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HERBICIDES EVALUATION FOR WEED CONTROL IN CHICKPEA

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ABSTRACT

To study the effect of various herbicides for weed control in chickpea, an experiment was conducted at Agricultural Research Station Ahmadwala, Karak, during Rabi season 2004–05. The experiment was laid out in randomized complete block (RCB) design with split plot arrangement having three replications. Two row spacings of 30 and 45 cm were arranged in main plots while five herbicides, hand weeding and a weedy control were assigned to subplots. The plot size of each sub-plot was kept at 7.2 m^2. The herbicides were metribuzin @ 1.92 kg, pendimethalin @ 1.32 kg and s-metolachlor @ 0.35 kg a.i ha^{-1} applied as pre-emergence. The post emergence herbicides were clodinafop-propargyl @ 0.05 kg and fenoxaprop-p-ethyl @ 0.75 kg a.i ha^{-1}. The data were recorded on wild onion (Asphodelus tenuifolius.) density m^{-2} and grain yield (kg ha^{-1}). Hand weeded treatment was the best having no wild onion weeds m^{-2} as compared to 7.00 wild onion weeds m^{-2} in the weedy control. Similarly, maximum grain yield (1297 kg ha^{-1}) was also recorded in hand weeding plots followed by pendimethalin treated plots (1136 kg ha^{-1}) as compared to only 423 kg ha^{-1} in weedy control plot.

Key words: Herbicides, chemical control, chickpea, wild onion.

INTRODUCTION

Chickpea has been characterized into two main categories primarily on seed characteristics: the 'desi' types, with relatively small, angular seeds with rough, usually yellow to dark brown testa; and the 'kabuli' types, which have larger more rounded and creamed colored seeds. The desi-types constitute about 85% of annual world production and are confined entirely to the Indian sub-continent, Ethiopia, Mexico and Iran. The kabuli-types comprise only a minor area and production, but account entirely for the crops of Europe and the America, except Mexico. Other categories are the 'gulabi' (pea shaped) types of central India and green-seeded desi-types of central and northwestern India. In Pakistan during 2003-04, chickpea was grown on area of 982.3 thousands ha with a production of 611.1 thousand tons with average yield of 622 kg ha^{-1} (Anonymous, 2004). Chickpea is traditionally cultivated in arid sandy areas of NWFP but recently its production has declined as chickpeas have been replaced by the rapid expansion of irrigated areas and the introduction of modern productive cultivars of wheat.

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The weed competition in addition to other production constraints strongly contributes in the yield reduction of chickpea. The chickpea yields in Pakistan are lower than the potentials of the cultivars. As chickpea is traditionally grown on residual soil moisture, therefore, weeds competition poses major problem.

In commercial practice, the cultivation of preceding rainy-season fallows not only helps to capture and conserve moisture but also reduces weed infestations. Potential yield losses in chickpea due to weeds range between 22 to 100%. Hand weeding at thirty and again at sixty days after sowing essentially eliminates the adverse effect of weed competition (Thakar *et al.* 1995). When properly used, pre-emergence herbicides accomplish effective and economic weed control, and consequently chickpea seed yields as similar to or only lightly smaller than those of weed free treatments are resulted (Hassan *et al.*, 2003). Bhalla *et al.* (1998) reported that herbicide treatment gave 50 to 64% weed control with an increase in yield. Weed growth was significantly reduced by the use of herbicides and resulted in 50% increase in yield against the control (Hosseini *et al.* 1997).

The experiment was designed with the objectives to investigate the efficacy of different herbicides for weed control and their effects on the yield of the chickpea crop.

MATERIALS AND METHODS

The experiment was conducted at Agricultural Research Station, Ahmadwala, Karak, NWFP during the rabi season 2004-05. It was laid out in randomized complete block design with a split plot arrangement, replicated three times. Row spacing (Factor A) was arranged in main plots and herbicides (Factor B) in the subplots. The sub-plot size was kept as 7.2 m^2. Standard agronomic practices were followed during the sowing stage and later on.

Table-1. List of the Treatments

Treatment No.	Herbicides (Trade names)	Row-Row distance-1 Row-Row distance-2	Common names of herbicides	Time of application	Rate (kg a.i. ha^{-1})
1.	Sencor 70 WP	30 cm	metribuzin	(Pre-emergence)	1.92
2.		45cm			
3.	Stomp 330 EC	30 cm	Pendimethalin	(Pre-emergence)	1.32
4.		45cm			
5.	Dual gold 960 EC	30 cm	s-metolachor	(Pre-emergence)	0.35
6.		45cm			
7.	Topik 15 WP	30cm	clodinafop-proparagyl	(Post-emergence)	
8.		45cm			0.05
9.	Puma super 75EW	30cm	fenoxaprop-p-ethyl	(Post-emergence)	0.75
10.		45cm			
11.	Hand weeding	30cm	---	---	---
12.		45cm			
13.	Weedy control	30cm	---	---	---
14.		45cm			

Data were recorded on wild onion (*Asphodelus tenuifolius*) density m^{-2} and grain yield (kg ha^{-1}). The data collected were subjected to statistical analysis and the treatment means were separated by least significance difference (LSD) test (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Wild onion (*Asphodelus tenuifolius*) density m^{-2}

The analysis of the data indicated that wild onion density m^{-2} was non-significantly affected by the row spacings as well as herbicides. The maximum numerical wild onion population (6.83 m^{-2}) was recorded in the weedy check and minimum wild onion density (0.00 m^{-2}) was recorded both in the hand weeding and Dual Gold 960 EC (Table-2). The other pre-emergence herbicides were comparatively better than the post emergence herbicides in control of the wild onions in chickpea. Thakar *et al.* (1995) and Balyan and Malik (1996) reported similar results.

Table-2. Wild onion density m^{-2} as affected by different row spacings and herbcides in chickpea.

Herbicides	Row-Row distance		Herbicide means
	30 cm	45 cm	
Sencor 70 WP	0.33	2.00	1.17
Stomp 330 EC	4.00	1.33	2.67
Dual gold 960 EC	0.00	0.00	0.00
Topik 15 WP	6.33	0.33	3.33
Puma super 75EW	0.00	0.67	0.33
Hand weeding	0.00	0.00	0.00
Weedy check (control)	7.00	6.67	6.83
R-R distance means	2.54	1.57	

Grain yield (kg ha^{-1})

The analysis of variance of the data revealed that different herbicidal treatments and hand weeding had significant ($P<0.05$) effect on grain yield in chickpea. The data in Table 2 indicated that maximum grain yield (1297 kg ha^{-1}) was recorded in hand weeded treatments followed by Stomp 330 EC (1136 kg ha^{-1}) as compared to the weedy check (423 kg ha^{-1}). The highest yield in hand weeding was probably due to maximum weed control and thus the crop efficiently utilized the available resources. These results are in conformity with those reported by Iqbal *et al.* (1991) and Marwat *et al.* 2003.

CONCLUSION

From this study it is concluded that the hand weeded treatment was the best in the control of wild onion population and for increasing grain yield (1297 kg ha^{-1}). All the herbicidal treatments were statistically at par with each other. But Stomp 330 EC (pendimethalin) @ 1.32 kg ha^{-1} as pre-emergence exhibited the best performance among all the herbicidal treatments in increasing the grain yield (1136 kg ha^{-1}) followed by Dual Gold 960 EC (s-metolachlor) as pre-emergence with grain yield of (940 kg ha^{-1}) as compared to the weedy control having 423 kg ha^{-1} grain yield. It is, however suggested that the best herbicide is better than hand weeding because it was less laborious, economical and convenient.

Table-3. Grain yield (kg ha^{-1}) as affected by different row spacings and herbicides in chickpea

Herbicides	Row-Row distance		Herbicide means
	30 cm	45 cm	
Sencor 70 WP	592	648	620 d
Stomp 330 EC	1274	997	1136 b
Dual gold 960 EC	1029	851	940 c
Topik 15 WP	996	848	922 c
Puma super 75EW	756	616	686 d
Hand weeding	1262	1332	1297 a*
Weedy check (control)	504	342	423 e
R-R distance means	917	805	

$LSD_{0.05}$ for herbicides = 109

* Means sharing a letter in common in the respective category do not differ significantly by least significant difference test at 5% level of probability.

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