

EFFICACY OF DIFFERENT PRE- AND POST-EMERGENCE HERBICIDES FOR CONTROLLING WEEDS IN CHICKPEA

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ABSTRACT

To study the efficacy of different pre- and post-emergence herbicides for controlling weeds in chickpea, an experiment was conducted at Agricultural Research Institute, D.I.Khan during 2002-03 using RCB design, having four replications. The experiment comprised of seven herbicides and a Weedy check. The herbicides included Stomp 330EC @ 0.82 kg, Stop 33EC @ 0.99 kg, Stomp 455CS @ 0.85 kg and Galaxy 450EC @ 0.67 kg applied as pre-emergence, while the post-emergence herbicides were Puma Super 75EW @ 0.93 kg, Isoproturon @ 0.80 kg and Ronstar 25EC @ 0.50 kg a.i ha⁻¹. Variety Karak-I of Chickpea was planted during the last week of October, 2002. The data were recorded on weed density m⁻² and grain yield (kg ha⁻¹). None of the herbicide except Ronstar 25EC had a phytotoxic effect on crop. Both the parameters were significantly affected by different herbicidal treatments. Maximum weed m⁻² (35.25) were observed in weedy check plots. Minimum weeds m⁻² (3.00) were observed in plots treated with Stomp 330EC was applied. The highest grain yield of 2035, 2018, 1973 and 1920 kg ha⁻¹ were obtained from plots treated with Stomp 330EC, Stomp 455 CS, Stop 33 EC and Galaxy 450EC, respectively.

Key words: Chickpea, herbicides, Stomp, Puma Super, weed control.

INTRODUCTION

Chickpea (*Cicer arietinum*) is the principal pulse and provides a major source of protein in the diet of the predominantly vegetarian population. 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 cream colored seeds (Hawtin, 1980). 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 2001, Chickpea was grown on an area of 905 thousands ha with a production of 397 thousand tons. Punjab and Sindh are leaders in Chickpea production (Anonymous, 2001).

The chickpea yields realized in Pakistan are lower as compared to maximum potentials of the cultivars. The gap could mainly be attributed to the weed competition in

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addition to other production constraints. Although chickpeas are traditionally grown on residual soil moisture, weeds competition pose major problem in many situations. Common annual weed species include *Chenopodium album*, *Asphoedelus tenuifolius*, *Argemone mexicana*, *Carthamus oxyacantha*, *Cenchrus ciliaris*, *Fumaria parviflora*, *Polygonum sp.*, *Lathyrus spp.*, *Vicia stiva*, *Euphorbia dracunculoides* and *Orobanche sp.* Common perennial species are *Cyperus rotundus*, *Cynodon dactylon* and *Cirsium arvense* (Marwat, 1984; Saxena and Yadave, 1976). 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. Potential yield losses in chickpea due to weeds range between 22-100% (Saxena and Yadave, 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 increased 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. The worst chickpea weed of D.I.Khan; meadow peavine (*Lathyrus aphaca*) alongwith common lambsquarters and fumitory was controlled by trifluralin, pendimethalin and metribuzin (Balyan and Malik, 1996). Recognizing the fact, the present investigations were undertaken to study the efficacy of different herbicides and to figure out the environment friendly, safe and economical herbicides for weed control in chickpea.

MATERIALS AND METHODS

In order to study the efficacy of different pre-emergence and post-emergence herbicides for controlling weeds in Chickpea, an experiment was conducted at Agricultural Research Institute; D.I.Khan. Karak-I variety of chickpea was planted on 28th October 2002. The seed rate used was 69 kg ha⁻¹.

The experiment was laid out in Randomized complete Block (RCB) design with four replications. There were 8 treatments in each replication. The size of each plot was 7 x 3.20 m². The following treatments were studied during the course of the experiment.

S. No.	Treatment in	Common Name	Time of Application	Rate (kg a.i.ha ⁻¹)
1.	Stomp 330EC	pendimethalin	Pre-emergence	0.82
2.	Stomp 330EC	pendimethalin	Pre-emergence	0.99
3.	Stomp 455CS	pendimethalin	Pre-emergence	0.85
4.	Galaxy 450 EC	acifluorfen-sodium+ bentazon	Pre-emergence	0.67
5.	Puma Super 75EW	fenoxaprop-p-ethyle	Post-emergence	0.93
6.	Isoproturon 50WP	lioproturon	Post-emergence	0.80
7.	Ronstar 25EC	oxadiazon	Post-emergence	0.50
8.	Weedy Check	-----	-----	-----

The data were recorded on weeds density m² and grain yield (kg ha⁻¹). Uniform cultural practices and plant protection measures were adopted for raising a successful crop. Data on weeds density m² were recorded by randomly throwing 1m² quadrat in each treatment. Data were also recorded on grain yield per plot, which were

subsequently converted to kg ha^{-1} . The data collected were subjected to the ANOVA Technique by using MSTATC Computer software and means were separated by using Fisher's protected LSD test (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Weeds density m^{-2}

The statistical analysis of the data showed that there was significant ($P < 0.05$) affect of different herbicides on weed density m^{-2} (Table-I). The maximum weeds m^{-2} (32.25) were recorded in weedy check. Minimum weeds (3.00 m^{-2}) were recorded in Stomp 330EC. The density in the best treatment was however statistically at par with Stomp 455CS (4.0 m^{-2}), Stop 33 EC (5.00 m^{-2}) and Ronstar 25EC (5.75). The variability in weed populations in different treatments can be attributed to the fact that some herbicides are more effective for weed control than other. These results are in line with the findings of De *et al.*, (1995) and Althahi (1994).

Grain yield (kg ha^{-1})

Analysis of variance of the data exhibited that different herbicidal treatments had significant ($P < 0.05$) effect on grain yield. The perusal of data in Table-I indicated that maximum grain yield of 2035 kg ha^{-1} was produced by those plots to which Stomp 330EC was applied for weed control. However it was statistically similar with Stomp 455CS (2018 kg ha^{-1}), Stop 33EC (1973 kg ha^{-1}) and Galaxy 450EC (1920 kg ha^{-1}). The minimum grain yield was recorded in weedy check (1446 kg ha^{-1}). The possible reason for increased in grain yield by Stompt 330EC, Stompt 445 CS, Stop 33EC and Galaxy 450EC treated plots could be the best control of weeds and consequently increased nutrients availability to the crop. These results are in line with the findings of Singh (1998), Bhalla *et al.*, (1998) and Malik (1996).

Table-1. Efficacy of different pre-emergence and post-emergence herbicides on weed density m^{-2} and grain yield of chickpea

S.N	Treatment	Weed density m^{-2}	Grain yield (kg ha^{-1})
1	Stomp 330EC (pre-em)	3.00 d	2035 a
2	Stop 33EC (pre-em)	5.00 cd	1973 a
3	Stomp 455CS (pre-em)	4.00 cd	2018 a
4	Galaxy 450ES (pre-em)	6.25 c	1920 a
5	Puma-Super75EW (post-em)	27.50 b	1524 b
6	Isoproturon 50WP (post-em)	29.00 b	1515 b
7	Ronstar 25EC (post-em)	5.75 cd	1467 b
8	Weedy check	32.25 a	1446 b

Means in the columns followed by different letters are significantly different at $P < 0.05$, using LSD test.

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