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Araştırma Makalesi

Yerel Nohut (*Cicer arietinum* L.) Genotiplerinin Yazlık Ekimde Bazı Özelliklerinin Karekterizasyonu ve Ana Bileşen Analizi

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ÖZ

Akdeniz, Geçit kuşağı ve Orta Anadolu bölgelerinden, Adana, Hatay, Osmaniye, Maraş, Mersin, Karaman illerinden toplanan yerel nohut (*Cicer arietinum* L) populasyonlarının ıslah çalışmalarında değerlendirilmesi ve bazı önemli agronomik ve morfolojik özelliklerinin belirlenmesi amacıyla toplam 170 adet farklı genotip ile çalışılmıştır. Genotiplerde yazlık ekimde kalitatif ve kantitatif özellikler incelenmiştir. Morfolojik karekterizasyon çalışmaları IPGRI'nin nohut için yayınlamış olduğu tanımlama listesi ve bu türe ait UPOV özellik belgesine göre yapılmıştır. Nohut bitkisine ve tohumuna ilişkin özellikler incelenmiş ve bu incelenen özellikler arasındaki farklılıklar belirlenmiştir. Bu çalışmada, ele alınan özelliklerin ilk üç ana bileşendeki ağırlıkları ve katkı payları incelendiğinde birinci ana bileşen üzerinde tohum şekli ve birinci dal sayısı değerleri sırasıyla en yüksek değere sahip olduğu görülmektedir. İkinci ana bileşen değerleri incelendiğinde en yüksek değerlere ikinci dal sayısı ve üçüncü dal sayısı sahip olduğu tespit edilmiştir. Üçüncü ana bileşende ise yaprakçık genişliği ve kanopi yüksekliğine ait değerler sırasıyla en yüksek değerler olarak saptanmıştır. Üç ana bileşen içerisinde, belirlenen özellikler genotiplerin ayrımında önemli olabilecek karakter olarak ortaya çıkmaktadır.

Anahtar kelimeler: Nohut, Yazlık Ekim, Karekterizasyon, Ana Bileşen Analizi (ABA)

Characterization and Principle Component Analysis for Some Characteristics of Local Spring Sown Chickpea (*Cicer arietinum L.)* Genotypes

ABSTRACT

A total of 170 different genotypes were studied to evaluate the local chickpea (Cicer arietinum L) populations collected from the Mediterranean, Passage belt and Central Anatolia regions, Adana, Hatay, Osmaniye, Maraş, Mersin, Karaman provinces in breeding studies and to determine some important agronomic and morphological characteristics. Qualitative and quantitative properties of genotypes in early spring sowing were investigated. Morphological characterization studies were carried out according to the definition list published by IPGRI for chickpea and the UPOV feature document of this species. The characteristics of chickpea plant and seed were examined and the differences between these examined characteristics were determined. In this study, when the weights and contribution margins of the characteristics discussed in the first three main components are examined, it is seen that the seed shape and first branch number values on the first main component have the highest values, respectively. When the second main component values were examined, it was determined that the second branch number and the third branch number had the highest values. In the third main component, the values of leaflet width and canopy height were determined as the highest values, respectively. Among the three main components, the determined features emerge as characters that may be important in the differentiation of genotypes.

Key words: Chickpea, Spring sowing, Characterization, Principle Component Analysis (PCA).

INTRODUCTION

Chickpea (*Cicer arietinum* L.) is grown as an important edible legume plant in aridregions and transition zones worldwide. Heat and drought tolerant, chickpea is low irrigated crop. It contains an average of 18-37% protein, 38.1-73.3% carbohydrates, 51.5-6.8 fat and 51.6-9.0 cellulose in its grains (Eser 1981). It is an important legume in terms of health and nutrition with its high protein content, meeting the need for vegetable protein, and high energy with starch in its composition (Singh et al., 2003). The contribution of chickpea in nutrition and increasing soil fertility is very important. It provides nitrogen to the soil by living symbiotically with Rhizobium cicer bacteria, which enables the formation of nodosities in chickpea roots, and improves the physical and biological structure of the soil (Işık 1992). Chickpea farming is performed on 517,785 ha cultivation area, with 630,000 tons of production, and the grain yield per unit area is 122.00 kg/da (FAO, 2021) in Turkey. Increase in yield is important to match the demand for nutrition of growing world population. For this reason chickpea varieties with high yield and resistant to diseases and pests are gaining importance. It has been determined that the average grain yield can be up to 250-300 kg/da in winter plantings of chickpeas in some regions of the Mediterranean, Aegean and Southeastern Anatolia (Engin, 1989; Özdemir et al.,. 1996; Anlarsal, 1999; March, 2000). Local genotypes present high genetic diversity as they were not crossed with any widely cultivated variety. Due to high gene pool landraces are capable of adapting easily to climatic changes and various conditions through years. For this reason, it is of great importance to collect and preserve such genotypes before they are lost (Demir, 1975).

The aim of current study to asses agronomic characters of local landraces quantitatively and qualitatively under summer cropping conditions.

MATERIAL AND METHOD

In this study, chickpea populations collected from the Mediterranean, Passage belt and Central Anatolia regions by the Eastern Mediterranean Agricultural Research Institute were used. 170 local chickpea (*Cicer arietinum* L.) populations collected were included in this study (Table: 1)

Table 1. Information on the province and region where the local chickpea populations used in the study were collected.

Turkey	Regions	Locations	No of Samples
Mediterranean Region	Adana	Tufanbeyli-Saimbeyli-Pozantı-Kamışlı-Aladağ	44
Mediterranean Region	Osmaniye	Hasanbeyli-Bahçe-Çelikler	16
Mediterranean Region	Mersin	Gülnar-Silifke	18
Mediterranean Region	Hatay	Central-Altınözü-Yayladağ-Kırıkan-Belen	20
Passage belt Region	K.Maraş	Central-Göksun-Elbistan-Afşin	29
Central Anatolia	Karaman	Central-Ayrancı-Ermenek	43
Sum	6	22	170

The collected materials were planted in the Eastern Mediterranean Agricultural Research Institute experimental field in early spring (March) in four-row plots with 5 m row length, 0.45 m between row and 10 cm above row spacing. Before sowing, fertilization was made with 3 kg/da pure nitrogen and 5 kg/da pure phosphorus in the experimental area, and necessary maintenance, observation and evaluation procedures were carried out from the emergence. Morphological characters with high heritability were observed in the characterization of the legume species, and observations and measurements were made by taking the IPGR (Anonymous. 1993) and UPOV (Anonymous, 2003) Chickpea Identification List as an example. In order to determine the different form groups of the samples produced in augmented design in detail, the observed character data were evaluated using the Principal Component Analysis (PCA), one of the multivariate analyzes (Sneath and Sokal, 1973; Clifford and Stephenson, 1975; Tan, 1983).

RESULTS AND DISCUSSION

The distribution of quantitative and qualitative characteristics in early spring sowing in local genotypes, their frequencies and percentage values according to the established intervals were examined. Climatic components increment or diminish the interaction by influencing the improvement and development

of plants (Singh, 1999). The foremost vital highlight in deciding the impacts of characters with each other is considered to be climatic highlights (Ülker & Ceyhan, 2008). The conveyance of quantitative characteristic values inspected in local genotypes, their frequencies and rate values agreeing to the built-up ranges are given in Table 2.

In the distribution of quantitative trait values in early spring sowing, when we classify the genotypes in terms of leaflet length, it was determined that they had 43.1% wide, 56.9 % medium length (Table 2.1). In the classification made in terms of pod size, it was determined that 100 % of the samples examined had large pod types (Table 2.3). In terms of the number of first branches, it is seen that the majority of the first branch number of the genotypes varies between 1.00 and 1.79 (Table 2.4). In the second branch number values, it is seen that the majority of genotypes vary between 2.60 and 3.79 values (Table 2.5). The third branch number values are examined, it is observed that the majority of the values vary between 5.60 and 8.39 values (Table 2.6). The canopy height is examined, it is observed that 51.2 % of the populations have values between 37.67-43.66 cm, and 35.4 % are between 43.67-49.66 cm. (Table 2.7). The values of plant canopy width were examined, 47.7 % of the genotypes varied between 11.47-15.26 cm; It was determined that 31.9% of the samples ranged between 15.27-19.06 cm. (Table 2.8). The first fruit height range was between 44.80-46.19 cm in 43.1 % of the genotypes (Table 2.9). In the population considered in terms of the number of flowering days, the interval values in 43.1 % of the samples were between 44.80-46.19 days; It is seen that 22.6% of them have a flowering period between 46.20-47.59 days and 21.5% with an interval value of 43.40-44.79 days. (Table2.10). When the values regarding the flowering period are examined, it is seen that 30.2% of the genotypes vary between 17.60 -19.19 days in the majority of the genotypes. (Table2.11). In terms of the number of days to maturity, the genotypes were found to be earlier, with 55.9% of the values varying between 54.00 - 69.46 days, and 44.1% changing between 69.47- 80.47 days. (Table 2.12). It is seen that all the samples examined in terms of the number of flowers in a flower stalk have 1 flower number (Table 2.13). It is seen that all the samples examined in terms of the number of pods on a flower stalk have 1 pod number. (Table 2.14). In the study carried out, as the number of pods increases, the grain weight decreases and both the hundred grain weight and the yield per plant decrease (Amini et al., 2002). It was observed that the values related to the number of pods in a plant, which is directly related to the yield, vary between 10.00-47.7 intervals in the vast majority of genotypes (Table 2.15). The relations between the characters come to the fore in the emergence of the characteristics that affect the yield values (Bozoğlu & Sözen, 2007). When the values regarding the number of seeds in a plant were examined, it was determined that 83.1% of the genotypes were between 6.3-38.9 intervals. (Table2.16). When the values of 100 grain weight are examined, 44.8 % of the samples were between 31.47-36.53, 26.7 % of them were between 36.54-41.66, 23.3 % were between 26.40-31.46 (Table2.17). Singh et al. (2003) reported that they obtained similar results in the characterization of Indian chickpeas. Cinsoy and Yaman (1998) report that considering the characters that affect the yield the most, instead of considering the yield directly in agricultural production programs, especially in breeding studies, will give more useful results.

Table 2 Distribution of quantitative characteristics values of chickpea genotypes sowed in early spring, frequencies and percentages according to the established class.

Table 2.1. Distribution of values for leaflet length, frequencies and percentages according to the established class

Class Values	Class	No of Samples	Frequence %
5	Medium	98	56.9
7	Wide	74	43.1

Table 2.2. Distribution of values for leaflet width, frequencies and percentages according to the established class

Class Values	Class	No of Samples	Frequence %
5	Medium	137	79.5
7	Wide	35	20.5

Table 2.3. Distribution of values for pod size, frequencies and percentages according to the established class.

Class Values	Class	No of Samples	Frequence %
3	Small	-	-
5	Medium	-	-
7	Large	170	100

Table 2.4. The distribution of values for the first branch number, their frequencies and percentages according to the established class range.

Class Range	No of Samples	Frequence %

1.00 – 1.25	55	31.9
1.26 – 1.53	61	35.5
1.54 – 1.79	35	20.4
1.80 – 2.06	17	9.8
2.07 – 2.32	4	2.4

Table 2.5. The distribution of the values of the second branch number, their frequencies and percentages according to the established class range.

Class Range	No of Samples	Frequence %
2.00 – 2.59	20	11.6
2.60 – 3.19	62	36.1
3.20 – 3.79	59	34.3
3.80 – 4.39	25	14.5
4.40 – 4.99	6	3.5

Table 2.6. The distribution of the values of the third branch number, their frequencies and percentages according to the established class range.

Class Range	No of Samples	Frequence %
2.80 – 5.59	28	16.4
5.60 – 8.39	103	60.2
8.40 – 11.19	26	15.2
11.20 – 13.99	15	8.2
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Table 2.7. Distribution of values related to plant canopy height, frequencies and percentages according to the established class range.

Class Range	No of Samples	Frequence %
31.67 – 37.66	7	4.1
37.67 – 43.66	88	51.2
43.67 – 49.66	61	35.4
49.67 – 55.66	14	8.1
55.67 – 61.66	2	1.2

Table 2.8. Distribution of values for plant canopy width, frequencies and percentages according to the established class range.

Class Range	No of Samples	Frequence %
7.67 – 11.46	18	10. 5
11.47 – 15.26	82	47.7
15.27 -19.06	55	31.9
19.07 – 22.86	15	8.7
22.87 – 26.66	2	1.2

Table 2.9. Distribution of values related to first pod height, frequencies and percentages according to the established class range.

Class Range	No of Samples	Frequence %
13.33 – 17.66	19	11.1
17.67 – 21.99	62	36.1
21.30 – 26.33	41	23.7
26.34 – 30.66	40	23.3
30.67 – 34.99	10	5.8

Table 2.10. The distribution of the values for the number of flowering days, their frequencies and percentages according to the established class range.

Class Range	No of Samples	Frequence %
42.00 – 43.39	15	8.7
43.40 – 44.79	37	21.5
44.80 – 46.19	74	43.1
46.20 – 47.59	39	22.6
47.60 – 48.99	7	4.1

Table 2.11. Distribution of values related to flowering time, frequencies and percentages according to the established class range.

Class Range	No of Samples	Frequence %

16.00 – 17.59	35	20.4
17.60 – 19.19	52	30.2
19.20 – 20.79	34	19.7
20.80 – 22.39	47	27.4
22.40 – 23.99	4	2.3

Table 2.12. Distribution of values for the number of days to maturity, their frequencies and percentages according to the established class range.

Class Range	No of Samples	Frequence %
54.00 – 69.46	96	55.9
69.47 – 80.47	76	44.1

Table 2.13. The distribution of values for the number of flowers in a flower stalk, their frequencies and percentages according to the established class.

Class Value	No of Samples	Frequence %
1.00	172	100

Table 2.14. The distribution of the values of the number of pods in a flower stalk, their frequencies and percentages according to the established class.

Class Value	No of Samples	Frequence %
1.00	172	100

Table 2.15. The distribution of the values of the number of pods in a plant, their frequencies and percentages according to the established class range.

Class Range	No of Samples	Frequence %
10.00 – 28.86	74	43.1
28.87 – 47.7	68	39.5
47.8 – 66.5	24	13.9
66.6 – 85.4	4	2.3
85.5 – 104.3	2	1.2

Table 2.16. The distribution of values for the number of seeds in a plant, their frequencies and percentages according to the established class range.

Class Range	No of Samples	Frequence %
6.3 – 22.6	70	40.7
22.7 – 38.9	73	42.4
39.0 – 55.3	23	13.4
55.4 – 71.6	5	2.9
71.7 – 87.9	1	0.6

Table 2.17. Distribution of values for 100 seed weight, frequencies and percentages according to the established class range.

Class Range	No of Samples	Frequence %
21.33 – 26.39	4	2.3
26.40 – 31.46	40	23.3
31.47 – 36.53	77	44.8
36.54 – 41.60	46	26.7
41.61 – 46.66	5	2.9

The distribution of the qualitative trait values examined in local chickpea genotypes, their frequencies and percentage values according to the established ranges are given in Table 3. When the distribution of qualitative trait values in early spring sowing was examined, in terms of plant type, 90.7 % of the genotypes were semi-upright, 8.7 % upright and 0.6 % semi-spreading (Table 3.1). The presence of pigmentation was not found in any population in early spring sowing, and there was only a difference in terms of the green color of the stem and leaves. In 98.8 % of the early spring samples, the stem and leaves were green, 1.2 % of the stems and leaves were observed as matte green (Table 3.2). In terms of hairiness, 60.2 % of the genotypes were hairy, 39.8 % were not found (Table 3.3). In the grouping made in terms of the number of leaflets in the leaf, 36.1 % of the samples were between 11-13, 35.4 % between 9-11, 25.6 % had the number of leaflets greater than 13, while only 2.9 % had values between 3-9 % (Table 3.4). It will always be beneficial and productive to adjust the planting time, where the plants will be least affected by the summer heat and winter cold; otherwise, it is necessary to be prepared for reductions in yield, especially the characters that affect yield (Mart 2000; Sözen, 2006). In terms of pod cracking, no pod cracking was found in 100 % of all samples (Table 3.6). When genotypes

were classified in terms of seed color, it was determined as 1.2 % red-brown, 0.6 % yellowish pink-brown, 24.8 % brown beige, 68.7 % beige, 0.6 % yellowish brown, 2.4 % yellowish beige and 1.8 % ivory white (Table 3.7). In terms of the presence of small black dots, no black dots were found in all samples (Table3.8). When classified in terms of seed shape, 25 % ram head is angular long, 69.8 % cubed is not fully rounded and 5.2 % is pea-like, fully rounded (Table3.9). In terms of testa structure, genotypes were found to be 96.5 % rough and 3.5 % smooth (Table 3.10).

The first fruit height was between 43.1 % and 44.80-46.19 (Table 3.11). (March 2000) obtained similar results with grain size, plant height and first pod height in winter sowing (Cinsoy et al.- 1997).

Table 3. The distribution of the values of the qualitative characteristics of chickpea sowed in early spring, their frequencies and percentages according to the established class.

Table 3.1. Distribution of values related to plant type, frequencies and percentages according to the established class.

Class Values	Class	No of Samples	Frequence %
1	Upright	15	8.7
2	Semi-upright	156	90.7
3	Semi-spreading	1	0.6

Table 3.2. Distribution of values related to plant pigmentation, frequencies and percentages according to the established class.

Class Values	Class	No of Samples	Frequence %
1	No anthion (stem and leaves matte green)	2	1.2
2	No anthion (stem and leaves green)	170	98.8
3	Slight anthosion (stem and leaves partly light purple)	---	---

Table 3.3. Distribution of plant hairiness values, frequencies and percentages according to the established class.

Class Values	Class	No of Samples	Frequence %
3	Hairies are almost absent.	68	39.8
5	Hairy	104	60.2

Table 3.4. The distribution of values for the number of leaflets in a leaf, their frequencies and percentages according to the established class.

Class Values	Class Range	No of Samples	Frequence %
1	3 – 9	5	2.9
3	9 – 11	61	35.4
5	11 – 13	62	36.1
7	>13	44	25.6

Table 3.5. Distribution of values for flower color, frequencies and percentages according to the established class.

Class Values	Class	No of Samples	Frequence %
4	Pink	7	4.1
9	White	165	95.9

Table 3.6. Distribution of values for pod cracking, frequencies and percentages according to the established class.

Class Values	Class	No of Samples	Frequence %
0	No Opening	172	100
1	< %10 There is an opening	---	---
2	> %10 There is an opening	---	---

Table 3.7. Distribution of values for seed color, frequencies and percentages according to the established class.

Class Values	Class	No of Samples	Frequence %
5	Red-Brown	2	1.2
7	Yellowish pink-Brown	1	0.6
9	Brown beige	42	24.8
10	Beige	119	68.7

13	Yellowish brown	1	0.6
16	Yellowish beige	4	2.4
17	Ivory white	3	1.7

Table 3.8. The distribution of values for the presence of small black dots, their frequencies and percentages according to the established class.

Class Values	Class	No of Samples	Frequence %
0	None	172	100
1	There is	---	---

Table 3.9. Distribution of values related to seed shape, frequencies and percentages according to the establishedclass.

Class Values	Class	No of Samples	Frequence %
1	Ram head, Angular long	43	25
2	Flaked, It's not fully round.	120	69.8
3	Pea-like, Fully round	9	5.2

Table 3.10. Distribution of values related to Testa structure, frequencies and percentages according to the established class.

Class Values	Class	No of Samples	Frequence %
1	Rough	166	96.5
2	Smooth	6	3.5
4	Warty	---	---

Table 3.11. Distribution of values related to first seed height, frequencies and percentages according to the established class range.

Class Range	No of Samples	Frequence %
13.33 – 17.66	19	11.1
17.67 – 21.99	62	36.1
21.30 – 26.33	41	23.7
26.34 – 30.66	40	23.3
30.67 – 34.99	10	5.8

The minimum, maximum and average values of the evaluated features are given in Table 4; When examined, it is noteworthy that the variations of the features are high.

Table 4. Minimum, maximum and average values of some traits examined in chickpea sowedearly spring

Feature	Minimum	Maximum	Mean
First branch number	1.0	2.3	1.38
Second branch number	2.0	5.0	3.25
Third branch number	3.7	14.0	7.39
Plant canopy height	31.7	61.7	43.62
Plant canopy width	7.7	26.7	14.89
Days until flowering	42.0	49.0	45.39
Flowering days	16.0	24.0	24.00
Number of flowers on a flower stalk	1.0	1.0	1.0
Number of pods on a flower stalk	1.0	1.0	1.0
Biological yield (gr/plant)	0.004	0.066	0.027
100 seed weight	21.3	46.7	34.26

The eigen values for the first three main components vary between 2.4877 and 4.6816. The first three main components accounted for 37.83% of the total variance (Table 5).

Table 5. Eigen and variance values calculated in chickpea sowed early spring.

Principal Component	Eigen Values	Variance Percentage	Stacked Variance
1	4.6816	16.72	16.72
2	3.4230	12.23	28.95
3	2.4877	8.88	37.83

When the weights and contribution margins of the examined quantitative characteristics in the first three main components are examined, it is seen that the number of pods and the number of first branches on the first main component have the highest values, respectively. It has been determined that the second principal component values have the highest values for the second branch number and the third branch number. In the third main component, the values of 100 grain weight and leaflet width were determined as the highest values, respectively. Among the three main components, the determined features emerge as the character that can be the basis for the differentiation of populations (Table 6).

Table 6. Distribution of quantitative characteristics in the main components in chickpea sowed early spring.

Feature	1. Principal Component	2. Principal Component	3. Principal Component
Leaflet length	0.0506	0.0927	0.0787
Leaflet width	0.0656	0.1096	0.2924*
1st branch	0.1019	0.2353*	-0.0036
2nd branch	0.0300	0.3690*	-0.0469
3rd branch	-0.2386	0.2772*	-0.1610
Canopy height	-0.1254	0.0543	0.2881*
Canopy width	-0.2288	0.0290	0.0541
Days until flowering	0.0525	0.1905	-0.0243
Total flowering days	0.0518	0.1134	-0.2987
Pod number per plant	0.2349*	-0.0530	0.0810
100 seed weight	0.0792	0.0483	0.3910*

When the weights and additives of the considered qualitative characteristics in the first three main components are examined, it is seen that the seed shape and flower color have the highest values, respectively. (Table7).

Table 7. The distribution of qualitative characteristics in summer cottage cultivation in the principal components.

Feature	1. Principal Component	2. Principal Component	3. Principal Component
Number of leaflets	0.0517	0.0433	0.2608*
Plant type	0.0484	-0.0258	0.0336
Pigmentation	-0.0590	-0.0420	0.0850
Hairiness	-0.0342	-0.0490	-0.2151
Flower color	0.0696	0.1152	0.1344
Seed color	0.0560	0.1313	-0.0729
Seed shape	0.3447*	0.0958	0.1016
Testa structure	-0.0145	-0.0624	-0.1143

According to the correlation analysis results of the relationships between the Quantitative and Qualitatively analyzed Characters in the early spring sowing of 2003, the number of branches on the number of pods per plant and the number of seeds per pod; positive between the width of the canopy; relationships have been found. It has been determined that the number of pods and the number of seeds per pod breeding studies aimed at increasing the grain yield of the chickpea plant as a result of early spring sowing, the number of branches and canopy width, which have a positive relationship with the correlation analysis result, will be the priority selection criteria (Table 8).

Table 8 Correlation Table of Quantitative and Qualitative Characters in in chickpea sowed early spring.

Correlation Table of Characters in Early Spring Sowing 2003												
	Hair .	Leaflet Number	1st branch	2nd branch	3rd branch	Cnp height	Cnp width.	Days until flowering.	Flowering days	Days until maturity.	Pod number per plant .	Seed number per pod	100 seed weight
Hair													-0.261**
Leaflet Number								1.000**					
1st branch				0.451**							0.237**	0.154**	
2nd branch			0.451**		0.328**						0.460**	0.379**	
3rd branch				0.328**			0.151*				0.486**	0.471**	
Cnp height							0.348**			0.187**			0.163*
Cnp width.					0.151**	0.348**						0.147*	
Days until flowering.		1.000**							1.000**				
Flowering days		1.000**						1.000**					
Days until maturity.						0.187**							0.218**
Pod number per plant .			0.237**	0.460**	0.486**							0.851**	
Seed number per pod			0.154*	0.379**	0.471**		0.147*				0.851**		
100 seed weight	-0.261**					0.163**				0.218**			

*: 1% and 5% significance of relationships between character

CONCLUSION

When the weights and contribution margins of the quantitative characteristics discussed in early spring sowing are examined in the first three main components, the highest value is the number of pods on the first main component, the number of the first branch and leaflet width, the number of second branches on the second main component, the number of third branches and the number of first branches, the third On the other hand, it was determined that the main component had hundred grain weight, leaflet width and canopy height characteristics. When the weights and contribution margins of the qualitative characteristics in early spring sowing are examined in the first three main components, seed shape, flower color and grain color on the first main component, flower color, grain rangi and seed shape on the second main component, and the number of leaflets on the third main component. , flower color and seed shape characteristics were determined. Among the three main components in early spring sowing , the determined characteristics emerge as the character that can be the basis for the differentiation of populations. As a result, this study, which was carried out with samples collected from the Mediterranean, Transition Zone and Central Anatolia Regions, is important in terms of revealing the breadth of variation between populations in the same province. As a breeding resource, local populations are used especially for the transmission of disease resistance and other quantitative and qualitative characteristics and for the expansion of genetic variation. When the properties affecting the formation of the groups in the main component analysis are examined; it is known that the correlations of these features with each other and with grain yield are significant, and their direct and indirect effects on yield are high (Açıkgöz et al., 1994). Local populations as a breeding resource are used to expand genetic variation. It is known that the characteristics that affect the formation of the groups in the main component analysis and their correlations with grain yield have significant effects on yield (Mart et al.,. 2003 and 2007), (Cinsoy et al., 1997 1 and 2)

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