



**Determination Of Yield And Yield Components In Some Dry Bean (*Phaseolus vulgaris* L.) Cultivars Under Giresun Conditions**

Nuri YILMAZ\*, Ferda OZKORKMAZ ATICI, Fatih ONER

<sup>1</sup>Ordu University, Agricultural Faculty, Field Crops Department, Ordu-TURKEY

\*Corresponding author: y\_nuri@hotmail.com

**Abstract**

This study was carried out to determine yield and yield components under Giresun ecological conditions in 2011. As the material of the research 6 registered cultivars (Balkız, Akman 98, Önceler 98, Yunus 90, Göynük 98, Karacaşehir 90), which were supplied from the Institute of Transitional Zone Agricultural Research- Eskişehir, and other cultivars as Çelik strimax and Alman Ayşe were utilized. The experiment was arranged in complete randomized blocks design with three replication. At the end of the research, the number of pods per plant was 13.90-18.00 and the number of grains per pod ranged between 3.97 and 5.43. The weight of 1000 grains was 205.33- 421.33 grams and the rate of protein was measured as %20.50-24.06. As a result of the statistical analysis, significant differences between average values were detected. The lowest grain per decare yield was measured in Önceler 98 as 82.31 kg/da, and the highest yield was obtained from Alman Ayşe as 131.11 kg/da.

**Keywords:** Bean, Type, Yield, Yield components

**Introduction**

In order to reduce the population that is fed in an insufficient and unbalanced way, the cultivation of edible grain legumes that are rich in protein and has a good rate of digestion in their compounds must be placed importance upon.

Edible grain legumes provide high-value crops in terms of protein, and preserve and increase the efficiency of the soil to some extent through their taproots as well as other organic wastes with high C/N parameter; therefore they are crucial in crop rotation (Geçit 1995).

Edible grain legumes play a momentous role in Turkish field crop cultivation and production. Turkey is one of the leading countries of the world in terms of edible grain legume production and consumption. According to the data from the year 2013, the total amount of edible grain legumes in Turkey is 1 million tons (Anonymous 2013)

Among the edible grain legumes, bean is the third after chickpeas and lentils in terms of cultivation land and production in Turkey. Bean, which had the first place among edible legumes in the world with 29.9 ha cultivation land and 23.2 million tons of production according to the data of 2013, has 94 thousand ha cultivation land, 200 thousand tons of production and 212 kg/da yield in our country (Anonymous 2013).

As day-neutral plant, bean is the legume type that is most commonly cultivated.

The cultivation is commonly done in the temperate zone. Bean cultivation is done in places with altitudes up to 2000 m above sea level in the world. Beans are cultivated in almost every region of Turkey (Düzdemir and Ece 2009).

To develop cultivars suitable for a particular region, it is necessary to know the factors of yield along with their rate of impact and relations among them and to choose materials for breeding programs in accordance with these criteria (Torun and Köycü 1999).

In this study, it was aimed to cultivate Balkız, Akman 98, Önceler 98, Yunus 90, Göynük 98, Karacaşehir 90, Çelik strimax and Alman Ayşe bean cultivars that have been registered and cultivated in Turkey under the ecological circumstances of Şebinkarahisar- Giresun and to determine their compatibility with the region by defining its yields components.

**Material And Method**

This study was carried out under the ecological conditions of Şebinkarahisar- Giresun in 2011. As materials of the study, Balkız, Akman 98, Önceler 98, Yunus 90, Göynük 98, Karacaşehir 90, Çelik strimax and Alman Ayşe registered cultivars were used.

In 2011, when the experiment was set, total amount of rain was 182.4 mm, average temperature was 17.04 °C, and the average humidity was %56.24. Soil texture of the

experimental area was clayed-loamy, it has alkaline reaction feature (pH = 7.85), and it is rich in organic substances and phosphorus.

The experiment was arranged in complete randomized blocks design with three replication. On the trial, the width of the lines was 50 cm, the distance between lines was 10 cm, and the length of the lines was 3 m. Each type was given 3 lines. Parcel area was measured as (1.5 m x 3m) 4.5 m<sup>2</sup>.

On the trial field, Ammonium Nitrate and Triple Super Phosphate fertilizers were applied in a pattern of 4.0 kg pure nitrogen, 6 kg P<sub>2</sub>O<sub>5</sub> per

decare (Şehirli, 1998). The harvest was done by hand in September.

On the study, the number pods per plant, number of grains per pod, the weight of 1000 grains, protein rate and grain yield per decare were analyzed.

The data obtained on the trial was subjected to variance analysis according to Coincidence Blocks Testing pattern; and Duncan test was applied on significant average differences.

**Table 1.** Number of pods per plant, grains per pods, weight of 1000 grains, protein rate, data on yield as grain per decare and Duncan groups

Types	Pods per Plant (pods/plant)	Grains Per Pod (Grains/Pod)	Weight of 1000 Grains (gr)	Protein Rate (%)	Grain Yield Per Decare (kg/da)
Çelik Strimax	14.90 bc	4.50 c	270.67 d	23.06 bcd	86.32 d
Balkız	14.40 c	5.43 a	405.67 ab	22.36 d	117.03 bc
Alman Ayşe	18.00 a	4.60 c	421.33 a	20.70 e	131.11 a
Akman 98	16.23 b	4.10 de	379.67 bc	24.06 a	107.99 c
Önceler 98	14.47 c	3.97 e	410.67 ab	23.70 ab	82.31 d
Yunus 90	13.90 c	4.40 cd	205.33 e	22.83 cd	121.62 ab
Göynük 98	15.07 bc	4.50 c	288.67 d	20.50 e	88.35 d
Karacaşehir 90	14.03 c	5.03 b	355.67 c	23.43 abc	93.32 d

### Results And Discussion

In terms of pods per plants, there are statistically (P<0.01) remarkable differences among types. As seen on Table 1, the values ranged between 13.90 and 18 pods/plants with the highest being Alman Ayşe and lowest being Yunus 90. The number of pods per plant was reported as 4.5- 25 pods per plant by Peşken and Gülümser (2005), as 4.1-18 pods/plant in a two-year average by Anlarsal et al. (1998), and as 7.4-18.33 pods/plant by Varankaya (2011). The results of the studies mentioned are in compliance with our findings. As the number of pods per plant increases, so does the number of seeds in the pods thus the yield per plant increases. And this is a desired feature in cultivation. As the number of pods per plant grows, so does the yield per plant.

As seen on Table 1, the number of grains per pod ranged between 3.97 and 5.43 highest being Balkız and the lowest being Önceler 98. Other cultivars varied within this range. There emerged statistically remarkable differences among the averages. Önder and Şentürk (1996) reported 1.86-4.53 grains under the circumstances of Tokat, Anlarsal et al. (2000) reported 1-9 in Çukurova's conditions, Ülker and Ceyhan (2008) reported a range between 3.53 and 4.89 in Konya's

ecological conditions. Our results comply with the results of these studies. Breeding studies demonstrates that the number beans in the pod stems from the genetic qualities of the plant (Sobral and Sobral, 1983). The number of beans in the pod is one the most influential characteristic that affects the grain yield; and its effects may vary according to different genotypes.

The highest and lowest weights of 1000 grains were detected on Alman Ayşe (421.33 g) and Yunus 90 (205.33 g). There emerged statistically remarkable differences among the averages in terms of 1000- grain weight. The weights of 1000 grains were reported as 460 g by Önder Şentürk (1996), 170-520 g by Pekşen (2005), and 174- 460 g by Cengiz (2007). One of the most significant elements that affect grain yield is the weight of 1000 grains, and it is effective directly on the yield.

As provided on table 1, the protein levels ranged between 20.70 and 24.06%. The highest protein level was detected on Akman 98 and the lowest level was measured on Alman Ayşe. Statistically significant differences were observed among protein rates. The protein values were documented as 19.25 - 23.66% by Cengiz (2007), 19.21 - 26.60% by Ülker (2008), 22.98 - 24.92% by Önder and Şentürk (1996), and 18.99 – 29.17 by

Düzdemir (1998). These results and our findings are in consistence.

The averages of grain per decare yield ranged between 82.31 and 131.11 kg/da. The highest grain per decare yield was observed on Alman Ayşe types and the lowest was obtained from Önceler 98. Statistically important differences ( $P < 0.01$ ) were reported in terms of grain per decare yield. Grain per decare was reported as 162.7 – 237.7 kg/da by Bozoğlu and Gülümser (2000), 285 – 472 kg/da by Fırtına (2006), 150.42 – 400.74 by Varankaya (2011). These results show that different environments and types along with their interactions affect the grain yield. It has been suggested that each genotype of beans has a different rate of adaptation to different ecologic conditions due to their genetic structure, which backs up our results. With cultural processes applied, the grain yield can also be increased.

In his study, where he analyzed the morphological and biological properties of bush bean types that are cultivated in Turkey, Şehirli (1988) reported the number of seeds in pod as 2-8, pods per plants as 3-12 and the weight of 1000 grains as 186-443 g.

In the study he did with 41 different bean lines in order to define the genetic differences and some quality characteristics of bush bean populations cultivated in Konya, Kahraman (2008), reported protein rate as 20.11-28.59%.

Zeytun and Gülümser (1988) made a comparative analysis on 33 domestic bean lines and 2 bred bean lines of foreign origin in terms of phenological qualities like flowering and pod formation, and morphological qualities as plant height, number of pods per plant and weight of 1000 grains on their study they conducted on the plain of Çarşamba in 1986. On each line, 16- 86 pods were detected and 3.26- 5.87 seeds per pod were found in each pod. In the same study, 1000-grain weight ranged between 177.9- 548.4 grams.

In the study they conducted on bush bean types (Yunus-90 and Karacaşehir-90), Önder and Akçin (1995) reported the protein rate on Yunus-90 type as 19.40% and as 21.63% on Karacaşehir-90 type.

In their test they conducted on Yunus 90 bean type in the ecological conditions of Konya, Önder and Sade (1996) reported the number of pods per plant as 13.50, seed per pod as 2.67, the grain yield as 231 kg/da and the weight of 1000 grains as 403.3 g.

On a research he did under the ecological circumstances of Samsun, Pekşen (2005) used a total number of 6 bean genotypes

consisting of four bean types (Yalova-5, Şahin- 90, Karacaşehir-90 and Yunus- 90) and two populations (American Bush and Iğdır). According to the average values of two years, the number of pods was 7.21- 13.45 pods/plant, the number of seeds per pod was 3.24- 6.06, weight of 1000 grains was 17.78- 52.88 g, and the highest grain yield was on Yunus-90 type (231.62 kg/da).

### Conclusion

This study was conducted with the aim of defining the suitability of some registered bean cultivars in Turkey for cultivation in Şebinkarahisar - Giresun and detecting the yield components in the ecological conditions of the region. As a result of the analyses and measures, the highest yield was in Alman Ayşe with 131,11 kg/da, the highest protein rate was in Akman 98 with 24.06%, the number of pods per plant was in Alman Ayşe, and the highest number of seeds per pod was in Balkız. The highest weight of 1000 grains was measured in Alman Ayşe with 421.33 kg/da. Although Alman Ayşe seems appropriate for the region in terms of its high yield, it would be useful to conduct the same study in different provinces of Giresun.

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