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Determination of Some Quantitative Characteristics of Fresh and Pinto Bean Genotypes Collected in Erzincan Province

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ABSTRACT

Plant genetic resources constitute the most valuable resources of countries. It is of great importance to determine the quantitative characteristics of these resources and to use them in breeding studies in this direction. In order to determine some quantitative characteristics of red pinto bean and fresh bean genotypes widely grown in Erzincan, 71 bean genotypes (41 pinto beans and 30 green beans) and four commercial varieties (Aleyna, Gina, Perolar and Serra) were examined. In the study, emergence time, first and 50% flowering time, flowering time, pod formation time, fresh pod ripening and harvest time, seed harvest time, pod length, pod width, 1000 seed weight, number of pods per plant, green pod weight, seeds per pod Quantitative properties such as the number of pods, pod thickness (mm), pod yield per plant (g), number of seeds per plant (pieces), seed yield per plant (g) and pod yield per decare (kg/da) were investigated. The data obtained were subjected to the DUNCAN test and according to the analysis result, it was determined that the genotypes differed at the level of 1% in terms of quantitative characteristics.

Erzincan İlinden Toplanan Taze Fasulye ve Barbunya Genotiplerinin Bazı Kantitatif Özelliklerinin Belirlenmesi

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ÖZ

Bitki genetik kaynakları ülkelerin en değerli kaynaklarını meydana getirmektedir. Bu kaynakların arasındaki kantitatif özelliklerinin belirlenmesi ve bu doğrultuda ıslah çalışmalarında kullanılması büyük önem arz etmektedir. Erzincan'da yaygın olarak yetiştiriciliği yapılan barbunya ve taze fasulye genotiplerinin bazı kantitatif özelliklerinin belirlenmesi amacıyla toplanan 71 fasulye genotipi (41 barbunya ve 30 taze fasulye) ile dört ticari çeşit (Aleyna, Gina, Perolar ve Serra) incelenmiştir. Araştırmada çıkış süresi, ilk ve %50 çiçeklenme süresi, çiçeklenme süresi, bakla oluşum süresi, taze bakla olgunlaşma ve hasat süresi, tohum hasat süresi, bakla boyu, bakla eni, 1000 tohum ağırlığı, bitki başına bakla sayısı, yeşil bakla ağırlığı, baklada tohum sayısı, bakla kalınlığı (mm), bitki başına bakla verimi (g), bitki başına tohum sayısı (adet), bitki başına tohum verimi (g) ve dekara bakla verimi (kg/da) gibi kantitatif özellikler incelenmiştir. Elde edilen veriler DUNCAN testine tabi tutulmuş analiz sonucuna göre, genotiplerin kantitatif özellikler bakımdan %1 seviyesinde farklılık gösterdiği belirlenmiştir.

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INTRODUCTION

Legumes are an important family that includes about 750 genera and more than 19,000 species (Sadeghi *et al.*, 2011). *Legumes*, which is one of the leading food sources, is a family that is important in human nutrition, especially in meeting protein needs (Yolci, 2020). Beans (*Phaseolus vulgaris* L.) are one of the most important crops of this family. It is stated that the mainland of the bean is two separate areas, Mesoamerican and South Andean. The Mesoamerican gene pool stretches from Mexico to Central America and northern Colombia. The Andean gene pool includes Peru, Chile, Bolivia and northern Argentina (Arteaga *et al.*, 2019). *P. vulgaris, P. lunatus, P. coccineus, P. acutifolius*, and *P. polyantus* species in the Leguminosae family are used in human nutrition (Akbulut *et al.*, 2014). Among these species, *Phaseolus vulgaris* constitutes approximately 75% of the species grown in the world (Gepts *et al.*, 2005). Beans (*Phaseolus vulgaris* L.) ranks first among edible legumes in the world in terms of both cultivation area and production. Bean; in addition to being consumed fresh, it has an important place in human nutrition with its high protein content as dry grains. In addition, sulfur-containing amino acids are found more in beans than in other legumes, and this feature causes the biological value of protein in beans to be high (Broughton *et al*., 2003). On the other hand, beans containing various vitamins (A, D, E and K) have an important place in terms of human health due to all these features (Ülker and Ceyhan, 2008; Zargar *et al.*, 2016). In addition to being the gene center of many plant species, Turkey has an important place in the world in terms of plant genetic diversity. However, Turkey also has very rich gene resources in terms of vegetable species as well as many plant species (Öztürk and Dursun, 2018). The characterization of plant genetic resources is mainly carried out in order to reveal the genetic differences between seed samples or populations, the amount and distribution of genetic variation in these samples and populations (Piergiovanni *et al.*, 2004). Therefore, studies on the conservation and use of genetic material have a special importance for Turkey. Gene resources collected in any species cannot be included in breeding programs unless they are identified, and even if they are included in breeding programs without identification, they are lost in a short time (Akbulut *et al*., 2014). Turkey has a wide variation in the bean population in terms of phenotypic and genotypic heritability (Girgel and Cokkizgin, 2019). Determination and evaluation of quantitative and qualitative morphological characteristics is an important traditional method for determining and defining the relationship between bean genotypes (Akbulut *et al.*, 2014). In Erzincan, there are many local types adapted to the conditions of the region, and there is a large genetic variation. In this study, fresh and pinto bean genotypes (71 genotypes) collected from Erzincan province and 4 standard commercial varieties (Aleyna, Gina, Perolar and Serra) were examined and compared in terms of agronomic and quality characteristics.

MATERIAL AND METHOD

Plant material

In this study, 71 local bean genotypes (41 pinto bean and 30 fresh bean) collected and selected from Erzincan province, district and villages in 2015 were used. It was also used as a witness in 4 standard commercial varieties (Table 1).

Some characteristics of Erzincan province where bean genotypes were collected.

The province of Erzincan, where the experiment was conducted, is located in the Eastern Anatolia Region. The province is adjacent to Erzurum in the east, Sivas in the west, Giresun, Gümüşhane, Bayburt in the north, Malatya, Elazığ, Tunceli and Bingöl in the south. The approximate area of the province is 11 903 km² and its altitude is 1 185 meters (Karadeniz and Altinbilek, 2018). Erzincan province shows microclimate characteristics among the surrounding provinces in terms of climate characteristics. Due to this feature, many agricultural products can be grown in the province.

Table 1. *General information on bean genotypes collected from Erzincan province*

Code	Type	Collected location	Longitude (° ′)	Latitude (° ′)	Altitude (m)
G1	Pinto Bean	Bahçeliköy village	39°20'	39°45'	1371
G2	Pinto Bean	Bahçeliköy village	39°20'	39°45'	1371
G3	Pinto Bean	Bahçeliköy village	39°20'	39°45'	1371
G4	Pinto Bean	Bahçeliköy village	39°20'	39°45'	1371
G5	Pinto Bean	Bahçeliköy village	39°20'	39°45'	1371
G6	Pinto Bean	Bahçeliköy village	39°21'	39°45'	1371
G7	Fresh bean	Bahçeliköy village	39°21'	39°45'	1371
G8	Fresh bean	Bahçeliköy village	39°21'	39°45'	1371
G9	Pinto bean	Bahçeliköy village	39°21'	39°45'	1371
G10	Pinto bean	Ballıköy Village	39°19'	39°45'	1503
G11	Pinto bean	Ballıköy Village	39°19'	39°45'	1503
G12	Pinto bean	Ballıköy Village	39°19'	39°45'	1503
G13	Fresh bean	Ballıköy Village	39°19'	39°45'	1503
G14	Fresh bean	Üzümlü- Bayırbağ	39°43	39°41'	1381
G15	Pinto bean	Cevizli Village	39°21'	39°43'	1400
G16	Pinto bean	Cevizli Village	39°21'	39°43'	1400
G17	Fresh bean	Cevizli Village	39°21'	39°43'	1400
G18	Fresh bean	Cevizli Village	39°21'	39°43'	1400
G19	Fresh bean	Cevizli Village	39°21'	39°43'	1400
G20	Fresh bean	Cevizli Village	39°21'	39°43'	1400
G21	Pinto bean	Cevizli Village	39°21'	39°43'	1400
G22	Fresh bean	Cevizli Village	39°21'	39°43'	1400
G23	Pinto bean	Cevizli Village	39°21'	39°43'	1400
G24	Pinto bean	Çatalarmut Village	39°18'	39°48'	1440
G25	Pinto bean	Çatalarmut Village	39°18'	39°48'	1440
G26	Fresh bean	Çatalarmut Village	39°18'	39°48'	1440
G27	Fresh bean	Çatalarmut Village	39°18'	39°48'	1440
G28	Fresh bean	Çatalarmut Village	39°18'	39°48'	1440
G29	Fresh bean	Çayırlı-Balıklı Village	40°00'	39°50'	1547
G30	Pinto bean	Çayırlı-Balıklı Village	40°00'	39°50'	1547
G31	Pinto bean	Çayırlı-Balıklı Village	40°00'	39°50'	1547
G32	Pinto bean	Çayırlı	40°02'	39°48'	1527
G33	Fresh bean	Çayırlı	40°02'	39°48'	1527
G34	Pinto bean	Çayırlı	40°02'	39°48'	1527
G35	Pinto bean	Çayırlı	40°02'	39°48'	1527
G36	Fresh bean	Erzincan- Center	39°28'	39°43'	1178
G37	Fresh bean	Ekmekli Village	39°20'	39°45'	1339
G38	Fresh bean	Ilic	38°33'	39°27'	1091
G39	Fresh bean	Kemah	39°02'	39°36'	1074
G40	Fresh bean	Kemaliye	38°29'	39°15'	973
G41	Fresh bean	Kemaliye	38°29'	39°15'	973
G42	Pinto bean	Refahiye	38°46'	39°54'	1593
G43	Pinto bean	Tercan	40°23'	39°46'	1593
G44	Fresh bean	Üzümlü-Uluköy	39°44'	39°37'	1164
G45	Fresh bean	Üzümlü-Uluköy	39°44'	39°37'	1164
G46	Fresh bean	Üzümlü-Uluköy	39°44'	39°37'	1164
G47	Fresh bean	Üzümlü-Uluköy	39°44'	39°37'	1164
G48	Pinto bean	Üzümlü-Uluköy	39°44'	39°37'	1164
G49	Fresh bean	Üzümlü-Uluköy	39°44'	39°37'	1164
G50	Fresh bean	Üzümlü-Uluköy	39°44'	39°37'	1164
G51	Pinto bean	Üzümlü-Uluköy	39°44'	39°37'	1164
G52	Pinto bean	Üzümlü-Uluköy	39°44'	39°37'	1164
G53	Pinto bean	Üzümlü-Uluköy	39°44'	39°37'	1164
G54	Pinto bean	Üzümlü-Uluköy	39°44'	39°37'	1164
G55	Pinto bean	Üzümlü-Uluköy	39°44'	39°37'	1164
G56	Pinto bean	Üzümlü	39°41'	39°41'	1290
G57	Pinto bean	Üzümlü	39°41'	39°41'	1290
G58	Fresh bean	Üzümlü	39°41'	39°41'	1290
G59	Pinto bean	Üzümlü	39°41'	39°41'	1290
G60	Pinto bean	Üzümlü	39°41'	39°41'	1290

G61	Pinto bean	Üzümlü	39°41'	39°41'	1290
G62	Pinto bean	Üzümlü	39°41'	39°41'	1290
G63	Pinto bean	Üzümlü	39°41'	39°41'	1290
G64	Pinto bean	Üzümlü	39°41'	39°41'	1290
G65	Pinto bean	Üzümlü	39°41'	39°41'	1290
G66	Pinto bean	Üzümlü	39°41'	39°41'	1290
G67	Pinto bean	Üzümlü	39°41'	39°41'	1290
G68	Pinto bean	Üzümlü	39°41'	39°41'	1290
G69	Pinto bean	Üzümlü	39°41'	39°41'	1290
G70	Pinto bean	Yaylabaşı	39°30'	39°39'	1244
G71	Fresh bean	Yanlızbağ	39°48'	39°24'	1344
Aleyna	Fresh bean	Commercial cultivar			
Gina	Fresh bean	Commercial cultivar			
Serra	Pinto bean	Commercial cultivar			
Perolar	Fresh bean	Commercial cultivar			

Method

Bean types and standard varieties were planted in rows along drip irrigation pipes on the land belonging to the Erzincan Horticultural Research Institute in 2016. The experiment was established with 3 replications according to the randomized complete blocks trial design, with 30 plants in each replication. Quantitative measurement of agricultural characteristics in plants was made according to the parameters used by Dursun (1999) and Balkaya (1999).

The following quantitative features were examined in the study;

Emergence time, flowering time, pod formation time, pod formation time, fresh pod ripening and harvest time, seed harvest time, pod length, pod width, 1000 seed weight, number of pods per plant, green pod weight, number of seeds per pod, pod thickness (mm), pod yield per plant (g), number of seeds per plant (number), seed yield per plant (g) and pod yield per decare (kg/da).

Data analysis

The analysis of quantitative morphological characteristics of the bean genotypes used in the study was done with the SPSS 22.0 statistical package program. Statistical differences between the means were determined by Duncan multiple comparison test at 1% significance level. Correlation analysis was assessed by the Pearson test. A principal component analysis (PCA) was used to examine the relationship between analyzed traits and similarity between inclusions.

RESULTS

Considering the quantitative characteristics examined in the genotypes, statistically significant differences were found at the 1% level (Table 2). The time that 50-60% of the plants emerge after sowing was determined as the emergence period. The earliest emerging genotypes after sowing were G8 and G40 (6 days) genotypes, while the latest emerging genotypes were G5, G13, G22, G24, G42, G58 and Serra cultivars (9 days). In other studies, Fırtına (2006) determined the emergence time as the earliest 12, the latest 15 days, Özbekmez (2015) determined the earliest time as 11.33, the latest as 16.33 days, and Atıcı (2013) determined this time between 13 and 25 days. Based on the seed sowing date, the first flowering and 50% flowering period were calculated according to the date when the first flowers were seen in the genotypes and 50% of the plants in the plot were seen. As a result, the first flowers were detected in the G36 genotype with the earliest 32 days. The latest was determined in G49 genotype with 68 days. 50% flowering was observed in the earliest G36 (39 days) and the latest G49 (75 days) genotypes as in the first flowering. Ekincialp (2012), in his research, found an average of 63.72 days for 50% flowering in the genotypes he studied. The earliest flowering period was 49.67 days in G29, G71 and G95 bean genotypes; The longest flowering period was found in the G69 genotype with 83.67 days. Our findings are similar to the results of the researcher. It was determined that the earliest pod-forming genotypes were G2 and G36 genotypes with 41 days, and the last pod-forming genotype was G42 with 72 days. The pods that came to the earliest green eating death were determined respectively in the settling types G36 (55 days), Aleyna (61 days) and Gina (62 days) and G2 (63 days) genotypes. The latest ripening and harvesting times were

determined in the inverted G51 (98 days), G69 (97 days), G16 and G13 (95 days) genotypes, respectively. Erdinç et al. (2013), in their study on the determination of various vegetative characteristics of some bean genotypes, determined the average harvest time of broad beans to be 92.71 days. In terms of seed harvest time, the earliest harvest time was determined in G2 genotype with 106 days. It was determined that the genotypes that reached the latest seed harvest death were Bhç-7 and G30 genotypes with 139 days. It has been observed that the genotypes with the seated growth form come to the harvest later than the pole genotypes. In the evaluation made between pinto bean genotypes, it was observed that the harvest times of the genotypes other than the G2 genotype varied between 134 and 139 days, while the seed harvest times of the green bean genotypes varied between 113 and 139 days. Balkaya (1999), in his study on green beans, determined that the seed harvest time ranged between 76 and 93 days in sitting types and between 93 and 178 days in pole types. Similarly, in our study, it was determined that the squat (dwarf) forms came to seed harvest earlier. The reason for this is thought to be due to the shorter vegetation period of the dwarf forms (Table 2).

Table 2. *Average of quantitative characteristics of genotypes*

Genotype	ET^{ns}	FFT*	%50 FT*	FWT*	PFT*	PFHT*	SHT*
BHÇ 1	7	66	74	47	71	91	136
BHÇ 2	8	36	45	51	41	63	106
BHÇ 3	7	54	58	52	61	91	134
BHÇ 4	7	39	48	62	53	67	117
BHÇ 5	9	63	71	45	68	81	138
BHÇ 6	8	50	55	51	55	79	137
BHÇ 7	8	62	69	58	71	64	139
BHÇ 8	6	44	47	64	48	65	118
BHÇ 9	7	65	72	54	71	89	135
BKY 10	8	58	62	56	64	94	136
BKY 11	7	56	69	47	59	82	136
BKY 12	8	55	59	61	58	81	136
BKY 13	9	61	63	65	64	95	133
BYR-14	7	56	66	55	67	91	132
CVZ 15	7	58	61	59	64	93	136
CVZ 16	7	62	69	54	71	95	136
CVZ 18	7	51	56	71	67	90	137
CVZ 21	7	48	54	72	55	87	136
CVZ 22	9	60	66	57	70	82	138
CVZ 23	7	56	67	59	71	91	136
ÇTL 24	9	60	71	57	70	93	137
ÇTL 25	8	57	64	58	66	91	136
ÇTL 26	7	59	64	55	71	83	136
ÇTL 27	7	61	70	57	71	93	137
ÇTL 28	8	56	62	68	71	83	138
ÇYR 29	8	57	62	62	66	83	137
ÇYR 30	8	51	55	61	57	82	139
ÇYR 31	7	53	62	55	64	73	135
ÇYR 32	7	53	56	74	57	85	136
ÇYR 33	8	56	59	67	57	84	138
ÇYR 34	8	56	65	66	67	90	134
ÇYR 35	8	49	54	64	55	74	137
EBK 36	7	32	39	66	41	55	113
ILÇ 38	8	43	45	61	48	65	116
KMH 39	7	44	48	62	53	65	116
KML 40	6	42	45	66	47	67	119
RFH 42	9	63	69	51	72	94	137
TRC 43	7	49	52	54	58	92	136
ULU 44	8	44	46	78	48	67	117
ULU 45	8	56	63	42	61	80	136
ULU 46	7	65	71	49	66	83	138
ULU 49	7	68	75	55	71	93	136
ULU 50	7	52	57	67	68	87	136
ULU 51	8	65	74	48	70	98	136
ULU 53	7	50	55	71	62	83	136

ULU 54	8	58	69	49	65	83	136
ÜZM 56	7	55	58	71	62	82	136
ÜZM 57	8	65	69	46	70	82	136
ÜZM 58	9	59	62	63	62	83	136
ÜZM 59	7	51	55	66	57	87	136
ÜZM 60	7	55	65	52	60	83	136
ÜZM 61	8	52	62	57	63	85	136
ÜZM 63	7	62	69	57	71	85	136
ÜZM 65	8	59	64	59	62	85	136
ÜZM 66	7	61	66	59	69	91	136
ÜZM 67	7	58	62	64	62	76	136
ÜZM 68	7	58	70	45	61	84	136
ÜZM 69	7	52	55	62	55	97	136
ALEYNA	7	44	52	69	52	61	115
GİNA	8	43	51	62	56	62	115
PEROLAR	8	49	60	63	48	70	117
SERRA	9	42	55	65	48	67	118

ET:Emergence time, FFT:First flowering time, %50 FT: %50 flowering time, FWT:Flowering time, PFT:Pod formation time, PFHT:Fresh pod ripening and harvest time, SHT:Seed harvest time; ns: insignificant, *significant at %1 level

On average, the longest pod length was 18.03 cm in the Cvz-21 genotype and the shortest pod length was 5.44 cm in the Çyr-35 genotype. In a study conducted in Samsun province, in fresh seat and pole bean varieties; It was observed that the pods of all dwarf cultivars were of medium length. In the pole cultivars, it was determined as a result of the measurements that the longest pod length belonged to Zondra (18.3 cm in the first year, 18.2 cm in the second year) and German Ayşe (17.7 cm in the first year, 17.6 cm in the second year). It has been determined that the pod length of Özayşe-16 cultivar is shorter than the other pole cultivars (Kar *et al.*, 2005). In a study, it was determined that pod length varies depending on fertilizer applications and varieties (Çavuşoğlu and Akçin 2007). In the evaluation made according to the pod width, it was determined as a result of the measurements that the widest pod width was in Üzm-58 (19.34 mm) and the narrowest pod width was in the Kmh-39 (9.22 mm) genotype. It was determined that there was a statistically significant difference between genotypes in terms of pod width. It is thought that this difference may be due to the fact that pod width is a genotype-specific feature. Çavuşoğlu and Akçin (2007) investigated the effects of different fertilizer applications on yield and yield components in beans. As a result of the research, they determined that the pod width in the control group was 14.60 mm higher than the other applications. It is thought that the width of the pod, like the length of the pod, may vary with the effect of genetic structure and plant nutrition status. The lowest 1000 seed weights were found in Üzm-66, Ebk-36 and Ulu-45 genotypes with an average of 309.28, 334.54, 342.66 g, respectively. The highest weight was determined in Çyr-31, Çyr-35 and Üzm-63 genotypes with an average of 808.56, 804.3, 788.88 g, respectively. In a study conducted on Balkız, Akman 98, Önceler 98, Yunus 90, Göynük 98, Karacaşehir 90, Çelik strimax and German Ayşe cultivars, it was determined that the highest 1000 seed weight was in German Ayşe with 421.33 g, and the lowest in Yunus 90 with 205.33 g (Yılmaz *et al.*, 2014). Significant differences were observed between genotypes in terms of green pod weight. The highest pod weight (20.19 g) was determined in the Uzm-68 genotype, and the lowest pod weight (2.86 g) was determined in the Çyr-35 genotype. Balkaya (1999), in his study, found the weight of the broad bean between 3.7 and 12.4 g. Significant differences were found between genotypes in terms of the number of seeds in the pod. The maximum number of seeds in the pod was determined in Bhç-4 with an average of 7.77 seeds, and the least in the Uzm-66 genotype with an average of 1.2 seeds. Akbulut (2014) found that the number of seeds per legume was between 5 and 7 in his study on 12 bean genotypes. When the findings of the researcher are examined, it is seen that the average seeds are similar at most, but the least number of seeds is different. It is thought that this may be due to the genotypes studied.

Table 3. *Average of quantitative characteristics of genotypes*

Genotype	PDL*	PDW*	1000 SEW*	NPP*	GPW*	NSP*
BHÇ 1	10.87	11.14	484.78	19.67	7.30	4.50
BHÇ 2	14.19	14.78	604.96	27.00	9.00	4.90
BHÇ 3	13.02	11.43	532.47	10.00	8.68	4.27
BHÇ 4	16.35	12.90	491.94	31.33	9.78	7.77
BHÇ 5	14.08	12.57	438.03	37.25	8.07	5.40
BHÇ 6	12.21	13.41	503.02	12.00	10.23	5.23
BHÇ 7	9.79	15.11	624.78	18.67	7.82	2.97
BHÇ 8	16.54	12.09	512.59	30.00	11.44	5.57
BHÇ 9	11.32	13.74	687.97	11.00	8.08	3.50
BKY 10	13.29	10.34	658.93	33.33	5.33	3.30
BKY 11	14.46	14.23	655.90	34.67	9.89	4.87
BKY 12	11.83	14.35	732.15	23.00	8.85	4.47
BKY 13	11.11	16.66	444.81	47.00	8.60	5.28
BYR-14	11.92	11.70	445.50	33.17	6.03	3.39
CVZ 15	12.56	13.84	628.50	34.00	8.24	3.33
CVZ 16	9.83	12.60	377.10	21.33	4.72	2.40
CVZ 18	12.25	10.16	517.22	26.20	6.30	4.40
CVZ 21	18.03	14.26	693.04	35.00	15.01	6.62
CVZ 22	8.89	11.89	353.84	31.33	4.87	4.28
CVZ 23	14.53	13.12	554.08	30.75	9.25	4.13
ÇTL 24	10.63	13.46	654.94	50.25	10.19	4.05
ÇTL 25	13.85	13.66	699.32	36.67	9.51	3.50
ÇTL 26	11.58	15.00	444.52	40.60	9.52	4.45
ÇTL 27	10.14	13.59	473.60	22.67	6.76	3.07
ÇTL 28	9.91	13.91	685.78	45.60	8.77	3.20
ÇYR 29	9.67	11.65	390.64	20.00	4.26	3.37
ÇYR 30	11.89	15.99	767.08	45.00	12.32	3.92
ÇYR 31	9.55	15.13	808.56	36.60	13.23	3.28
ÇYR 32	12.99	16.91	599.28	48.67	12.83	4.42
ÇYR 33	15.24	13.48	691.32	44.33	12.57	3.70
ÇYR 34	10.49	18.60	571.20	38.33	12.28	3.78
ÇYR 35	5.44	10.17	804.30	47.75	2.86	3.30
EBK 36	16.56	15.32	334.54	51.67	10.56	6.72
ILÇ 38	15.13	9.99	519.82	29.33	8.72	6.33
KMH 39	14.60	9.22	519.82	27.00	8.47	5.83
KML 40	13.54	14.81	532.34	33.33	9.87	5.27
RFH 42	11.30	13.02	638.40	28.85	8.90	3.52
TRC 43	11.34	14.00	717.20	32.60	9.08	4.00
ULU 44	13.10	16.38	452.42	14.67	12.64	5.43
ULU 45	9.31	12.86	342.66	44.50	6.36	4.47
ULU 46	13.91	13.70	519.18	24.00	9.72	4.53
ULU 49	14.98	13.96	560.20	16.00	11.94	3.50
ULU 50	11.05	11.28	434.86	37.25	6.28	3.08
ULU 51	12.27	14.69	655.96	16.00	9.92	2.75
ULU 53	12.92	14.05	740.02	48.33	13.04	3.58
ULU 54	15.48	16.01	593.44	58.70	13.21	3.00
ÜZM 56	11.75	14.41	668.98	20.67	8.45	3.75
ÜZM 57	13.41	15.28	649.37	35.67	12.74	4.03
ÜZM 58	12.24	19.34	502.50	53.00	15.15	3.83
ÜZM 59	14.53	13.72	726.52	41.33	10.11	2.57
ÜZM 60	10.09	14.16	613.84	42.00	8.41	3.47
ÜZM 61	15.66	15.46	643.64	26.00	3.70	3.83
ÜZM 63	10.48	13.54	788.88	54.33	9.35	3.52
ÜZM 65	11.55	12.64	773.08	36.00	8.13	3.67
ÜZM 66	16.90	16.28	309.28	50.00	12.99	1.20
ÜZM 67	13.38	16.64	499.52	46.00	14.11	3.50
ÜZM 68	16.99	19.26	719.50	19.00	20.19	3.28
ÜZM 69	16.79	15.35	709.92	28.33	13.34	3.87
ALEYNA	14.00	16.66	438.90	27.33	11.93	5.83
GİNA	12.70	15.88	525.92	26.00	9.88	5.60

PEROLAR	13.34	17.47	592.86	31.67	14.68	4.63
SERRA	13.32	15.07	706.12	32.67	10.93	5.23

PDL: Pod length, PDW: Pod width, 1000 SEW:1000 seed weight, NPP: Number of pods per plant, GPW: Green pod weight , NSP: Number of seeds per pod; *significant at %1 level

CONCLUSION

As a result, in this study, when some bean and kidney bean genotypes collected from Erzincan province were evaluated in terms of grain yield and some agricultural characteristics, it was revealed that there were significant genetic differences between the genotypes in terms of the investigated characteristics. It has been demonstrated by this research that these bean genotypes can be easily used in subsequent breeding studies.

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