

## Integrated Weed Management in Maize+Blackgram Intercropping System

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### ABSTRACT

In maize+blackgram intercropping system, application of alachlor at 3 kg ha<sup>-1</sup> fb hand weeding on 30 DAS performed significantly superior to fluchloralin, pendimethalin and twice hand weeding and increased the maize kernel yield by 3.16 times and blackgram grain yield by 3.3 times compared to unweeded control. All the integrated treatments performed significantly superior to twice hand weeding.

### INTRODUCTION

The productivity of maize is constrained predominantly by moisture stress, poor soil fertility and inadequate agronomic management. The wider spacing adopted encourages prolific weed growth and competition with an ultimate decline in yield. The yield reduction ranged from 40-60% or more depending upon the intensity and type of weed flora (Mishra, 1997). Intercropping reduces weed problems but it depends on the crops, planting density, cultural operations, herbicide selectivity and residual toxicity (Palaniappan, 1988). Pulses if intercropped in maize allowed only little space for growth of weeds (Bhuvanewari *et al.*, 2002). Keeping these facts in view, the present study was conducted to evolve a suitable integrated weed management programme for maize intercropping system.

### MATERIALS AND METHODS

Field experiment was conducted with maize intercropped with blackgram during July-October 2003 and 2004 under irrigated conditions at the Experimental Farm, Faculty of Agriculture, Annamalai University. The texture of the soil was clay loam with pH of 7.8 and EC 0.45 dSm<sup>-1</sup>. The available nitrogen, phosphorus and potassium in the soil were 215, 21 and 332.5 kg ha<sup>-1</sup>, respectively. The treatments compared were weedy, twice hand weeded at 15 and 30 DAS and application of

different herbicides each at two doses viz., alachlor at 2 and 3 kg ha<sup>-1</sup>, pendimethalin at 1 and 1.5 kg ha<sup>-1</sup> and fluchloralin at 1 and 1.5 kg ha<sup>-1</sup>. These herbicide treatments were supplemented by one hand weeding on 30 DAS. Hybrid maize-CoH(m)-4 was sown at a spacing of 60 x 25 cm and blackgram (VBN-3) was intercropped at 30 x 10 cm spacing. Alachlor and pendimethalin were sprayed next day of sowing and fluchloralin was sprayed on a dry soil after sowing and was immediately followed by irrigation. Herbicides were sprayed using 500 l ha<sup>-1</sup> of spray fluid and knapsack sprayer fitted with flood jet deflector nozzle with a pressure of 12 psi. The base crop fertilizer schedule of 135 : 62 : 50 kg N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O was adopted with standard cultivation practices.

### RESULTS AND DISCUSSION

#### Effect on Weeds

All the weed control treatments significantly influenced *Echinochloa colona* (L.), *Trianthema portulacastrum* (L.), *Cynodon dactylon* (L.) and *Cleome viscosa* (L.). *Cyperus rotundus* (L.), *Euphorbia hirta* (L.), *Acalypha indica* (L.) and *Phyllanthus niruri* (L.) were not significantly influenced by the treatments (Table 1) as they were sporadic in frequency of occurrence and negligible in density. The weed flora was predominated by annual weeds viz., *E. colona* and *T. portulacastrum*

Table 1. Effect of treatments on weed density (No. m<sup>-2</sup>) at 60 DAS (Average of two seasons)

Treatment	Dose (kg ha <sup>-1</sup> )	<i>E. colona</i>	<i>T. portulacastrum</i>	<i>C. dactylon</i>	<i>C. viscosa</i>	<i>C. rotundus</i>	<i>E. hirta</i>	<i>A. indica</i>	<i>P. niruri</i>
Weedy	-	21.27* (452.5)	15.75 (247.5)	9.79 (95.5)	6.36 (40.0)	3.81 (14.00)	3.81 (14.00)	3.39 (11.00)	2.92 (8.00)
Hand weeding 15 & 30 DAS	-	13.85 (191.50)	11.79 (138.5)	6.74 (45.0)	4.41 (19.0)	3.81 (14.00)	3.39 (11.00)	3.08 (9.00)	1.87 (3.00)
Alachlor fb weeding on 30 DAS	2.0	10.56 (111.0)	8.12 (65.50)	5.70 (32.0)	3.67 (13.00)	2.35 (5.00)	1.87 (3.00)	1.87 (3.00)	0.71 (0.00)
Alachlor fb weeding on 30 DAS	3.0	8.66 (74.5)	7.30 (53.00)	3.67 (13.0)	3.08 (9.00)	2.12 (4.00)	0.71 (0.00)	0.71 (0.00)	2.35 (5.00)
Pendimethalin fb weeding on 30 DAS	1.0	13.52 (182.50)	10.93 (119.00)	6.82 (46.0)	3.80 (14.0)	2.35 (5.00)	2.35 (5.00)	2.55 (6.00)	0.71 (0.00)
Pendimethalin fb weeding on 30 DAS	1.5	12.71 (161.0)	9.89 (97.5)	6.04 (36.0)	3.67 (13.0)	2.55 (6.00)	0.71 (0.00)	0.71 (0.00)	2.12 (4.00)
Fluchloralin fb weeding on 30 DAS	1.0	13.76 (189.0)	10.01 (100.0)	7.65 (58.0)	3.54 (12.0)	0.71 (0.00)	2.12 (4.00)	1.87 (3.00)	1.58 (2.00)
Fluchloralin fb weeding on 30 DAS	1.5	12.68 (160.5)	9.27 (85.5)	6.40 (40.5)	3.39 (11.0)	2.12 (4.00)	2.92 (8.00)	2.12 (4.00)	0.71 (0.00)
LSD (P=0.05)		1.0164	0.6918	0.3815	0.3873	NS	NS	NS	NS

\*Data subjected to square root transformation. Data in parentheses are original values.  
NS-Not Significant.

Table 2. Effect of treatments on weeds, maize kernel yield and blackgram yield (Average of two seasons)

Treatment	Dose (kg ha <sup>-1</sup> )	Weed dry matter at 60 DAS (g m <sup>-2</sup> )	Maize kernel yield (kg ha <sup>-1</sup> )	Blackgram grain yield (kg ha <sup>-1</sup> )
Weedy	-	127.0	1960	189
Hand weeding 15 & 30 DAS	-	58.22	4747	444
Alachlor fb weeding on 30 DAS	2.0	34.46	5501	472
Alachlor fb weeding on 30 DAS	3.0	20.72	6208	567
Pendimethalin fb weeding on 30 DAS	1.0	51.87	5201	497
Pendimethalin fb weeding on 30 DAS	1.5	46.92	5762	521
Fluchloralin fb weeding on 30 DAS	1.0	54.19	5460	528
Fluchloralin fb weeding on 30 DAS	1.5	44.76	5784	538
LSD (P=0.05)		9.29	324.01	43.9

with a relative density of 45.58 and 32.11%, respectively. Alachlor at 3 kg ha<sup>-1</sup> followed by hand weeding resulted in least weed counts and weed dry matter production. All the integrated treatments involving pre-emergence herbicide application supplemented by one hand weeding on 30 DAS performed significantly superior to weedy in reducing weed dry matter production and the reduction recorded ranged from 72.81 to 106.28 g m<sup>-2</sup> at 60 DAS. The high weed count, weed dry matter and least crop yields were recorded in unweeded control.

#### Effect on Yield

Application of alachlor at 3 kg ha<sup>-1</sup> followed by hand weeding excelled all other treatments in increasing the kernel yield (Table 2). This is in conformity with the reports of Pandey and Ved Prakash (2002). Herbicides at lesser doses followed by hand weeding exerted similar influence on kernel yield. Twice hand weeding significantly increased the kernel yield upto 2.42 times than weedy. Blackgram grain yield was increased upto 2.35 to 3.3 times due to various treatments. The highest blackgram grain yield was recorded in alachlor at 3

kg ha<sup>-1</sup> followed by hand weeding and it was comparable with both the doses of fluchloralin followed by hand weeding. Twice hand weeding was found to be on par with alachlor at 2 kg ha<sup>-1</sup> followed by hand weeding. Significant differences between two levels of herbicides in influencing the maize kernel yield and blackgram grain yield were observed in alachlor and pendimethalin applications. In the integrated treatments, longer soil persistence of herbicides like alachlor checked the repeated annual weed seed germination and to some extent, the perennials which resulted in least weed density, weed dry matter and higher crop yields.

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