

Studying the Yield and Compatibility of Different Lines of White Bean, *Phaseolus Vulgaris* L., in Khuzestan, Sardasht and Eghlid

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Abstract

This study was conducted with a total of 10 lines of white bean with two bean controls, the variety of Daneshkade and line of 11805, totally 12 lines and varieties in a completely randomized block design with four replications and in three places (Khuzestan – Sardasht - Eghlid) in 2014 and 2015 that as a result the line of 74Emerson with the yield of 3.757 t ha and line of Karakasehiro with the yield of 4.281 t ha in Sardasht and the line of Jules with the yield of 2.57 t ha in Eghlid showed the highest yield. The results of combined analysis of variance for main effects and interactions included:

The effects of year have become significant.

The effects of variety have become significant.

The effects of place have become significant.

The interactions of variety × year × place have become significant.

The interactions of year × variety have not become significant.

The interactions of variety × place have become significant.

Totally three places and two years, the Jules variety with the yield of 3.168 t/ha showed the highest yield.

- The correlation coefficients showed that there was a positive and significant correlation between seed yield and 100 seed weight (0.32), number of pods per plant (0.03), and plant height (0.22) at 5% level.

Introduction

Given the importance of the bean in terms of protein content in its seeds (18-23%) and the area under cultivation in the country (over 114000 hectares) and the property of desirably being canned and its ability to get foreign exchange by exports, the introduction of high-

yielding varieties and lines that are favorable qualitatively and quantitatively is one of the most important priorities in the programs of improvement and development of the bean cultivation in the country. The seeds of lines used in this study have been prepared from the experiments in the last years in different places of the country that it had the good advantages in terms of yield, type of plant and 100 seed weight compared to other lines and varieties. In 1999, Ghaffari Khaliq et al introduced the three red bean varieties named Akhtar, Sayyad and Derakhshan by the experiments of yield comparison (3). In 2000, Ghaffari Khaliq introduced two promising varieties of white beans named 74Emerson and Jules by using the experiments of bean yield comparison (4). In 1982, Adams reported that the bean yield depended on three major factors (number of pods per plant, number of seeds per pod and 100 seed weight) (6 and 9).

In 1985 Ram and Prasad reported that there was a genetic linkage between plant height and unlimited-growth type of bean and pod shape and size. In 1996, in a study conducted in Karaj, Ghaffari Khaliq reported that the seed protein content with the seed yield had the negative linkage (47%) at 1% level (2). In 2000, Beizaei reported that the lines of G-11867 and Jules had the better yield than the controls in the experiments of yield comparison and determination of compatibility of white bean varieties in Markazi province (1). In 2000, Mohammad Khani reported that Great Northern line is one of the suitable varieties for Lorestan province in the experiments of yield comparison of bean varieties and lines (5).

Materials and methods:

This study was examined and compared with 10 lines and varieties of white bean with two controls (white bean, Daneshkade variety, and white bean, 11805), totally 12 lines and varieties, in a completely randomized block design with four replications in three places (Khuzestan - Sardasht - Eghlid).

The number of rows per plot, including four lines with the length of four meters, 50 cm distances between rows and 10 cm distances between plants on the rows were considered.

Seedbed preparation in this project included the plow, disc, leveler, and ruler according to the conventional agricultural method. Before planting, the seeds were disinfected by methyl thiram fungicides (1.5 per thousand) and before planting the seeds the Treflan herbicide (1.5 per thousand) was used. During the growth of bean plants the characteristics such as plant height and number of pods per plant were recorded. At the time of harvest, the border lines and a half meters from the beginning and end of each line and variety were removed. The harvest area of 3 square meters of chemical fertilizers was conducted based on the soil test. The seed product of each line and variety was harvested separately and 100 seed weight and marketability were determined in the laboratory. After weighing the product, the statistical analysis was conducted by analysis of variance and the mean comparison was conducted by L.S.D. At the end of the second year of combined analysis of variance was performed in every place and totally in three places. The correlation coefficients of yield components such as plant height, number of pods per plant, and 100 seed weight were also calculated. Finally, the interactions of varieties \times place, year \times place, variety \times year, place \times year and variety \times place were also conducted.

Table 1. Some physical and chemical characteristics of the soil

Depth (Cm)	salinity EC (ds/m)	acidity (PH)	Soil texture	organic carbon OC%	Nitrogen N%	Phosphorus P%	Potassium K (ppm)	Zn (ppm)	Iron Fe (ppm)	Manganese Mn (ppm)	Br (ppm)
0-30	0.73	7.38	Sandy loam	0.82	0.92	6.3	281	0.68	8.39	9.02	0.68

Results

Analyzing the statistical data of experimental conducted in this study showed the following results:

A) Totally the line No.9 with the name of 74-Emerson with the yield of 3.757 t/ha showed the highest yield in two years in Sardasht that was not significant compared to the Daneshkade control with the yield of 3.939 t/ha but it became significant compared to the control 11805 with the yield of 1.704 t/ha.

B) Totally the line No.2 with the name of Karacasehiro with the yield of 4.281 t/ha showed the highest yield in two years in Khuzestan that

was significant compared to the Daneshkade control with the yield of 3.816 t/ha but it became significant compared to the control 11805 with the yield of 2.885 t/ha.

C) Totally the line No.8 with the name of Jules with the yield of 2.570 t/ha showed the highest yield in two years in Eghlid that was significant compared to the Daneshkade control with the yield of 1.987 t/ha but it became significant compared to the control 11805 with the yield of 1.519 t/ha.

D) Totally the promising line No.8 with the name of Jules with the yield of 3.168 t/ha had the highest yield in two years and three places that did not show a significant difference compared to the Daneshkade control with the yield of 3.147 t/ha.

E) The effects of year, the effects of place and the effects of variety became significant and the interactions of year \times variety \times place have not become significant.

F) The interactions of variety \times place became significant and the interaction of variety \times year did not become significant.

G) The correlation coefficients showed that the seed product yield with 100 seed weight (0.32), number of pods per plant (0.03), and the plant height (0.22) was significant at 5% level and had a positive correlation.

Discussion

Considering the results of this study, the line of Jules had more desirable yield than other lines and varieties in all places. Also, this line showed better yield in the experiments conducted in Khomein and Karaj in the previous years.

It is suggested to do the complementary experiments (pests and diseases) in every area for this line and the better lines.

Correlation coefficients showed that 100 seed weight, plant height and number of pods per plant affect the bean yield. In particular, the plant height that is an important factor in increasing product should be considered by reformers of beans in the country.

Reference

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