Pak J. Weed Sci. Res. 12(4): 293-298, 2006

EFFICACY OF DIFFERENT HERBICIDES FOR CONTROLLING NOXIOUS WEED IN CHICKPEA IN DISTRICT KARAK

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ABSTRACT

To study the effect of different herbicides for controlling noxious weeds in Chickpea in District Karak, an experiment was conducted at farmer field in District Karak, NWFP, during Rabi 2004–05, using RCB design having three replications. The experiment comprised of nine herbicides and a weedy check weeding treatment. The herbicides included in the experiment, were Guel gold @ 5.31 kg a.i ha^{-1}, Isoproturon (pre) @ 4.5 kg a.i ha^{-1}, Isoproturon (post) @ 4.5 kg a.i ha^{-1}, Stomp (pre) @ 3.7 kg a.i ha^{-1}, Stomp (post) @ 3.7 kg a.i ha^{-1}, Sencor (pre) @ 2.45 kg a.i ha 1. Sencor (post) @ 2.45 kg a.i ha 1, Puma super @ 1.87 kg a.i ha^{-1}, Topik @ 0.16 kg a.i ha^{-1}. The data were recorded on weed density m^{-2}, number of branches plant^{-1}, seed pod^{-1}, plant height, number of pods plant^{-1}, biological yield (kg ha^{-1}), 100-grains weight (g) and grains yield (kg ha^{-1}). For controlling weeds, Puma super 75 EW proved to be the best, giving only 20.70 weeds m^{-2} as compared to 31.23 weeds m^{-2} in weedy check plots. Similarly, maximum grains yield (1.077 kg ha^{-1}), 100 grains weight (58.33 g) were recorded in Puma super 75 EW plots followed by Topik produced highest yield (0.8767 kg ha^{-1}).All the herbicides were equally effective against grassy and broadleaf weeds in chickpea except Asphodelus tenuifolius, which are permanent threat to this area.

Key words: Chickpea weed control, herbicides, weed diversity, weed density..

INTRODUCTION

Chickpea is one of the pulse crops that provide a major source of protein in the diet of man. It is traditionally cultivated in arid sandy areas of NWFP but recently its production has declined as chickpeas have been displaced by the rapid expansion of irrigated areas and the introduction of modern productive cultivars of wheat. Two main categories of chickpea are distinguished, based primarily on seed characteristics: the 'desi' types, having 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 2002-03, chickpea was grown on area of 963 thousands ha with a production of 675.2 thousand tons (Anonymous, 2003).

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The Chickpea yields in Pakistan are lower than the maximum potential of the cultivars which could mainly be attributed to the weed competition in addition to other production constraints. Although chickpea is traditionally grown on residual soil moisture, therefore, weeds competition poses major problem. Common weed species include *Chenopodium album, Asphodelus tenuifolius, Argemone mexicana. Carthamus oxyacantha. Cenchrus ciliaris, Cyperus rotundus, Fumaria* sp. *Polygonum sp., Lathyrus spp. Vicia sativa, Cynodon dactylon* and *Cirsium arvense* (Mullen *et al.*, 2000; Saxena and Yadav, 1976).

Hand weeding at thirty and again at sixty days after sowing essentially eliminates the adverse effect of weed competition (Saxena, 1980). In commercial practice, the cultivation of preceding rainy-season fallows not only helps to capture and conserve moisture but also reduces weed infestations. On black soils, on the wetter areas of central India, "haveli" cultivation (the practice of containing water by bunding in the rainy season) serves similar purposes. Inter-row cultivation by tractor or animal-drawn implements is common, facilitated in North Africa by sowing the crop in very wide rows. When properly used, pre-emergence herbicides such as Prometryne, Tervutryne, Pronamide, Cyanazine and Methabenz-thiazuron accomplish effective and economic weed control, accompanied by chickpea seed yields similar to or only lightly smaller than those of weed free treatments (Sheldrake *et al.*, 1997)

Potential yield losses in chickpea due to weeds range between 22-100% (Saxena and Yadav, 1976). Post emergence application of pyradate herbicide gave 97.5% weed control (Skrobakova, 1999). Bhalla *et al.*, (1998) reported that herbicide treatment gave 50-64% weed control with increase in yield. Weed growth was significantly reduced by the use of herbicides and resulted in increased yield of 50% against the control (Stork, 1998). Singh (1998) and Sukhadia *et al.*, (1999) pointed out that weeds reduced productivity in chickpea by up to 36.8% and 41-44%, respectively.

In view of the importance of the problem, an experiment was designed to investigate the efficacy of different herbicides on weeds infesting the chickpea crop pressure and the consequent effect of herbicides on various parameters on yield and yield components of chickpea. The present experiment was carried out with the following objectives:

1) To find out most suitable and economical herbicides for controlling noxious weeds in chickpea.
2) To study the response of chickpea to different herbicides.
3) To increase awareness about herbicides use for weeds control.

MATERIALS AND METHODS

Experiment entitled "To study the efficacy of different herbicides for controlling noxious weeds in chickpea in District Karak, was conducted on farmer's field at village Titter Khel Khattak, District Karak, NWFP during Rabi 2004-05. Planted on October 4, 2004, the experiment was laid out in randomized complete block (RCB) design with three replications. There were ten treatments in each replication. The size of each plot was

10x1.50 m^2. Each treatment had 5 rows, 30 cm apart. The detail of treatments is as under:

S.NO	Treatments	Common Name	Time of application	Rate kg a.i ha-1
1	Dual gold960 EC	S-metolachlor	Post-emergence	5.31
2	Isoproturon 500EW	isoproturon	Pre-emergence	4.5
3	Isoproturon 500EW	isoproturon	Post-emergence	4.5
4	Stomp 330E	pendimethalin	Post-emergence	3.7
5	Stomp 330E	pendimethalin	Pre-emergence	3.7
6	Sencor70 WP	metribuzin	Pre-emergence	2.45
7	Sencor70 WP	metribuzin	Post-emergence	2.45
8	Puma super 75 EW	fenoxaprop-p-methyl	Post-emergence	1.87
9	Topik 15WP	clodinafop-propargyl	Post-emergence	0.16
10	Weedy check	----------	----------	----------

Data were recorded on weeds density m^{-2}, number of branches $plant^{-1}$, No. of seeds pod^{-1}, plant height (cm), number of pods $plant^{-1}$, biological yield (kg ha^{-1}), 100-grains weight (g) 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

The weed species infesting the experiment were *Asphodelus tenuifolius*, *Cyperus rotundus*, *Convolvulus arvensis*, *Cynodon dactylon* and *Fumaria indica*. Statistical analysis of the data showed that weeds density m^{-2} was significantly affected by various weed control measures (Table-1). Maximum weeds m^{-2} (31.23) were recorded in weedy check plots, followed by Stomp (Post) (23.80 m^{-2}), Topik 15 WP (23.37 m^{-2}) and Stomp (pre) (22.83 m^{-2}). Minimum weeds were recorded in Puma super 75 EW (20.70 m^{-2}) plots. The herbicides had a variable effect on the predominant weed *Asphodelus tenuifolius* densities, which was not completely controlled by any of the herbicides tested.

Statistical analysis of the data showed that different herbicides had significant effect on the number of branches $plant^{-1}$. Comparison of the treatment means reflects that maximum number of branches $plant^{-1}$ (15.67) were recorded in Puma Super75EW treated plots, followed by Dual gold (14.60), Sencor (post) (14.53), while minimum number of secondary branches (11.53) were recorded in Stomp (post) plots (Table-1).

Further perusal of Table-1 exhibits that that different herbicides had non-significant effect on the seeds pod^{-1}. Comparing of the treatment means showed that maximum number of Seeds pod^{-1} (2.000) were recorded in Isoproturon (post) , Sencor (post) and weedy check. While minimum number of Seeds pod-^{1} (1.867) were recorded in Stomp (post) and Puma super 75 EW plots.

Table-1: Efficacy of different herbicides on weed density m^{-2}, number of branches $plant^{-1}$ and number of seed $Pods^{-1}$ of Chickpea

treatments	Weeds Density m^{-2}	No of Branches $Plant^{-2}$	Seeds pod^{-1}
Duel Gold 960 EC	21.97f	14.60b	1.933
Isoproturon (pre) 500FW	21.63g	12.87g	1.933
Isoproturon (Post) 500FW	22.10e	13.40e	2.000
Stomp (Pre) 330 E	22.83d	13.87d	1.933
Stomp (Post)330E	23.80b	11.53h	1.867
Sencor (Pre) 70 WP	21.20h	13.27ef	1.933
Sencor(Post) 70 WP	20.93i	14.53bc	2.000
Puma super75EW	20.70j	15.67a	1.867
Topik 15 WP	23.37c	12.93f	1.933
Weedy check	31.23 a	14.20cd	2.000
LSD (0.05)	0.05224	0.3857	N S

Means in the columns followed by different letters are significantly different at 5% level of probability, using LSD test.

For the plant height, the statistical analysis of the data showed that different herbicides had significant effect on plant height. Highest plant height (87.27 cm) was recorded in (Sencor post) followed () by Stomp (pre and post) having a plant height of 81.53, 80.67 cm. The minimum plant height (73.53) was recorded in Puma super 75 EW plots followed by 74.20 cm in weedy check (Table-2)

Statistical analysis of the data exhibited that herbicides had significant effect on the number of pods $plant^{-1}$ (Table-2). The highest (48.80) number of pods $plant^{-1}$ were recorded in Puma super75 EW plots. While other herbicides like Isoproturon (pre 36.00 and post 38.60), Stomp (post 34.13 and Topik 31.80) were statistically similar with each other. Lowest number of pods was recorded in weedy check plots (24.00). The probable reason for the best performance of herbicides had most effective weed control except *Asphodelus tennivifulus*., while the possible reason for minimum pods $plant^{-1}$ in weedy check plots might be due to high competition with weeds. Quite analogous results were reported by Althahi (1994) that weeds reduce pods $plant^{-1}$ in chickpea.

Statistical analysis exhibited that herbicides and weedy check significant effect on 100 grains weight (Table-2). The means for 100 grains weight showed that the highest (58.33 g) was obtained from Puma Super75EW plots followed by Isoproturon (post 45.00 g), Stomp (pre 43.33 g) and Sencor (post 41.67). The lowest 100 grains weight was recorded in weedy check plots (30 g). The probable reason for highest 100 grains weight in Puma Super75EW plots was largely due to the fact that it showed maximum grassy weeds control, thus maximized the available resources for the crop and reduced weeds

competition, while the probable fact for lowest 100 grains weight might be due to weeds competition. These results are in line with the findings of Hosseini (1997).

Analysis of variance of the data revealed that different herbicidal treatments and weedy check had significant effect on grain yield in chickpea. The data indicated that maximum grain yield of (5385 kg ha^{-1}) was obtained from Puma super 75 EW followed by Topik (4383.5 kg ha^{-1}). Stomp (post) 4283.5 kg ha^{-1}. and Isoprotruon (post) 4250 kg ha^{-1}. while grain yield in other treatment are satistically similar with each other. The minimum grain yield was recorded in weedy check plots (3733.5 kg ha^{-1}). The highest yield in Puma super 75 EW plots was probably due to maximum weed control and thus the crop was flourished and efficiently utilized all the available resources. Almost all the herbicides equally controlled both grassy and broadleaf weeds Chickpea, the slight differences in their grain yield might be due to the fact that different treatments were facing competition of *Asphodelus tennvifulus*. Singh (1998), Bhalla *et al.* (1998) and Balyan and Malik (1996) also reported analogous results.

Table-2: Efficacy of different herbicides on Plant height (cm), Number of pods $plant^{-1}$, 100 grains weight (g), and Grain yield (kg ha^{-1}) of Chickpea

Treatments	Plant height (cm)	No. of Pods $plant^{-1}$	100 grains weight (g)	Grain yield (kg ha^{-1})
Duel Gold 960 EC	75 33f	24 60il	38 33e	3966 5b
Isoproturon(pre) 500FW	78.53d	36.00d	31 67g	3916 5b
Isoproturon (Post)500FW	79.07d	38 60c	45 00b	4250b
Stomp (Pre) 330 E	81.53b	45.53b	43.33c	3700b
Stomp (Post)330E	80.67c	34 13e	38.33e	4283.5ab
Sencor (Pre) 70 WP	73.53h	25.87h	38.33e	3883.5b
Sencor(Post) 70 WP	87.27a	27.93g	41 67d	3883 5b
Puma super75EW	73.40h	48 80a	58.33a	5385a
Topik 15 WP	77.60e	31.80f	33.33f	4383 5ab
Weedy check	74.20g	24.00j	30.00h	3733.5b
LSD (0 05)	0.6388	0.1828	0.1183	1112

Means in the columns followed by different letters are significantly different at 5% level of probability, using LSD test.

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