha which was on par with atrazine @ 0.75 kg/ha PE fb 1 HW at 45 DAS and intercropping of maize+Soybean (1 : 1)+Pendimethalin @ 0.75 kg/ha PE, and recorded significantly superior WCE over rest of the treatments. At 60 and 90 DAS, pre-emergence application of atrazine @ 0.75 kg/ha fb 1 HW at 45 DAS recorded significantly superior WCE over rest of the treatments except application of atrazine @ 1 kg/ha and weed free check. Similar findings were reported by Kolge *et al.* (2004).

Interaction effects on weed control efficiency were significant at 30 and 90 DAS. At 30 DAS highest weed control efficiency was recorded with 100% RDF with pre-emergence application of atrazine @ 1 kg/ha ( $N_3 \times W_1$ ) which was significantly superior over rest of the treatments except  $N_3 \times W_2$  and  $N_3 \times W_4$  (Table 2). At 90 DAS, highest weed control efficiency was recorded in case of application of 100% RDF with pre-emergence

application of atrazine @ 0.75 kg/ha fb 1 HW at 45 DAS ( $N_3 \times W_2$ ) which was superior over rest of the treatments.

### Yield Components

The application of 100% RDF and 75% RDF+25% N through FYM was on par and recorded significantly higher maize grain, fodder and maize equivalent yield as compared to application of 50% RDF+50% N through FYM. All the weed control treatments yielded significantly higher than unweeded check. Application of atrazine @ 0.75 kg/ha PE fb 1 HW at 45 DAS was at par with weed free check and application of atrazine @ 1 kg/ha and recorded

significantly higher grain, fodder and maize equivalent yield over rest of the weed control treatments. The above findings are similar to the results reported by Khot and Umrani (1992), Paradkar and Sharma (1993) and Mundra *et al.* (2003)

### Economic Studies

Application of 100% RDF and 75% RDF+25% N through FYM was on par and recorded significantly higher gross monetary (Rs. 59350 and 59062/ha) and net monetary returns (Rs. 42576 and 43350/ha) as compared to application of 50% RDF+50% N through FYM (Table 3). It was due to increased grain yield of

Table 1. Weed control efficiency as influenced by different treatments

Treatment	Weed control efficiency (%)		
	30 DAS	60 DAS	90 DAS
<b>Nutrient management</b>			
$N_1$ -50% RDF+50% N through FYM	58.01	70.99	84.93
$N_2$ -75% RDF+25% N through FYM	67.94	75.20	86.30
$N_3$ -100% RDF	67.87	77.29	84.73
LSD (P=0.05)	5.66	NS	NS
<b>Weed management</b>			
$W_1$ -Atrazine @ 1 kg a. i./ha PE	82.75	83.27	76.98
$W_2$ -Atrazine @ 0.75 kg a. i./ha PE fb 1 HW at 45 DAS	77.92	93.06	94.34
$W_3$ -Intercropping of maize+ Soybean (1 : 1)	50.50	58.60	82.91
$W_4$ -Intercropping of maize+Soybean (1 : 1)+Pendimethalin @ 0.75 kg a. i./ha PE	71.62	58.27	82.44
$W_5$ -Weed free check	40.24	79.28	89.93
$W_6$ -Unweeded check	-	-	-
LSD (P=0.05)	7.31	7.45	2.32
<b>Interaction (N x W)</b>			
SE $\pm$	4.38	4.46	1.39
LSD (P=0.05)	12.66	NS	4.03

NS-Not Significant.

Table 2. Weed control efficiency (%) as influenced by nutrient management x weed management practices at 30 and 90 DAS

Treatment	At 30 DAS				At 90 DAS			
	$N_1$	$N_2$	$N_3$	Mean	$N_1$	$N_2$	$N_3$	Mean
$W_1$	81.53	82.90	83.82	82.75	75.10	81.92	73.92	76.98
$W_2$	69.57	80.38	83.81	77.92	92.65	94.60	95.78	94.34
$W_3$	32.37	70.16	48.99	50.50	82.74	83.59	82.41	82.91
$W_4$	66.06	75.98	72.81	71.62	82.79	82.23	82.31	82.44
$W_5$	40.53	30.27	49.94	40.24	91.37	89.16	89.26	89.93
$W_6$	-	-	-	-	-	-	-	-
Mean	58.01	67.94	67.87		84.93	86.30	84.73	

Table 3 . Yield and economics of maize as influenced by different treatments

Treatment	Grain yield (q/ha)	Fodder yield (q/ha)	MEY (q/ha)	GMR (Rs./ha)	NMR (Rs./ha)	B : C ratio
<b>Nutrient management</b>						
N <sub>1</sub> -50% RDF+50% N through FYM	52.80	64.39	57.73	52682	34032	2.82
N <sub>2</sub> -75% RDF+25% N through FYM	59.17	70.18	65.19	59062	43350	3.76
N <sub>3</sub> - 100% RDF	59.98	71.97	65.09	59350	42576	3.54
LSD (P=0.05)	4.80	5.73	4.77	2800	2801	-
<b>Weed management</b>						
W <sub>1</sub> - Atrazine @ 1 kg a. i./ha PE	66.26	80.13	66.26	62408	46684	3.97
W <sub>2</sub> -Atrazine @ 0.75 kg a. i./ha PE fb 1 HW at 45 DAS	71.18	85.09	71.18		50070	3.98
W <sub>3</sub> - Intercropping of Maize+Soybean (1 : 1)	47.28	56.07	61.68	54390	36991	3.13
W <sub>4</sub> -Intercropping of maize+Soybean(1 : 1)+ Pendimethalin @ 0.75 kg a. i./ha PE	48.22	57.10	63.82		38270	3.06
W <sub>5</sub> - Weed free check	69.71	83.16	69.71	65429	46580	3.47
W <sub>6</sub> - Unweeded check	38.46	47.00	38.46	30322	15323	2.02
LSD (P=0.05)	6.79	8.11	6.75	3960	3961	-
<b>Interaction (N x W)</b>						
SE ±	4.26	5.07	4.22	2478	2479	-
LSD (P=0.05)	NS	NS	NS	NS	NS	-

MEY–Maize equivalent yield, GMR–Gross monetary returns, NMR–Net monetary returns, B : C–Benefit : Cost ratio.  
NS–Not Significant.

maize with increase in nutrient sources. However, application of 75% RDF+25% N through FYM (3.76) recorded higher benefit : cost ratio as compared to application of 100% RDF (3.54) and 50% RDF+50% N through FYM (2.82). Similar findings were also reported by Panwar (2008). The application of atrazine @ 0.75 kg/ha PE fb 1 HW at 45 DAS was on par with the atrazine @ 1 kg/ha PE alone and weed free check and recorded significantly higher monetary returns than rest of all the treatments. The highest benefit : cost ratio was recorded with herbicidal application with or without hand weeding (W<sub>1</sub> and W<sub>2</sub>). Similar results were also reported by Bhopal Singh *et al.* (1991).

It can be concluded from the above findings that the application of 75% RDF+25% N through FYM was found more remunerative and per-emergence application of atrazine @ 0.75 kg/ha fb 1 HW at 45 DAS was found effective to control weeds in maize crop.

## REFERENCES

- Bhopal Singh, C. M. Singh, Manoj Bhargava and R. D. Sood, 1991. Integrated weed control in maize. *Himachal J. agric. Res.* **17** : 8-10.
- Khot, R. B. and M. K. Umrani, 1992. Seed yield and quality parameters of African tall maize as influenced by spacing and level of nitrogen. *Ind. J. Agron.* **37** : 103-104.
- Kolge, A. K., S. H., Shinde and R. L. Bhilare, 2004. Weed management in **kharif** maize. *J. Maharashtra agric. Univ.* **29** : 110-111.
- Lal, S. and R. S. Saini, 1985. Technology for increasing maize production. *Ind. Fmg.* **35** : 5-9.
- Mundra, S. L., A. K. Vyas and P. L. Maliwal, 2003. Effect of weed and nutrient management on weed growth and productivity of maize. *Ind. J. Weed Sci.* **35** : 57-61.
- Panwar, A. S. 2008. Effect of nutrient management in maize (*Zea mays*)-mustard (*Brassica campestris* var. *toria*) cropping system in mid-hills altitude. *Ind. J. agric. Sci.* **78** : 27-31.
- Paradkar, V. K and R. K Sharma, 1993. Integrated weed management in maize. *Ind. J. Weed Sci.* **25** : 81-83.