

## COMPARATIVE EFFICACY OF DIFFERENT PLANTING METHODS AND WEED MANAGEMENT PRACTICES ON SEED COTTON YIELD

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### ABSTRACT

*A field experiment was conducted to assess the effect of different methods and weed management practices on seed cotton yield at Agronomic Research Station, Bahawalpur, Punjab, Pakistan during cotton crop season 2006. The experiment was laid out in Randomized Complete Block Design with three replications. The experiment comprised of six sowing methods viz. Flat sowing by drill and weeding twice, Flat sowing and each row earthing up, Flat sowing and alternate row earthing up, dibbling on both sides of bed at proper moisture regime and weeding twice, dibbling on both sides of bed in dry condition and followed by irrigation and weeding twice and planting in flat and mulching up. Cotton variety CIM-534 was planted during 1<sup>st</sup> week of June, 2006. Pendimethalin @3.75 L ha<sup>-1</sup> was applied as pre-emergence herbicide to all the treatments. Flat sowing by drill and every row earthing up proved to be the best sowing method by giving maximum seed cotton yield of 3542 kg ha<sup>-1</sup> with minimum weed density of only 12 plants m<sup>-2</sup> and biomass of 10 g m<sup>-2</sup> followed by dibbling on flat and mulching by giving 3209 kg ha<sup>-1</sup> with weed density of 15 plant m<sup>-2</sup> and biomass of 18 g m<sup>-2</sup> and flat sowing by drill and alternate row earthing up giving the same seed cotton yield with 16 weed plants m<sup>-2</sup> and biomass of 20 g m<sup>-2</sup>. While the lowest seed cotton yield 2792 kg ha<sup>-1</sup> was recorded in dibbling on both sides of bed at proper moisture regime with weed density of 55 plant m<sup>-2</sup> and biomass of 84.7 g m<sup>-2</sup>.*

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## INTRODUCTION

Weeds are a serious menace in crop production, reducing yield and quality of crops, harboring insects and disease organisms, impairing human health, damaging irrigation systems and depreciating land values. They compete with crops mainly for light, nutrients, water and carbon dioxide (Anderson, 1983). The damage caused by weeds through the loss of nutrients and water is major cause of concern to the growers. Schwerzel and Thomas (1971) observed that weeds consumed three to four times more nitrogen, potassium and magnesium than a weed free crop. They also noted that weeds removed more moisture from the soil than the cotton plants.

Shad (1987) stated that cotton, being a crop of irrigated areas, is severely infested by almost all type of Kharif weeds. Among 10 most important weeds commonly observed in Pakistan, *Cynodon dactylon* L. is a serious threat to our National Agriculture after *Trianthema portulacastrum* L. While, *Dactyloctenium aegyptium* L. is the fourth major weed causing yield losses to the crops. Panwar *et al.* (2001) evaluated trifluralin, pendimethalin, acetachlor, fluzafop-p-butyl and pysithiobac in combination with manual weeding in cotton. Application of pendimethalin and trifluralin at 1000 g ha<sup>-1</sup> and pyrithiobac at 100 g ha<sup>-1</sup> reduced the weed population significantly over the weed control. One hoeing at 45 days after sowing followed by 1500 g acetochlor ha<sup>-1</sup> was the most effective in controlling the weeds and recorded significantly higher seed cotton yield than the weedy control. Hiremath and Rao (2001) evaluated the effect of weed management in irrigated hybrid cotton and found the diuron + manual weed control, inter-cultivation, standard farmer's practice and diuron followed by glufosinate @ 0.525 kg ha<sup>-1</sup> applied after 20 or 40 days of sowing producing similar seed cotton yields to the weed-free control. Askew *et al.* (2002) conducted field trial and reported that weeds were controlled and yield was increased by the application of herbicides at different levels. The pre-sowing and pre-emergence herbicides are not effective against all weeds, whereas, post-emergence herbicide can control weeds but it needs proper time and skill. The combination of pre and post emergence herbicides are required to be integrated for effective weed control and increased in seed cotton yield. Ali *et al.* (2005) reported that maximum increase of 199.4% in seed cotton yield was obtained with Stomp 330E in combination with interculturing plus hand weeding while Round-up 490 G/L @ 4.7 L ha<sup>-1</sup> with 188.9% should increase over untreated check. Stomp 330E in combination with inter-culturing + hand weeding gave 90% broad leaf weeds (BLW) and 89% narrow leaf or grassy weeds (NLW) control, respectively, while

Round-up 490 G/L (directed spray) in combination with inter-culturing + hand weeding provided 93% control of BLW and 80% of NLW over untreated check. Keeping in view the importance of weeds in cotton, a field experiment was conducted to assess the effect of different methods and weed management practices on seed cotton yield.

## MATERIALS AND METHODS

A field experiment was conducted to assess the effect of different methods and weed management practices on seed cotton yield at research area of Agronomic Research Station, Bahawalpur, Punjab, Pakistan during crop season 2006. The experiment was laid out in Randomized Complete Block Design with three replications. The experiment comprised of six sowing methods viz. Flat sowing by drill and weeding twice, Flat sowing and each row earthing up, Flat sowing and alternate row earthing up, dibbling on both sides of bed at proper moisture regime and weeding twice, dibbling on both sides of bed in dry condition and followed by irrigation and weeding twice and planting in flat and mulching up. Cotton variety CIM-534 was planted in 75cm apart rows on flat as well as on bed by maintaining plant spacing 22.5cm between them. Plot size was kept 3 x 8m<sup>2</sup>, sowing of the trial was done during the 1st week of June, 2006. Pendimethalin @3.75 L ha<sup>-1</sup> was applied as pre-emergence herbicide to all the treatments. A fertilizer dose of 120-60-60 Kg NPK ha<sup>-1</sup> was applied. All PK and 1/3 Nitrogen was applied at sowing while remaining 2/3 Nitrogen was applied in two equal splits at flowering and boll formation. The planning of the treatment was based on the use of pre-emergence herbicide, earthing up by ridger, hand weeding (hoeing with *Khurpa*) and plastic mulching. Irrigations were applied in different methods according to the need of the crop, double irrigation were applied in bed & furrow method of planting at short intervals as compared to flat planting, however, delta of water was kept uniform. Data were recorded on weed density (m<sup>-2</sup>), weed biomass (g m<sup>-2</sup>), No. of bolls plant<sup>-1</sup>, 100-boll weight (g) and seed cotton yield (kg ha<sup>-1</sup>) and subsequently subjected to ANOVA technique. The significant means were separated using LSD test to determine the efficacy for different treatments (Steel and Torrie, 1980).

## RESULTS AND DISCUSSIONS

### Relative weed density (%)

The data given in Table-1 showed that experimental area was infested with three different types of weeds such as broad leaf weeds, grasses and sedges. Broad leaf weeds comprising six species was the dominant group with 54% mean population followed by grasses occupying 31%. The lowest infestation of 15% was that of sedges comprising a single species viz. *Cyperus rotundus*. Among all the species *Trianthema portulacastrum* L with 40% density was the most serious weed infesting the trial. Similar diversity of weeds is found in the core cotton area of Punjab, Pakistan (Shad, 1987).

**Table-1. Relative weed density (%) of different weed species and groups.**

<b>I. BROAD LEAF WEEDS</b>				
<b>S.No.</b>	<b>Common Name</b>	<b>Local Name</b>	<b>Botanical Name</b>	<b>Infestation (%)</b>
1	Horse purslane	Itsit	<i>Trianthema portulacastrum</i>	40
2	False amaranth	Tandla	<i>Digera arvensis</i>	5
3	Pigweed	Jungli cholai	<i>Amaranthus viridis</i>	1
4	Wild melon	Chibber	<i>Cucumis prophetarum</i>	5
5	Common purslane	Qulfa	<i>Portulaca oleracea</i>	1
6	Puncture vine	Bhakhra	<i>Tribulus terrestris</i>	2
<b>Total</b>				<b>54</b>
<b>II. GRASSES</b>				
7	Bermuda grass	Khabbal ghas	<i>Cynodon dactylon</i>	1
8	Crow foot grass	Madhana	<i>Dactyloctenium aegyptium</i>	15
9	Jungli rice	Swanki	<i>Echinochloa colona</i>	15
<b>Total</b>				<b>31</b>
<b>III. SEDGES</b>				
10	Purple nutsedge	Deela	<i>Cyperus rotundus</i>	15

The data on weed density and weed biomass  $m^{-2}$  (Table-2) revealed that all the planting methods and weed control practices included in the trial significantly reduced the weed density as well as weed biomass  $T_2$ ,  $T_3$  and  $T_6$ , remained at par with minimum weed density of 12, 16 and 15 weeds  $m^{-2}$ , respectively and weed biomass of 10, 20 and 18 g  $m^{-2}$ , respectively while maximum weed density and weed biomass was in cotton planted by bed and furrow method by dibbling in moist and dry conditions followed by irrigation in

Treatments 4 and 5 because of frequent irrigation at short intervals which enhanced the infestation of weeds and ultimately poor seed cotton yield.

**Table-2. Weed Density / Biomass  $m^{-2}$  as affected by different planting method and weed control practices.**

Treatments		Weed Density ( $m^{-2}$ )	Weed Biomass $g(m^{-2})$
T <sub>1</sub>	Flat sowing by drill and weeding twice	43b	86.3a
T <sub>2</sub>	Flat sowing and each row earthing up	12c	10.0b
T <sub>3</sub>	Flat sowing and alternate row earthing up	16c	20.0 b
T <sub>4</sub>	Dibbling on both sides of bed in proper moisture condition and weeding twice	55a	84.7a
T <sub>5</sub>	Dibbling on both sides of bed in dry condition and followed by irrigation and weeding twice	52a	84.3a
T <sub>6</sub>	Planting in flat and mulching up	15c	18b
LSD <sub>0.05</sub>		8.15	19.58

#### Seed cotton yield and yield components

Data given in Table-3 revealed that different planting methods and weed control practices were significantly different to influence the different agronomic parameters of cotton. Flat sowing by drill and every row earthing up proved to be the best sowing method by giving maximum seed cotton yield of 3542 kg ha<sup>-1</sup> with 37 bolls plant<sup>-1</sup> and 322g 100-boll weight followed by dibbling on flat and mulching up by giving 3209 kg ha<sup>-1</sup> with 33 bolls plant<sup>-1</sup> and 308 g 100-boll weight and flat sowing by drill and alternate row earthing up by giving the same seed cotton yield with 33 bolls plant<sup>-1</sup> and 314g 100-boll weight. While, the lowest seed cotton yield of only 2792 kg ha<sup>-1</sup> with 31 bolls plant<sup>-1</sup> and 299g 100-boll weight was recorded in dibbling on both sides of bed at proper moisture regime. These findings are in a great agreement with the work of Panwar *et al.* (2001) who reported the efficacy of pendimethline for controlling weeds in cotton. The findings of Hiremath and Rao (2001) and Ali *et al.* (2005) further support our conclusions.

**Table-3. Seed cotton yield and yield components as affected by different planting methods and weed control practices.**

Treatments		No. of Bolls Plant <sup>-1</sup>	100-Boll Weight (g)	Yield kg ha <sup>-1</sup>
T <sub>1</sub>	Flat sowing by drill and weeding twice	32ab	307bc	2917b
T <sub>2</sub>	Flat sowing and each row earthing up	37a	322a	3542a
T <sub>3</sub>	Flat sowing and alternate row earthing up	33ab	314ab	3209ab
T <sub>4</sub>	Dibbling on both sides of bed in proper moisture condition and weeding twice	31b	299c	2792b
T <sub>5</sub>	Dibbling on both sides of bed in dry condition and followed by irrigation and weeding twice	29b	300c	2800b
T <sub>6</sub>	Planting in flat and mulching up	33b	308bc	3209ab
	LSD <sub>0.05</sub>	4.74	11.64	425

**CONCLUSIONS**

It was concluded from the study that pendimethalin 330E @ 3.75 L ha<sup>-1</sup> effectively controlled most of the broad leaf weeds when applied as pre-emergence herbicide in all the methods of planting. Flat sowing by drill and each row earthing up proved to be the best method for the control of weeds and produced maximum seed cotton yield, No. of bolls plant<sup>-1</sup> and 100-boll weight followed by flat sowing by drill and alternate earthing up and dibbling in flat and mulching up while dibbling on both sides of the bed in moist as well as in dry conditions followed by irrigation and weeding twice has given the minimum seed cotton yield, No. of bolls plant<sup>-1</sup> and 100-boll weight due to maximum weed infestation on account of frequent irrigations which enhance the emergence and growth of all types of weeds.

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