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POSTEMERGENCE HERBICIDAL CONTROL OF *Asphodelus tenuifolius* in Desi chickpea, *Cicer arietinum* L. AT LAKKI MARWAT, PAKISTAN

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ABSTRACT

To study control of noxious weed Asphodelus tenuifolius in Cicer arietinum L. through application of post emergent herbicides, an experiment was conducted at farmer's field in District Lakki Marwat,NWFP-Pakistan during Rabi 2004-05, using RCB design having three replications. The experiment comprised of four herbicides, hand weeding and weedy check treatments. The herbicides included were Sencor @ 2.45 kg a.i ha^{-1}, isoproturon 4.5 kg a.i ha^{-1}, Topik @ 0.16 kg a.i ha^{-1}, and Puma super @ 1.87 kg a.i ha^{-1}. The data were recorded on weed density m^{-2}, number of pods plant^{-1}, plant height (cm) and grain yield (kg ha^{-1}). All the herbicdes failed to give an adequate control of Asphodelus. For controlling weeds, hand weeding proved to be the best, giving only 3.733 weeds m^{-2} as compared to other herbicidal treated plots. The grain yield although non-significant statistically among the different treatments was the maximum in Topik 15 treated plots. It was closely by hand weeding (2470 kg ha^{-1}) and Isoprotuon (2392.5 kg ha^{-1}).

Key words: Chickpea, *Cicer arietinum, Asphodelus,* herbicides Lakki Marwat.

INTRODUCTION

Chickpea (*Cicer arietinum* L.) is a dry pulse crop or as a green vegetable with the former use being most common. Seeds average about 20% protein, 5% fat and 55% carbohydrate. They are not well adapted to high moisture areas, saline soils, soils which are slow to warm in the spring and wet or waterlogged soils. It may be advantageous to avoid seeding chickpeas in low lying areas of the field, around sloughs or in areas of high soil organic matter to prevent uneven or prolonged maturity. Two main types 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 (Hawtin and Singh, 1980). Chickpeas thrive under

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good moisture conditions with daytime temperatures between 21 to 29°C and nighttime temperatures near 20°C. Length of maturity depends on available heat and moisture, but is in the range of 95-105 days for desi type and 100-110 days for kabuli type. The desi types, also known as Bengal grain, 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, locally important, categories are the 'gulabi' (pea shaped) types of central India and green-seeded desi types of central and northwestern India. In Pakistan, during 2003-4, chickpea was grown on an area of 982.3 thousands ha with a production of 611.1 thousand tons. During the year under reference, the area and production in NWFP was 52.2 thousand ha and 19.7 thousand tons, respectively. Mean national yield during the year of report was 622 kg and in NWFP it amounted to 377 kg ha^{-1}. Punjab and Sindh with an area of 854.4 thousand and 61.7 thousand ha are the leaders in chickpea production in Pakistan (Anonymous, 2004).

The Chickpea yield in Pakistan is lower as compared to maximum potentials of the cultivars. The gap could mainly be attributed to the weed competition in addition to other production constraints. Although chickpeas are traditionally grown on residual soil moisture, weeds competition pose major problem in many situations. Common annual weeds of chickpea include *Chenopodium album, Asphodelus tenuifolius, Argemone mexicana, Carthamus oxycantha, Cenchrus ciliaris, Fumaria parviflora, Polygonum* sp., *Lathyrus* spp., *Vicia sativa, Euphorbia dracunculoides* and *Or obanche* sp. Common perennial species are *Cyperus rotundus, Cynodon dactylon* and *Cirsium arvense* (Marwat, 1984; Sexena and Yadav, 1976). Hand weeding at thirty and again at sixty days after sowing essentially eliminates the adverse effect of weed competition (Sexena, 1980). In commercial practice, the cultivation of preceding rainy-season fellows not only helps to capture and conserve moisture but also reduces weed infestations. Inter-row cultivation by tractor or animal-drawn implements is common, facilitated in North Africa by sowing the crop in very wide rows. Potential yield losses in chickpea due to weeds range between 22-100% (Sexena 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 increase yield of 50% against the control (Stork, 1998). Singh (1998) and Sukhadia *et al,* (1999) pointed out that weeds reduced productivity in chickpea by upto 36.8% and 41-44%, respectively. Yasin et al. (1995) effectively controlled graminaceous weed in their studies.

In view of the importance of the weeds problem in chickpea in district Lakki Marwat and other chickpea growing areas of NWFP, this experiment was designed to investigate the efficacy of different herbicides on grassy weeds pressure and consequent effects on various parameters of chickpea including yield and yield components.

MATERIALS AND METHODS

An experiment on control of noxious weed *A. tenuifolius* in *C. arietinum* L. through application of post emergent herbicides was conducted at farmer's field in Lakki Marwat, NWFP during rabi 2004-05. The experiment was laid out in randomized complete block (RCB) design with three replications. There were six treatments in each replication. The size of each plot was 2 x 5 m^2. Standard agronomic practices were adopted equally for all the treatments during the course of studies except for concerned treatments. The detail of treatments is as under:

S.NO	Treatments	Common Name	Time of application	Rate (kg a.i ha^{-1})[1]
1	Sencor	metribuzin	Post-emergence	2.45
2	Isoproturon	isporoturon	Post-emergence	4.5
3	Topik 15Wp	clodinafop-propargyl	Post-emergence	0.16
4	Puma Super75EW	fenoxaprop-p-ethyl	Post-emergence	1.87
5	Hand weeding	----------	----------	----------
6	Weedy check	----------	----------	----------

Herbicides were applied little late, when the target weed had reached 4-5 leaf stage, therefore, the efficacy of herbicides is lower than the expectation. During the experimentation, data were recorded on weed density m^{-2}, number of pods $plant^{-1}$, plant height and grain yield (kg ha^{-1}).
The data collected were subjected to statistical analysis and the significant treatment means were separated by least significance difference (LSD) test (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Statistical analysis of the data showed that weeds density m^{-2} was significantly affected by various weed control measures (Table-1). The experimental site was heavily infested mainly with *Asphodelus tenuifolius*. All the herbicides are little weaker, because as already enunciated the targel weed was at 4-5 leaf stage at the time of herbicidal application. Maximum weeds m^{-2} (20.20) were recorded in isoproturon plots, followed by Topik

(17.30 m^{-2}), Sencor (15.83 m^{-2}) and Puma super 75 EW (14.80 $^{-2}$). Minimum weeds were recorded in hand weeding (3.733 m^{-2}) plots. The results are in conformity with those reported by De et al, (1995), Hassan *et al.* (2003), and Marwat et al. (2004). They reported that all the herbicide treatments and hand weeding were effective against grassy weeds and gave greatest reduction in weeds populations.

Statistical analysis of the data exhibited that herbicides and hand weeding as weed control measures had significant effect on the number of pods $plant^{-1}$ (Table-1). The highest (45.00) number of pods $plant^{-1}$ was recorded in hand weeding. It was however, statistically similar with Sencor plots (44. 60) and Weedy check (36.60). Lowest number of pods were recorded in Isoproturon plots (25.20). The possible reason for minimum pods $plant^{-1}$ in Isoproturon plots is due to its weakness on controlling *Asphodelus* as well some non visible adverse effect on the crop. Quite analogous results were reported by Althahabi *et al.* (1994) who concluded that weeds reduce pods $plant^{-1}$ in chickpea.

Further review of data exhibited that herbicides and hand weeding had significant effect on plant height (Table-1). The means for plant height showed that the highest (31.83 cm) height was attained from hand weeding plots, followed by Isoproturon (28.73 cm), and Puma Super75EW (26.77 cm). The lowest plant height was recorded in Sencor (18. 43 cm) treated plots.
Analysis of variance of the data revealed that different herbicidal treatments and hand weeding had non-significant effect on grain yield in chickpea. The data indicated that maximum numerical grain yield of 2587.5 kg ha^{-1} obtained from Topik 15 WP plots. However, it was closely followed by hand weeding (2470 kg ha^{-1}) and Isoprotuon (2392.5 kg ha^{-1}). The minimum grain yield was recorded in weedy check plots (2105 kg ha^{-1}). Singh (1998), Bhalla *et al.*, (1998), Balyan and Malik (1996) Hassan et al. 2003, and Marwat *et al.* 2004 however, reported increased chickpea yields with the use of herbicides. The difference in findings could be attributed to the use of herbicides with different chemistries and the variability in flora infesting their experimental sites. Excessive rains were also a problem in partitioning of the phototsynthate towards grain yield, due to excessive vegetative growth and lodging. Moreover, slightly later application of herbicides could be a possible reason for decreased efficacy of herbicides. The delay in application perhaps rendered *Asphodelus* foliage more waxy, which dwindled the absorption of herbicides into its foliage.

Further studies are suggested to confirm the instant findings and investigate the response of *Asphodelus* at different phenological stages and to decipher the impact of different herbicides on chickpea crop.

Table-1. Efficacy of different herbicides on Weed density m^{-2}, number of Pods $plant^{-1}$, Plant height (cm) and Grain yield (kg ha^{-1})

Treatments	Weed Density m^{-2}	Number of Pods $plant^{-1}$	Plant height (cm)	Grain yield (kg ha $)^{-1}$
Sencor	15.83 c	44.60 b	18.43 f	2352.5
Isoproturon	12.27 e	25.20 f	28.73 b	2392.5
Topik 15WP	17.30 b	29.00 e	23.17 e	2587.5
Puma super 75 EW	14.80 d	31.20 d	26.77 c	2235.0
Hand weeding	3.733 f	45.00 a	31.83 a	2470.0
Weedy check	20.20 a	36.60 c	24.47 b	2105.0
$LSD_{0.05}$	0.6490	0.1718	0.5107	N.S

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

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