

## Evaluation of Integrated Weed Management Practices in Rainfed Cotton (*Gossypium hirsutum* L.) at Farmers Fields

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**ABSTRACT:** An on-farm trial was conducted during the kharif season of 2008 and 2009 at farmers fields in Belgaum district of Karnataka to find out suitable integrated method of weed control for rainfed cotton. Pre- and post-emergence application of herbicides along with 2 hand-weedings and 2 hoeings at 20 and 40 days after sowing (DAS) gave effective control of weeds. The highest weed-control efficiency was recorded by pre-emergence application of pendimethalin followed by post-emergence application of glyphosate with 2 hand-weedings and 2 hoeings at 20 and 40 days. Maximum seed-cotton yield (8.54 q/ha) was recorded with 3 hand-weedings and 3 hoeings followed by pre- and post-emergence application of pendimethalin and glyphosate with 2 hand-weedings and 2 hoeings (8.44 q/ha). Maximum benefit:cost ratio (1.34) was recorded with 3 hand-weedings and 3 hoeings treatments. Among integrated weed-management treatments, the post-emergence application of glyphosate with 2 hand-weedings and 2 hoeings recorded more benefit:cost ratio compared to other integrated weed-management treatments.

**Key words:** Cotton, Integrated weed management, Herbicides, Weed-control efficiency, Economics

### INTRODUCTION

Cotton (*Gossypium hirsutum* L.) is an important cash crop cultivated over an area of 95.36 lakh hectare in India in 2009-2008. India covers about 29% of total world cotton area and second largest producer of raw cotton. The productivity of cotton in the country is low as compared to the other cotton growing countries. In cotton, weeds besides nutrients compete for moisture and sunlight, and weeds emerging late in the season are less competitive than those in early season. Balyan *et al.* (1983) and Deshpande *et al.* (1987) reported need of weed-free maintenance of 60-70 days after emergence for better yield in cotton. Looking at the erratic behavior of rains and scarcity of labour, the integrated weed management in cotton has great importance. Cultural methods along with use of herbicides may prove effective in controlling weeds as well as cultural practices for better moisture conservation.

### MATERIALS AND METHODS

An on-farm trial was conducted with cotton variety 'Jayadhar' during the kharif season of 2008 and 2009 at farmers fields in Belgaum district of Karnataka. The experiment was laid out in randomized block design with 3 replications. The treatments were: 1

hand-weeding + 1 hoeing at 30 days after sowing (DAS) (control); 2 hand-weeding + 2 hoeing at 20 and 40 DAS; pre-emergence application of pendimethalin @ 1.0 kg a.i./ha + 1 hand-weeding + 1 hoeing; pre-emergence application of pendimethalin @ 1.0 kg a.i./ha + 2 hand-weeding + 2 hoeings; 1 hand-weeding + 1 hoeing with post-emergence application of glyphosate @ 1.0 kg a.i./ha at 50 DAS; 2 hand-weeding + 2 hoeing with post-emergence application of glyphosate @ 1.0 kg a.i./ha at 50 DAS; 1 pre- and post-emergence application of pendimethalin and glyphosate, respectively, with 1 hand weeding + 1 hoeing; pre-and post-emergence application of pendimethalin and glyphosate, respectively, with 2 hand-weeding + 2 hoeings; and 3 hand-weeding + 3 hoeing at 20, 40 and 60 DAS. The experimental soil was sandy clay loam, low in nitrogen (208.2 kg/ha), medium in phosphorus (28.6 kg/ha) and high in potash (482.0 kg/ha) content. The pH of the soil was 8.1. Cotton variety was sown at 60 cm × 30 cm spacing and recommended dose of fertilizer, i.e. 50 kg N/ha and 25 kg P<sub>2</sub>O<sub>5</sub>/ha, was applied. The observations on weed count, weed dry matter were recorded in 0.5 m<sup>2</sup> area. The yield parameters and yield were recorded and economics was worked out.

**Table 1**  
**Effect of various weed management practices on weed count, weed control efficiency, bolls/plant, yield and economics of cotton.**

Treatments	Weed count at 90 DAS		Weed -control efficiency		Weed dry weight (q/ha) at 90 DAS		Mean bolls/plant	Seed-cotton yield (q/ha)	Net monetary returns (INR/ha)	B:C ratio
	2008	2009	2008	2009	2008	2009				
1 hand-weeding + 1 hoeing at 30DAS	10.73	10.48	--	--	20.73	20.26	7.70	04.76	4855	0.87
2 hand-weeding + 2 hoeing at 20 and 40 DAS	09.03	08.99	19.00	14.20	15.67	13.60	8.90	06.66	7713	1.14
pre-emergence application of pendimethalin @ 1.0 kg a.i./ha + 1 hand-weeding + 1 hoeing	09.27	09.12	13.60	13.00	17.33	15.33	7.80	05.74	5149	0.70
pre-emergence application of pendimethalin @ 1.0 kg a.i./ha + 2hand-weeding + 2hoeings	09.26	09.02	16.90	17.10	16.50	13.80	9.30	07.46	7753	0.91
1 hand-weeding + 1 hoeing with post-emergence application of glyphosate @ 1.0 kg a.i./ha at 50 DAS	08.55	08.35	20.40	20.30	11.13	11.46	8.20	06.40	6986	1.01
2 hand-weeding + 2 hoeing with post-emergence application of glyphosate @ 1.0 kg a.i./ha at 50 DAS	08.29	08.36	22.60	20.50	10.13	10.86	9.50	07.45	8245	1.04
1 pre- and post-emergence application of pendimethalin and glyphosate, respectively, with 1 hand weeding + 1 hoeing	08.53	08.58	20.30	18.20	10.60	10.26	8.90	06.77	6256	0.72
pre- and post-emergence application of pendimethalin and glyphosate, respectively, with 2 hand-weeding + 2 hoeings	07.99	07.95	25.50	24.00	10.00	9.60	11.30	08.44	8633	0.89
3 hand-weeding + 3 hoeing at 20, 40 and 60 DAS	08.51	08.13	20.80	17.10	12.40	10.41	11.60	08.54	10605	1.34
<b>CD (P=0.05)</b>	<b>NS</b>	<b>2.12</b>	<b>--</b>	<b>--</b>	<b>4.13</b>	<b>5.80</b>	<b>3.00</b>	<b>2.14</b>	<b>--</b>	<b>--</b>

## RESULTS AND DISCUSSION

### Weeds

The weed count was less under all weed-management treatments than in 1 hand-weeding + 1 hoeing treatment at 90 days after sowing. The weed biomass was also significantly reduced under weed-management treatments except pendimethalin + 1 hand-weeding + 1 hoeing and 1 hand-weeding + 1 hoeing treatment. The maximum weed control efficiency was recorded in treatment of 2 hand weeding + 2 hoeing with pendimethalin and glyphosate in both the years. Jain and Jain (1980) also reported maximum weed control with pre- and post-emergence application of herbicides. The treatment of 1 hand-weeding + 1 hoeing + glyphosate was next in order recording weed control efficiency. Less dry weed biomass was recorded in treatment of 2 hand-weeding + 2 hoeing + pendimethalin + glyphosate, while 1 weeding + 1 hoeing recorded higher dry weed biomass at 90 days in both the years.

### Cotton

All weed-management treatments recorded more seed-cotton yield than 1 hand-weeding + 1 hoeing treatment (Table 1). The highest seed-cotton yield was recorded by 3 hand-weedings + 3 hoeings, followed by 2 hand weeding + 2 hoeing + pendimethalin + glyphosate in pooled mean, indicating 76.3 and 76.2% increased seed-cotton yield, respectively, over 1 hand-weeding + 1 hoeing treatment. Gomashe *et al.* (1989) also reported the similar results. The least increased seed-cotton yield (19.8%) with 1 hand-weeding + 1 hoeing + pendimethalin over 1 hand-weeding + 1 hoeing treatment (control). Similar trend was noticed in yield-contributing parameters as that of seed-cotton yield/ha.

### Benefit:cost ratio

The benefit : cost ratio was higher with 3 hand-weeding+ 3 hoeing (1.34), followed by 2 hand-

weeding + 2 hoeing (1.14). Wankhede *et al.* (1993) reported more economic returns with 3 hand-weeding and 3 hoeing. Amongst all integrated weed-management treatments, more benefit : cost ratio (1.04) was recorded by the treatment of 2 hand-weeding + 2 hoeing + post-emergence application of glyphosate @ 1.00 kg a.i./ha at 50 days after sowing. The treatment of 3 hand-weeding + 3 hoeing and the treatment of 2 hand-weeding + 2 hoeing with pre- and post- emergence application of herbicides recorded similar seed-cotton yield. Though 3 hand-weeding + 3 hoeing recorded higher seed-cotton yield economically, however, post emergence application of glyphosate along with 2 hand-weeding + 2 hoeings can be recommended on the basis of benefit : cost ratio (1.04) in exceptional cases, where labour availability and wet period are the constraints to carry out timely cultural operation.

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