

## EFFICACY OF PRE AND POST-EMERGENCE HERBICIDES IN COTTON

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### ABSTRACT

An experiment was conducted to figure out the efficacy of different pre and post emergence herbicides in cotton. The experiment was laid out in randomized complete block design with four replications during 1999 and 2000. The data reveal that Dual Gold 960 E.C@ 2.5 L ha<sup>-1</sup> exhibited a maximum efficacy of 93.81%, for controlling weeds in the year 1999 and 95.04% in 2000, and consequently produced the highest seed cotton yields of 2395.83 and 2312 kg ha<sup>-1</sup>, respectively during the either yea of studies. Hence, the product Dual Gold @ 2.5 L ha<sup>-1</sup> is recommended against the broad leaved and grassy weeds in cotton crop.

**Key words:** Dual gold, S-metolachlor, Pre-emergence, seed cotton, *G. hirsutum*.

### INTRODUCTION

Cotton (*Gossypium hirsutum* L.) is an important cash crop of Pakistan and known as "Silver Fiber" covering an area of about 2699 thousands hectares with an annual production of 10,092, thousand bales. In Sindh province the total area during 2003 was 561.4 thousand hectares with a production of 2242.8 thousand bales (Anonymous, 2004).

Cotton crop brings cash return to farmers, supplies raw material to the textile industry and provides employment to thousands workers, both in rural and urban areas. Cotton feeds 1035 ginneries and about 5000 oil expelling units in the country, which produce 400,000 tons of edible oil. Cottonseed and cotton cake is also fed to milch cattle. Cotton and its products together makeup about two third of the country's export revenue (Anonymous, 2004). This crop suffers losses, due to high infestation of insects pests and also with the presence of weeds. Weeds; the un-wanted plants, which compete with the crop plants for nutrients, moisture, light, gases and space, also harbor insects and disease organisms (Anderson, 1983).

The cotton crop needs weed management in the early stages of growth. Weed control in cotton from planting upto 8 weeks after sowing may increase seed cotton yield from 30-40 percent. Tunio (2000) observed that weeds may be minimized in their population and losses through better weed control methods. Brar *et al.* (1998) reported that the weed control treatments, which resulted in a significant reduction in weed number as compared to control.

Hayee *et al.* (1983), observed that chemical and cultural weed control was effective in controlling weeds in cotton crop. They reported that hand weeding and chemical weed control methods lead to best control methods for obtaining highest yields in cotton crop. Ehsanullah, *et al.* (1995) stated that the hand weeding produced highest seed cotton yield over weedy check. Seed cotton yield is also increased by herbicidal

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application. Tunio, et al. (2003) reported that the application of herbicides Dual Gold 960 EC and Stomp 455 g/l C.S, as pre-emergence spray was effective weed control method for cotton alongwith hand weeding.

The present study was therefore undertaken to determine the efficacy of different herbicides as pre and post-emergence, for controlling the weeds and their effect on seed cotton yield of cotton crop in Sindh.

## MATERIALS AND METHODS

The study was conducted to evaluate the efficacy of pre and post emergence herbicides in cotton crop, at the experimental field of Plant Physiology Section, Agricultural Research Institute, Tandojam, Sindh, during kharif 1999 and 2000. The experiment was laid out in Randomized Complete Block Design with four replications and four treatments, having a plot size of 10x12 m<sup>2</sup>. The soil was loamy type, the general weather conditions were normal, the wind velocity was observed as less than 8 mph. The land was prepared by two dry plowings followed by land leveling. The soaking irrigation was applied and when soil came into *wattar* condition two plowings with Rotavator plow were applied to achieve fine seedbed. Soaked seed of variety NIAB-78 were sown with a single coulter hand drill with rows 75 cm apart at a seed rate of 20 kg ha<sup>-1</sup>. The herbicides Dual Gold 960 E.C at 2 L ha<sup>-1</sup> and 2.5 L ha<sup>-1</sup> and Stomp-330 E at the rate of 3.125 L ha<sup>-1</sup> were applied at pre-emergence after drilling has been completed and herbicides were sprayed and incorporated into the top 4 inch layer of soil with the help of a spade. The treatments included in the studied were Dual Gold 960 E.C at 2 L ha<sup>-1</sup> and 2.5 L ha<sup>-1</sup> and Stomp-330 E at the rate of 3.125 L ha<sup>-1</sup> and Control (Un treated).

The other agronomic practices were followed according to general recommendations. The recommended fertilizer dose of 170-100-0 NPK kg ha<sup>-1</sup> was applied to maintain balance of nutrients in the soil. The data on weed flora and their species m<sup>2</sup> and seed cotton yield in kg ha<sup>-1</sup> were recorded and subjected to statistical analysis by the procedure as suggested by Steel and Torrie (1984).

## RESULTS AND DISCUSSION

### Weed diversity and Infestation (%)

The data on weed diversity and their infestation % are presented in Table-1. Results reveal that on an average of both years, grassy weed *Echinochloa colonum* was found at 20.5%, *Cyperus rotundus* to the extent of 16.5%, and *Digera arvensis* at 15.5% respectively, whereas a minimum infestation % was that of the broad leaved weeds *Tribulus terrestris* 9% and *Trianthema monogyna* at 10% relative density. Bhatti and Soomro (1996) reported about 23 different weed species which compete with cotton crop.

### Mean Weed density m<sup>-2</sup> and Weed Control%

The data for average weed density m<sup>-2</sup> and weed control % of herbicides applied are presented in Table-2(A) and 2(B). The data reveal that on the average *T. monogyna* had the maximum density of 5.87 m<sup>-2</sup> in Stomp 330 E followed by Dual Gold 960 E.C at both doses, which is 3.37 m<sup>-2</sup>. *D. arvensis* occurred at a density of 6.5 and 3.5 in Stomp 330 E.C and Dual Gold 960, respectively. Stomp-330 E.C showed a lesser control of *C. rotundus* and had a number of 48.12 weeds m<sup>-2</sup>, whereas the total weeds m<sup>-2</sup> were 327.37 in the control treatment under Stomp-330 E. The minimum number (18.37) of weeds were recorded in Dual Gold960 E.C at 2.5 L ha<sup>-1</sup> followed by 23.25 in the Dual Gold 960 E.C at 2 L ha<sup>-1</sup>.

On an average of both years, highest weed control % 94.43 was recorded with the application of Dual Gold960 E.C at 2.5 L ha<sup>-1</sup> followed by Dual Gold960 E.C at 2 L ha<sup>-1</sup> and Stomp330 E.C at 3.125 L ha<sup>-1</sup>, with a control of 92.95 and 72.06%, respectively. Present findings are in accordance with the findings of Hayee, *et al.* (1983), Brar, *et al.* (1998) and Tunio, *et al.* (2003).

### Seed Cotton Yield (kg ha<sup>-1</sup>)

The data for seed cotton yield (kg ha<sup>-1</sup>) are presented in Table-3. The data indicated that highest yield of 2395.83 kg ha<sup>-1</sup> was obtained by the application of Dual Gold960 E.C at 2.5 L ha<sup>-1</sup> in the year 1999 followed by 2354.16 kg ha<sup>-1</sup> by Dual Gold960 E.C at 2 L ha<sup>-1</sup>, which were 41.97 and 39.51 % higher than the untreated check.

On an average of both the years Dual Gold960 E.C at 2.5 L ha<sup>-1</sup> gave maximum yield of 2354.16 kg ha<sup>-1</sup> as compared to Dual Gold960 E.C at 2 L ha<sup>-1</sup> and Stomp330 E at 3.125 L ha<sup>-1</sup>, which yielded 2305.08 and 1906.62 kg ha<sup>-1</sup>, respectively. Their yield was also 19.45 and 15.43 % higher as compared to the untreated check. Increase in seed cotton yield by herbicidal application had also been reported by Ehsanullah, *et al.* (1995).

Conclusively, it has been observed from the present results that product Dual Gold-960 E.C at the dose of 2.5 L ha<sup>-1</sup> showed better control of grassy and broad leaved weeds in cotton crop than the other products under test.

**Table 1. Weed flora present in cotton with infestation % during Kharif 1999 and 2000.**

Local Name	English Name	Botanical Name	Infestation Percent		
			1999	2000	Mean
<b>GRASSES AND SEDGES</b>					
Kabah	Purple nutsedge	<i>Cyperus rotundus</i>	20	13	16.5
Mandhano	Crowfoot grass	<i>Dactyloctenium aegyptium</i>	15	14	14.5
Sawari	Jungle rice	<i>Echinochloa colonum</i>	23	18	20.5
<b>BROADLEAF</b>					
Lunak	Purslane	<i>Portulaca oleracea</i>	12	16	14
Bhurt	Puncutre vine	<i>Tribulus terrestris</i>	10	8	9
Waho (Itsit)	Carpet weed	<i>Trianthema monogyna</i>	9	11	10
Lulur	Kanjero	<i>Digera arvensis</i>	11	20	15.5

Table-2 (A). Mean weed density  $m^{-2}$  in different treatments under different herbicidal doses and their weed control efficacy

Treatments	Mean weed density $m^{-2}$											
	<i>Trianthema monogyna</i>			<i>Digera arvensis</i>			<i>Echinochloa colonum</i>			<i>Cyperus rotundus</i>		
	1999	2000	Mean	1999	2000	Mean	1999	2000	Mean	1999	2000	Mean
Dual Gold 960 EC @ 2 L ha <sup>-1</sup>	3.5	1.75	3.37	4	3	3.5	4.25	3.25	3.75	3.75	3.00	3.37
Dual Gold 960 EC @ 2.5 L ha <sup>-1</sup>	2.75	1.25	3.37	3.25	2.25	2.75	3.5	2.5	3.0	3.25	2.25	2.75
Stomp 330 E @ 3.125 L ha <sup>-1</sup>	8.25	3.5	5.87	7.75	5.25	6.5	8	6.75	7.37	51	45.25	48.12
Control (Un treated)	36.75	33.5	35.12	42.75	59.25	51	74.25	58.25	66.25	61	34	47.5
Cd-I	2.588	3.298	-	3.49	1.829	-	2.866	2.795	-	6.41	4.419	-
Cd-II	3.546	4.519	-	4.782	2.506	-	3.927	3.83	-	8.783	6.055	-

Table-2(B). Mean weed density  $m^{-2}$  in different treatments for weed control efficacy %.

Treatments	Mean weed species $m^{-2}$														
	<i>Tribulus terrestris</i>			<i>Dactyloctenium aegyptium</i>			<i>Portulaca olerccae</i>			Total weeds $m^{-2}$			Total weed control %		
	1999	2000	Mean	1999	2000	Mean	1999	2000	Mean	1999	2000	Mean	1999	2000	Mean
Dual Gold 960 EC @ 2 L ha <sup>-1</sup>	3.75	2	2.87	5	2.75	3.87	3	3.5	3.25	27.25	19.25	23.25	92.15	93.74	92.95
Dual Gold 960 EC @ 2.5 L ha <sup>-1</sup>	2.75	1.75	2.25	4	2.25	3.12	2	3	2.5	21.5	15.25	18.37	93.81	95.04	94.43
Stomp 330 E @ 3.125 L ha <sup>-1</sup>	8.75	5	6.87	12.5	8.25	10.37	5.5	7.75	6.62	101.75	81.75	91.75	70.70	73.41	72.06
Control (Un treated)	38.25	21	29.62	50	46.25	48.12	44.25	55.25	49.75	347.25	307.5	327.37	-	-	-
Cd-I	2.815	1.492	-	2.753	2.578	-	3.182	2.95	-	-	-	-	-	-	-
Cd-II	3.857	2.043	-	3.771	3.532	-	4.359	4.042	-	-	-	-	-	-	-

**Table-3. Effect of different doses of herbicides on Seed cotton yield and yield increase over the untreated check**

Treatments	Yield kg ha <sup>-1</sup>			Yield increase over control		
	1999	2000	Mean	1999	2000	Mean
Dual Gold 960 EC @ 2 L ha <sup>-1</sup>	2354.16	2250.0	2305.08	39.51	39.39	39.45
Dual Gold 960 EC @ 2.5 L ha <sup>-1</sup>	2395.83	2312.5	2354.16	41.97	43.26	42.62
Stomp 330 EC @ 3.125 L ha <sup>-1</sup>	1979.16	1833.33	1906.62	17.28	13.58	15.43
Control (Un treated)	1687.5	1614.16	1650.82	-	-	-
Cd-I	1.935	2.347	-	-	-	-
Cd-II	2.651	3.215	-	-	-	-

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