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IMPACT OF WEED MANAGEMENT PRACTICES ON WILD ONION (*Asphodelus tenuifolius* Cav.) AND CHICKPEA (*Cicer arietinum* L.)

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ABSTRACT

To study control of noxious weed (A. tenuifolius) in chickpea cv. Shinghar through different weed management practices, an adaptive research trial was conducted at farmer's field in village Mela Mandra Khel, District Lakki Marwat, Khyber Pakhtunkhwa, Pakistan during winter 2007–08, using RCB design having four replications. The experiment comprised of five treatments viz., two herbicides, hand weeding (thrice), weeds free and weedy check. The herbicides included were Topik @ 0.2 kg a.i ha^{-1}, and Puma super @ 2 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}), which were significantly affected by different weed management practices. Maximum grain yield and its components (plant height and number of pods plant^{-1}) were obtained in weeds free plots, followed by plots, where noxious weeds were uprooted three times during crop growing period. Minimum grain yield and its components were recorded in weedy check, where noxious weed was left free to grow. Both herbicides showed no significant effect on number of pods plant^{-1} and grain yield.

Key words: Chickpea, *Cicer arietinum*, *Asphodelus tenuifolius*, herbicides, hand weeding.

INTRODUCTION

Wild onion (*A. tenuifolius*) is a weed of 15 crops (Holm *et al*. 1997). It is a serious weed of wheat (*Triticum aestivum* L.), mustard (*Brassica juncea* L.), chickpea (*Cicer arietinum* L.), lentil (*Lens culinaris* Medic.), and linseed (*Linum usitatissimum* L.) in India and Pakistan (Gupta *et al*. 1977; Poonia *et al*. 2001 and Tiwari *et al*. 2001). It germinates quickly and regenerates and, hence, competes with crops in the initial stages of crop growth (Yadav *et al*. 1999). Gupta *et al*. (1977) reported that wild onion was more deleterious in curtailing the growth and yield of chickpea than common

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lambsquarters (*Chenopodium album*) or natural weedy conditions. Tiwari *et al*. (2001) observed a reduction of 80% in chickpea yield and Yaduraju *et al*. (2000) reported a 56% reduction of mustard yield when wild onion was allowed to compete for the full season. They also concluded that the initial 60 day period appeared to be critical for its competition in rain-fed chickpea. The weed has the allelopathic potential to suppress the germination and growth of wheat, mustard, chickpea, and lentil (Mishra *et al*. 2002. The weed completes its life cycle with the crop and a large amount of weed seed is dispersed before the crop is harvested. If the weed can be removed or disturbed before seed-set, the crop losses can be minimized. The management of wild onion is very difficult under field conditions. Hand-pulling of this weed is common, but the unusual configuration of the sturdy roots often results only in top removal with this method. Top removal at one stage might be beneficial to weed growth and it becomes obvious that if hand-weeding is the practice, it may be done repeatedly, which might be a costly and time-consuming affair.

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. Among the weeds of chickpea, wild onion is the major constraint because wild onion is able to compete with crops and to escape control by herbicides. Although chickpeas are traditionally grown on residual soil moisture, weeds competition pose major problem in many situations.

In view of the importance of the weeds problem in chickpea growing areas of Khyber Pakhtunkhwa, Pakistan, this experiment was designed to investigate the impact of different weed management practices on noxious weed density (*A. tenuifolius*) and consequent effects on various parameters of chickpea including yield and yield components.

MATERIALS AND METHODS

An experiment on control of major noxious weed (*A. tenuifolius*) in chickpea cultivar "Shinghar" through different weed management practices was conducted at farmer's field in Village Mela Mandra Khel, District Lakki Marwat, Khyber Pakhtunkhwa, Pakistan during winter 2007-08. The experiment was laid out in randomized complete block (RCB) design with four replications. There were six treatments as explained in Table 1. Knapsack sprayer with nozzal size of 350 µm was used for spraying herbicides, whereas volume of water used at the rate of 300 L ha^{-1} pressurized at 40 psi. Both herbicides were applied at 2-3 leaf stage of the crop. In weedy check (control) plots, weeds were left free to grow, whereas in weeds free plots, no

weeds were left to grow and in plots where weeds were uprooted three times with 30 days interval during growing period of chickpea. The size of each plot was 5 x 10 m^2. Standard agronomic practices were adopted equally for all the treatments during the course of studies except for concerned treatments. During the experimentation, data were recorded on weed density m^{-2}, number of pods $plant^{-1}$, plant height (cm) and grain yield (kg ha^{-1}). The collected data 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

Weed density (m^{-2})

Statistical analysis of the data showed that weed density m^{-2} was significantly affected by various weed control measures (Table-2). The experimental site was heavily infested mainly with wild onion (*A. tenuifolius*). Maximum weeds density (29.77 m^{-2}) was recorded in weedy check Plots sprayed with Topik (25.99 m^{-2}) and Puma super (24.57 m^{-2}) were statistically at par and gave significantly lesser weed density as compared to weedy check. Minimum weeds were recorded in hand weeding plots (17.41 m^{-2}). 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. Chickpea is usually grown on large area under rainfed conditions in the area under discussion. Therefore herbicide application is not common. Usually the farmers practice manual weeding when the weeds attain maximum vegetative growth as the weeds are removed to feed to the animal. Therefore the weeds cause significant loss to the crop yield but in case of wild onion, animals do not eat this weed due to bitter taste. Hence it must be uprooted at its early stage of germination to increase its population in the area. Therefore transition in the mind of the farmers is suggested to avoid the yield losses in grain. *A. tenuifolius* is threat to chickpea production in the sandy zones of southern districts of this province therefore more research is needed to explore the ways and means on scientific background. Many farmers will not accept the idea of herbicide application for weed control in chickpea in this area due to higher cost of production and illiteracy of the farmers. Therefore preventing *A. tenuifolius* seed production is the best method that should be adopted by the farming community in this area. The farmers do not collect *A. tenuifolius* because the animals do not eat this plant therefore the infestation of this weed is increasing and the increasing

density and seed production further accelerate the yield losses in chickpea.

Grain yield (kg ha^{-1}) and yield components

Statistical analysis of the data depicted that different weed management practices had significant (P≤0.01) effects on plant height, number of pods plant^{-1} and grain yield kg ha^{-1} (Table-2). Maximum (50.30 cm) and minimum (30.28 cm) plant heights were recorded in weeds free and weedy check plots, respectively. Plant heights in plots sprayed by Topik (36.13 cm) and Puma super (33.52 cm) were statistically at par. Plant height (44.41 cm) in plots, where noxious weed was uprooted three times, was significantly (P≤0.01) higher as compared to weeds free and herbicide's treatments. Marwat *et al.* (2011) reported that weed control significantly increase the plant height of crop due to less weed crop competition. Further review of data exhibited that maximum number of pods plant^{-1} (53.92) was recorded in weed free plots, followed by plots where noxious weed was uprooted three times during crop growing period. Number of pods plant^{-1} was statistically at par in weedy check and herbicide treated plots. Similarly, the data indicated that maximum grain yield (kg ha^{-1}) was obtained in weed free treatments (3270.17 kg ha^{-1}), followed by plots (2824.99 kg ha^{-1}), where weeds were removed three times. Both treatments were statistically significant than others. The minimum grain yield was recorded in weedy check plots (2137 kg ha^{-1}), which was closely (P≥0.05) followed by plots sprayed with herbicides. Quite analogous results were reported by Althahabi *et al.* (1994) who concluded that weeds reduce pods plant^{-1} in chickpea. However, Bhalla *et al*., (1998), Hassan *et al*. (2003) and Marwat *et al.* (2004) reported increase in chickpea yields with the use of herbicides. Integration of herbicide application in agronomic practices is not acceptable to the farming community in the area under study. Because the weeds are the only source of animal feed in the area under discussion. Therefore recommendations of manual weeding at early growth stages of the crop are not only acceptable to the farmers but are also economical and safe. Hassan *et al.* (2010) reported that weed infestation, economic status of the farmers and poor management practices are the major production constraints in the southern distracts of Khyber Pakhtunkhwa. The area under discussion is totally dependent on the rainfall that prevails during the winter therefore the farmers usually do not take interest in weed control and other practices. However, sometimes due to excessive rainfall, the weeds growth occurs vigorously and thus outcompetes the chickpea crop. Therefore proper training of the farmers is needed not only to train in herbicide application but also to educate them about the possible negative effects of weeds on the chickpea grain yield. There are bright chances

of organic chickpea production due to absence of pests and easy control of weeds. Because the farm produce is directly consumed by the farmers at home.

Table-1. Detail of different treatments.

S.No	Treatments	Common Name	Time of application	Rate (kg a.i ha^{-1})
1.	Weedy check	---	---	---
2.	Weeds free	---	Manual weeding (weekly basis)	---
3.	Hand weeding (Thrice)	---	Weeding thrice (30-day interval)	---
4.	Topik 15WP	clodinafop-propargyl	Post-emergence	0.2
5.	Puma Super 75EW	fenoxaprop-p-ethyl	Post-emergence	2.0

Table-2. Mean squares for weed density, plant height, number of pods per plant and grain yield (kg ha^{-1}).

Source	DF	Weed density	Plant height	Number of pods per plant	Grain yield (kg ha^{-1})
Replications	3	2.80	0.541	11.186	1023.865
Treatments	4	558.070**	271.352**	301.422**	890740.530**
Error	12	2.022	5.540	3.928	12179.735
CV %		7.27	6.05	4.70	4.30

**= highly significant at 0.01 level of probability.

Table-3. Weed density, plant height, No of pods $plant^{-1}$, and grain yield as affected by different weed control methods.

Treatments	Weed density (m^{-2})	Plant height (cm)	No of pods $plant^{-1}$	Grain yield (kg ha^{-1})
Weedy check	29.77 A	30.28 D	34.14 C	2137.00 C
Weeds free	00.00 D	50.30 A	53.92 A	3270.17 A
Weeding (thrice)	17.41 C	44.41 B	48.75 B	2824.99 B
Topik 15WP	25.99 B	36.13 C	36.25 C	2256.29 C
Puma super 75EW	24.57 B	33.52 CD	37.64 C	2347.25 C
$LSD_{(0.01)}$	2.733	4.547	3.854	213.2

Means not sharing common letters are significantly different at 0.01 level of probability.

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