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Study of effects of different herbicide toxins on number of pods per plant, number of pods per secondary branch, number of grains per pod, and 100-grain weight of different cultivars of fall chickpeas in the region of Eslam Abad- E- Gharb

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Abstract

In order to study effects of different herbicide toxins on the numbers of main stalk , secondary branches, and days till formation of pods in various fall pea cultivars, a research is done in the from of split plot design based on complete random blokes with 3 repeats. Major factor includes 3 cultivars Arman, Azad, and Hashem ; and minor factor includes any type of toxins and their mixtures including herbicides pyridite , bentazone, imaztapyr, metrybiozin, cyiavazine , fomasaphen , mixture of pyridite and fomasaphen , mixture of bentazone and cyianazine , mixture of imaztapyr and metrybiozin , and manual weeding.In this study, results from variance analysis showed that cultivar factor had no statistically significant effect on the number of pods per plant while effect of herbicide toxin factor on the mentioned trait was significant at 1% probability level, indicating indirect effect of utilization of herbicide toxin on the number of grains per pod. Variance analysis results showed that cultivar X toxin interaction on the number of pods per plant was insignificant. These results indicated that, at 5% level, cultivar factor had a statistically significant effect on the number of pods per secondary branch. In present study, herbicide toxin factor had a significant effect (at 1% probability level) on the number of pods per secondary branch.Based on results, cultivar factor had no statistically significant effect on the number of grains per pod; and no significant difference between toxin levels as well as no significant toxin x cultivar interaction on the basis of variance results, of 1% level, a significant difference was observed between cultivars in terms of 100-grain weight; and a significant difference existed between levels of herbicide toxins in terms of said trait at the same level of probability.

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Introduction

Presence of weeds is one of problems pea faces , especially under dry farming conditions . Pea is not a competitive plant , being sharply defeated by weeds. Pea sprouts more slowly than weeds do, with its growth being faster at early germination stage, therefore pea is a weak competitor for weeds and its canopy does not cover soil surface completely until a long time after planting. At this stage, fast growth of weeds ' shoots and roots, if not controlled , defeats the crop easily. According to studies performed, weed – induced reduction of yields of pea fields are 40%-87%, 42%, and 23% - 52% in India, Russia , and west of Asia, respectively (Rastegar,1996) Because of being costly and time consuming, manual weeding is not cost-effective and, under such conditions , making use of various farming machinery results in a decrease in soil moisture storage. For each unit of produced dry matter, weeds absorb and evaporate more moisture compared to crops accompanying them. In this direction, it seems that application of herbicides is the easiest and cheapest method. But applying this method at different growth stags brings about environmental pollution and threats consumers, health (Seyedsharifi, 2007). For this crop, research shows that application of only one herbicide to control, frequent use of chemicals and / or integration of chemical methods with mechanical ones are needed. As a self-propelled plant, weed grows unwontedly in the fields and gardens, being a nuinvited guest for major crop and lowering quantity and quality, hence economic importance of crops sharply and rising production costs while interfering with farming operations. Term weed is used. Against those categories of plants being cultivated by farmers (Rastegar, 1996). Iterbicides are chemical used to remove weed. Millions liter of herbicides are used on the fields and gardens annually. In general, herbicides are divided into 2 groups: general herbicides and selective herbcides, the former of which hare compounds used to remove all plants and destroy whatever being growing such as Randap Gramaxon and the latter of which are compounds that if be used at recommended concentration, they have no undesirable effects on crops or on main plants such as Aphalon, 2-4-D, Sianazin, etc. Herbicides, whether general or selective, are used in 2 ways: one on the shoot and the other inside the soil (Rastegar, 1996).Having 18% -23% protein, Legume seeds play an important role in supplying protein substances needed by human beings . In recent years, global pea production has been 7-9 million tons (Allaahdaadi, 2007).

Pea has a high level of digestable protein and is phosphorus – and calcium-rich compared to other legume. In places where grains constitute main food, consumption of legume including pea increases value of meals with grains (Goldaani, 2007). Because of having various uses and diverse utilization and of the ability to develop in low-input farming regimes under soil non-friendly conditions and in dry environments, this plant has become an important part of farming regimes of subsistence agriculture. Also, sue to the role it plays in soil fertility, pea is considered an important factor stabilizing grains production within dry regions and drylands of developing countries while having a special status in alternate cropping (Goldaani, 2005). Legumees is an important group of plants fixing nitrogen, playing a significant role in improvement of efficiency of nitrogen fixation and of seed yields (Ahamd Khan, 2011). The purpose of this project is to obtain the highest yield of fall chick – peas in the region of Eslam abad- E- gharb.

Materials and methods

Study side

Present research was done on a field in the suburb of Eslamabad-e Gharb country located at 47◦ 26' eastern longitude and 34◦ 8' northern latitude, with a 1346-m altitude from sea level, having moderate cold climate . Its average rainfall is 538 mm annually.

Following results were obtained by performing soil analysis operations on random soil samples taken from a 0-125-cm depth of test field soil at agrology lab of soil & water Research Division of Kermanshah Agriculture Research Center. Soil of target region with 11.4% sand , 58% silt , and 35.5% clay has a silty – clay – loam texture . This project was implemented

in the from of split plot design based on complete random blocks with 3 repeats, Major factor includes 3 cultivars Arman, Azad, and Hashem ; and minor factor includes any type of toxins and their mixtures including herbicides pyridite, bentazone, imaztapyr, metrybiozin, cyianazine, fomasaphen, mixture of pyridite and fomasaphen, mixture of bentazone and cyianazine, mixture of imaztapyr and metrybiozin, and manual weeding. Following operations of bedding and planting, in order to measure and examine studied traits, samples are taken from a 5.0 × 5.0 m2 frame at different times during crop management stage. category: Measurements were performed by counting. Number of pods per plant, Number of pods per secondary branch, Number of grains per pod and 100-grain weight.

Statistical analysis

Variance analysis was performed on data obtained using statistica C-MSTAT software and means of studied truits were compared by using LDS test at levels of 5% and 1%.Operations of preparation and cultivation were done according to local custom. Operations of cultivation were done with pneumatic machine on intervals and rows 50cm wide and 80 kg seeds ha, witch were disinfected by dungicide toxin ManKozab. In order to control Aggrotis and ltetiotis, toxin Swine (3kg/ha) was used in spring.

Results and discussion

Number of pods per plant

In present study, results from variance analysis indicated that cultivar factor had no statistically significant effect on the number of pods per plant.Therefore, it can be said that cultivars tested for production of the number of pods per plant in climatic conditions of Islamabad-e Garb exhibit identical reactions. Cv. Airman showed maximum number of pods per plant (35.4). Number of pods produced per plant can represent genetic potential of a cultivar for traits of gelid and gelid components. No significant difference was observed between genotypes in this study. After fecundation, although flowers turn into fruitful pods, density of weed during vegetative period results in deficient uptake of water and available nutrients by crops, leading to reduction of the number of leaves and of leaf surface area, hence of total photosynthetic materials produced for growth, grain formation and achievement of high yield.In this study, herbicide toxin factor had significant effects on the number of pods per leant at 1% probability level, indicating indirect effects of herbicide use on the number of grains per pod. Such a difference was generated due to maximum number (52.4) of pods per plant with manual weeding and minimum number (16.3) of that with using herbicide Bent zone+ Cyanine mixture. Due to less errors in controlling weed as well as to uptake by crops of soil water and available nutrients, manual weeding could result in production of the most pods of all weed control treatments, but it is not economical to control weed because of high labor costs. After manual weeding treatment, using herbicide Pyridine resulted in production of the most pods (51) per plant.Under conditions where weed limits the amount of moisture available in soil, crops can't grow well.In sufficient growth and dysfunctional photosynthesis along with more competition by plant organs for Photosynth etheric materials result in reduction of weight and productive volume of generative organ (flowers) as well as in a decrease in the number of fruitful pods. Therefore, optimal utilization of herbicide toxins along with weed control increase sunlight penetration into the plants' canopy which increases the field's photosynthetic area, hence yield and yield components.Results from variance analysis indicated that cultivar x toxin interaction was not significant for the number of pods per plant. So it can be argued that utilization of different herbicide toxins for controlling weed creates identical effects on the number of pods per plant of common pea cultivars. This means that all kinds of toxins used in present research can control weed while indirectly helping to increase the number of pods per plant greatly. By using Duncan's technique, comparison of mean interactions showed that Arman treatment under manual weeding conditions and cv. Arman with herbicide Pyridine accounted for maximum number of pods per plant as 60.4 and 53.7 respectively. Minimum number of stalks belonged to cv.Azad under the effects of

herbicide Imaztapir.

Number of pods per secondary branch

In this study, results from variance analysis showed that cultivar factor had a statistically significant effect on the number of pods per secondary branch at 5% level. So it can be said that cultivars tested for production of the number of pods per secondary branch under climatic conditions of Eslamabad-e Gharb exhibit different reactions.

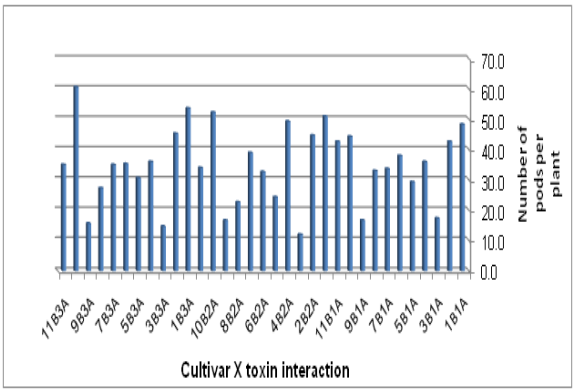

Fig. 1A. Cultivar X toxin interaction on the number of pods per plant.

Cv. Arman showed maximum number (3.9) of pods per secondary branch per plant. In present study, herbicide toxin factor had a significant effect (at 1% level) on the number of pods per secondary branch, indicating indirect effect of herbicide toxin utilization on the number of grains per pod. This difference is typically due to maximum number (5.4) of pods per secondary branch in weed control treatment through manual weeding and minimum number (2.6) of that with utilization of herbicide Imaztapir. After fecundation, although flowers change into fruitful pods, density of weed during vegetative period results in deficient uptake by crops of water and available nutrients which reduces the number of leaves and leaf surface area, as a result of which total photosynthetic materials produced for pod growth, grain formation and achievement of high yield are reduced. Under condition where weed Limits amount of moisture available in soil, crops can't grow well. Insufficient growth, disordered photosynthesis and more competition by plant organs for photosynthetic materials result in reduction of weight and amount of productive volume of generative organ (flowers), and in a decrease in the number of fruitful pods. As a result of optimal use of herbicide toxins and weed control, more sunlight penetrates into plants canopy which increase the field's photosynthesis area increasing yield and yield components.Results from variance analysis indicated no significant cultivar X toxin interaction on the number of pods per secondary branch.

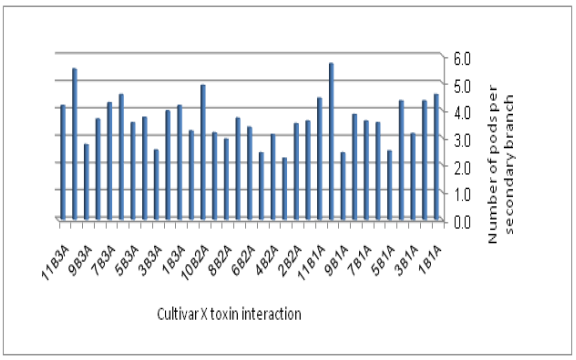

Fig. 1B. Cultivar X toxin interaction on the number of pods per secondary branch.

So it can be stated that using different herbicide toxins for controlling weed generates identical effects on the number of pods per secondary branch, that is, all Kinds of toxin used in this research indirectly resulted in an increase in the number of pods per in addition to controlling weed. By using Duncan's technique, comparison of means of interactions showed that the highest number of pods per secondary branch per plant (5.7) was observed for cv.Hashem in manual weeding treatment and the lowest number of stalks with 2.2 pods belonged to cv. Azad under effects of herbicide Imaztapir.

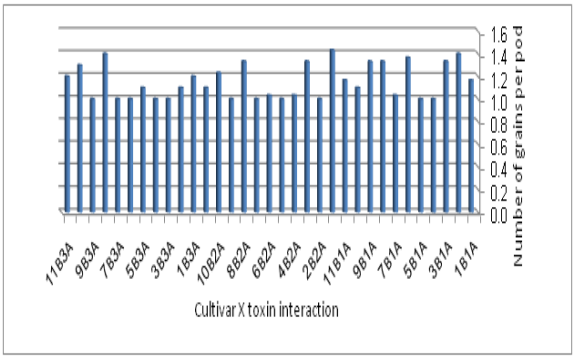

Fig. 1C. Cultivar X toxin interaction on the number of grains per pod 100-grain weight.

Number of grains per pod

In this study, results from variance analysis showed

that cultivar factor had no statistically significant effect on the number of grains per pod. Therefore, it can be said that cultivars tested for the number of grains per pod under climatic conditions of Eslamabad-e Gharb exhibited same reactions. Maximum number of grains per pod per plant (1.2) belonged to cv.Hashem. Number of grains per pod can reflect genetic potential of a cultivar for yield traits. Pods of different genotypes of common pea rarely contain more than one grain. For this reason, difference genotypes was not significant.

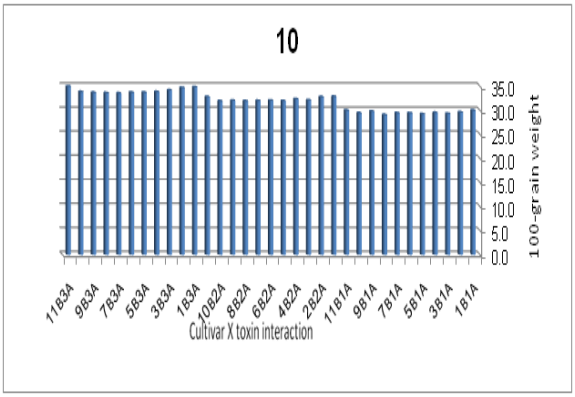

Fig. 1D. Cultivar X toxin interaction on the 100-grain weight.

Results from variance analysis indicated that there existed no significant differences between toxin levels as well as toxin x cultivar interactions in terms of the number of pods per plant. So it can be stated that different toxin create same reactions on the number of grains per pod. Although controlling weed on common pea fields relatively improves vegetative growth and foliation and/or other traits, it has no much effect on the number of pods per plant. Maybe one reason why such traits as the number of grains per pod are not significant is that they are influenced more by genotypes, not by environmental factors.

Variance analysis results indicated that difference between cultivars in terms of 100-grain weight was significant at 1% level, reflecting genetic variety among cultivars and genotypes in terms of trait of 100-grain weight. So it can be said that weight of 100 grains of common pea varies from one cultivar to another under the effects of genotypes, which is usually due to a 5-gr difference in 100- grain weight among cultivars. The heaviest (34.5 gr) and lightest (19.5) 1000-grain weight belonged to cv. Arman and cv. Hashem, respectively.Also, at 1% level, there was a significant difference between herbicide toxin levels for trait of 100-grain weight, which was created due to maximum 100-grain weight (31.6 gr) in manual weeding treatment and minimum 100-grain weight (31.5) with herbicide Benntazone+ Cyanazine mixture. Increase I decrease in 100-grain weight under the effects of herbicide toxins can be attributed to density of weed on the field after some toxin is used. So it can be stated that on the fields where weed is controlled poorly. Intensified competition is observed between crops and weed for up taking available nutrients, sunlight and other growth factors, making variations in 100-grain weight. In general, grain weight of common pea is a function of its filling rate and duration, which is supplied by 2 current photosynthesis sources and re-translocation of store materials prior to flowering.In addition to reduced sunlight penetration into canopy, crops enjoy less water and available nutrients during growth period due to presence of weed. This results in reduced current photosynthesis, decreased rate and duration of grain filling and, finally, in reduced grain weight. With too much weed density, reduction of 100-grain weight can be attributed to the lower amount of per-pollination stored carbohydrates in vegetative organs as well as to dropped leaf area durability. High density of weed, especially during vegetative growth period of crops, reduces leaf area, photosynthesis rare and amount of non-structural stored carbohydrates, therefore, controlling the field's weed by herbicide toxins increases uptake by crops of water and salt and improves synthesis of sap and assimilates and their translocation into grains. For manual weeding treatment, heaviest 100-grain weight (32.6gr) was obtained because of fewer mistakes in the weed control. Following manual weeding treatment, utilization of herbicide Pyridine could contribute to crop growth and increased 1000-grain weight.Results from variance analysis indicated that cultivar X toxin interaction on trait of 100-grain weight was not significant. So it can be said that using different herbicide toxins for controlling weed generates identical effects on 100-grain weight in common pea

cultivars. This means that all kinds of toxins used in this research indirectly increase 100-grain weight of common pea crop in addition to the weed control.By using Duncan's technique, comparison of mean interactions showed that maximum 100-grain weight (34.8gr) belonged to cv. Armanwith herbicide Pyridine and minimum 100-grain weight (29gr) belonged to cv.Hashem under effect of herbicide Bent zone+ Cyanazin mixture.

Conclusion

Results from variance analysis showed that cultivar factor had no statistically significant effect on the number of pods per plant while effect of herbicide toxin factor on the mentioned trait was significant at 1% probability level, indicating indirect effect of utilization of herbicide toxin on the number of grains per pod. Variance analysis results showed that cultivar X toxin interaction on the number of pods per plant was insignificant. These results indicated that, at 5% level, cultivar factor had a statistically significant effect on the number of pods per secondary branch. In present study, herbicide toxin factor had a significant effect (at 1% probability level) on the number of pods per secondary branch.Based on results, cultivar factor had no statistically significant effect on the number of grains per pod; and no significant difference between toxin levels as well as no significant toxin x cultivar interaction on the basis of variance results, of 1% level, a significant difference was observed between cultivars in terms of 100-grain weight; and a significant difference existed between levels of herbicide toxins in terms of said trait at the same level of probability.

References

Ahamd Khan I. 2011. Weed control in chickpea through different managment technique in arid zone of southern districts of Khyber-Pakhtunkhwa (NWFP), Pakistan, International Planning Workshop.

Allaahdaadi A, Shirkhaani Rahimiyan H. 2007. Study of effects of weed on rain-fed common pea yield. Agriculture Journal **8(2),** 1-12.

Goldaani M, Rezwaani M. 2007. Effects of different moisture and planting data regimes on phonological characteristics and growth indices of 3 rain-fed/irrigated common pea cultivars in Mashhad. Journal of Agriculture and Natural Resources Sciences **14(1).**

Goldani M, Rezvani M. 2005. Effects of drought levels and planting dates on the yield and yield components of rain-fed and irrigated pea cultivars in Mashhad. Iranian Agronomy Research Journal **2(2),** 12-13.

Rastegaar, Mohammadi. 1996. One thousand and there hundred and fourteen species of weed and their control. University Press Center, Tehran.

Seyedsharifi R, Farzaneh S, Seyyedsharifi R. 2007. Comparison of chemical control and allelopathy of weed for common pea under fry-farming conditions. Tran Biology Journal **2(4),** 334-343.