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Study of Effects of Different Herbicide Toxins on Biological Yield and Harvest Index of Fall Common Pea Cultivars in the Region of Eslamabad-E Gharb

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Abstract
In order to study effects of different herbicide toxins on biological yield and harvest index 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. Results of variance analysis of present research indicated that there was no significant difference among cultivars in terms of biological yield. Also, based on the results of variance analysis, it was found that there was a significant difference, at probability level of 1%, among the levels of different herbicide toxins for trait of biological yield. And according to the results obtained from variance analysis, it was know that cultivar x toxin interaction was not significant for trait of biological yield.
Results of data variance analysis of this research showed that variety (genotype) had no significant effect on harvest index. Also, results demonstrated that toxin factor had a significant effect on harvest index at the level of 1%. Also, cultivar x toxin interaction on harvest index became statistically significant at the level of 5%, the highest (53%) and lowest (13.9%) values of which were obtained from cultivar Armani x Pyridine toxin interaction and cultivar Azad x Imaztapyr toxin interaction, respectively.
Keywords: Herbicide , Cultivar , biological yield , harvest index.

I. 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 (1) 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.
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 uninvited 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. It herbicides 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, Two-four-D, Simazyn, etc. Herbicides, whether general or selective, are used in 2 ways, one on the shoot and the other inside the soil [1-3].

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 [3-4].

Pea has a high level of digestible 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. 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 dry lands of developing countries while having a special status in alternate cropping [5].

Legumes is an important group of plants fixing nitrogen, playing a significant role in improvement of efficiency of nitrogen fixation and of seed yields.

II. Materials and methods

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 m^2 frame at different times during crop management stage. Variance analysis was performed on data obtained using statistica l 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. Dimensions of each test plot were set at 10×5 m. During management stage, samples were taken at specified times to measure some traits studied by using 5% × 5% frame and biological yield as well as harvest index were measured.

III. Results and discussion

Biological yield

Results of present research variance analysis indicated that there was no significant difference among cultivars in terms of biological yield, the highest (209 kg/ha) and lowest (201 kg/ha) amount of which belonged to cultivars ltashem and Azad, and cultivar Arman, respectively.

Variance analysis results showed that, at level of 1%, the difference among the levels of different herbicide toxin was significant. Therefore, it can be said that final yield of common pea changed under the effects of herbicide toxin treatments. Maximum yield (270kg/ha) was obtained under the effects of treatments (controlling weed manually) while minimum yield (172 kg/ha) was obtained under the effects of herbicide toxin Imaztapyr.

So given the nature of dry farming, it weed is controlled well at early stages of crop growth, soil-stored moisture, in terminative stage of crop, results in favorable development of plants and an increase in foliage which, in turn, results in an enhancement of leaf area (LA). With removal of weed, availability of sufficient space for plants growth, and increased area of plant photosynthesis, synthesis and translocation of assimilates. It appears that sufficient ,moisture available at different development stages including flowering and grain-setting improves grain yield because durin these stages,2 important components(number of pods per plant and number of grains per pod) of grain yield are formed. During stages of crop and nutrients present in the soil are supplied to plants and plant bulk grows and grains become bigger.

Results of variance analysis indicated that cultivar x toxin interaction was not significant for trait of biological yield. So it can be said that utilization of different herbicide toxins to control weed leaves different responses on biological yield among different cultivars. This means that each of herbicide toxin treatments (controlling weed) has different effects on degree of weed control, but such effects cannot create a significant difference among treatments. To control weed can, directly and

indirectly, result in an increase in biological yield, in grain yield, and in components of grain yield.

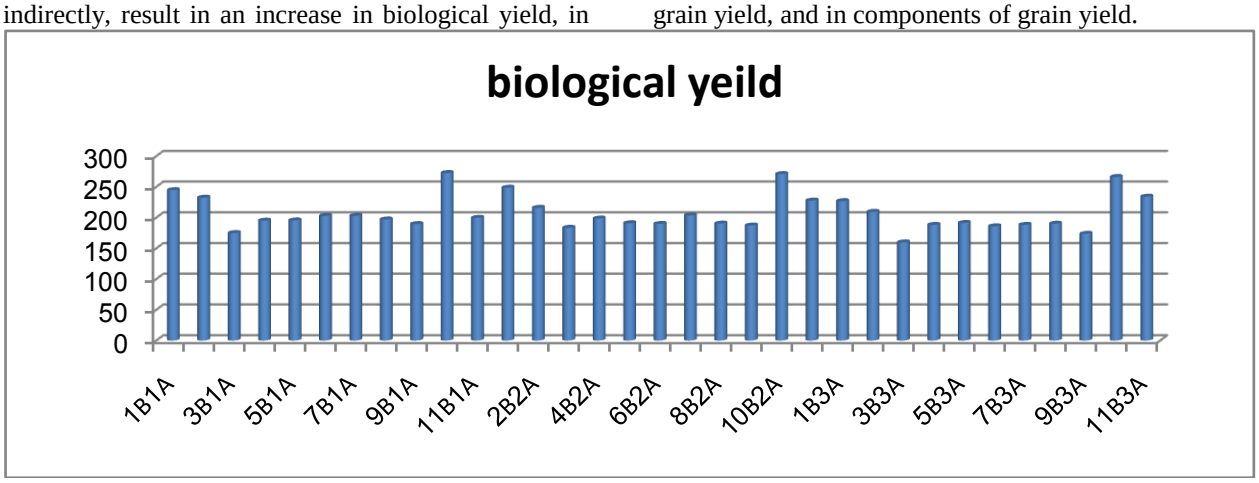

Diagram 1. Cultivar × toxin interaction on biological yield

IV. Harvest index

Results from data variance analysis of this research showed that variety (genotype) had no significant effect on harvest index, the highest (38%) and lowest (30%) values of which belonged to cultivar Arman and cultivar Hashem, respectively. It seem that nutrients distribution, appropriate penetration of light into plant canopies, and balanced use of water during different stages of crops growth result in increased plant aerial bulk, proper development of stems, leaves, and other organs of plants, therefore, produced dry matter increases. Increased harvest index reflects plants ability to translocate and allocate more assimilates to the shoot and is identified as one of indices used to evaluate efficiency of crop dry matter divisions. (Genetically, cultivar Arman has maximum harvest index(38%). It can be said that, compared to other cultivars, cultivar Arman allocates more volume of produced dry matter to grains and possesses a better grain to biological yield ration.

Leaf area index (LAI) and dry matter yield (DMY) of crop decrease on the fields with high density of weed because a great amount of water and nutrients is consumed by weed. Therefore, harvest index or grain to dry matter ratio decreases due to competition among plants.

In presents research, factors of toxin had significant effects on trait of harvest index at the level of 1% so that maximum (45%) and minimum (15%) values of it were obtained from toxin Pyridite and toxin interaction on harvest index became significant statistically at the level of 5%, the highest (53%) and lowest (13.9%) values of which were obtained from cultivar Arman x toxin Pyridite interaction and from cultivar Azad x toxin Imaztapyr interaction, respectively.

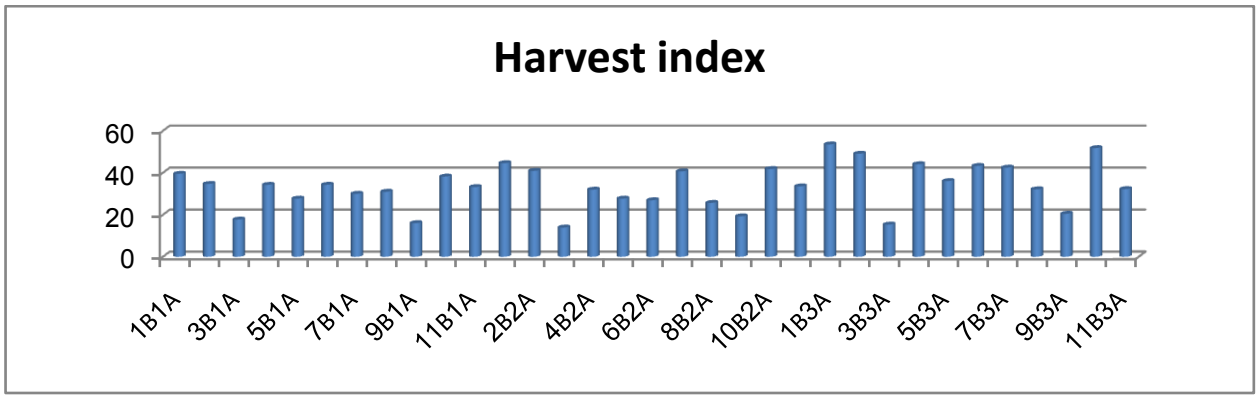

Diagram 2. Cultivar × toxin interaction on harvest index

V. Conclusion

Results from present research variance analysis indicated that there was no significant difference among cultivars in terms of biological yield and harvest index. In this research, factors of toxin had significant effects on traits of biological yield and harvest index at the probability level of 1%. Results from variance analysis showed that cultivar x toxin interactions were not significant for trait of biological yield while interaction of both factors was significant for trait of harvest index.

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