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SEED AND LEAF CHARACTERISTICS OF OLIVE GENOTYPES COLLECTED FROM KAHRAMANMARAS REGION OF TURKEY

Fatma Ebru Yogurtcu [1] , Aydin Uzun [1*], Hasan Pinar [1]

[1] Erciyes University, Department of Horticulture, Kayseri, Turkey

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Abstract
Because of it can be used as a table, for oil or wood and practical medicine, olive became highly valued in Mediterranean basin. Olive oil is considered more important due to its nutritional and health advantages. The olive tree can adapt to adverse soil conditions because it is not very selective in terms of soil requirements. Turkey has a very rich diversity because it is located in the homeland of olives and has been cultivated for many years. There are olive populations that show variation in tree form, leaf and fruit characteristics in different regions of Turkey. Identifying and revealing the characteristics of plants in these populations is important for their evaluation. In this study, some morphological features were determined in olive populations in Kahramanmaraş region, which has a significant diversity. Within the olive populations, seed and leaf characteristics were revealed in 44 genotypes that were visually different and over 50 years of age. Statistical differences were found between genotypes in terms of all parameters studied. The kernel weights of the genotypes varied between 0.76-0.38 g. Kernel length and width values were determined as 16.03-12.21 mm and 10.07-8.01 mm, respectively. The highest leaf length of the genotypes was 7.42 cm and the lowest 5.70 cm. Leaf widths were determined as 15.82-8.49 mm. The results revealed that there is a significant olive diversity in Kahramanmaraş region. It is important to conservation this richness and use it in breeding and genetic studies.

Keywords: diversity, genetic resources, *Olea europea*

1. INTRODUCTION

Olive (*Olea europaea* L.) is one of the oldest and most economically important species in the Mediterranean basin. The origin of olive, which is considered to be of Southeastern Anatolia and Middle East. Cultivation of olive has been carried out for about 6000 years. (Zohary and Spiegel Roy, 1975). It has become a very valuable species in the Mediterranean region due to its table, oil, wood and medicinal use (Owen et al., 2005). Although the tree height of olive varies between 2-10 meters, it can also reach up to 15-20 meters. While the fruits are green at first, they turn purple and ripen in October-November. Olives, which can live up to 300-400 years, also have trees that live up to 2000 years. Their longevity is due to the fact that olive is a drought resistant plant (Kaplan and Karaöz Arıhan, 2011).

*Corresponding author, E-mail address: uzun38s@yahoo.com

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Turkey is one of the important olive producing countries in the world. While world olive production is 23 million tons, Turkey's production is 1.4 million tons (FAO, 2020). In Turkey 'Aegean' region is the first olive producing area and followed by 'Marmara', 'Mediterranean' and 'Southeast Anatolia' regions (Ozkaya et al., 2010).

There are widespread olive populations in many regions of Turkey. This richness contains a high level of variation in fruit, leaves, plant forms, seeds, and genetics. With the studies to be carried out in this richness, it is necessary to reveal the superior genotypes and to use them in production and breeding studies. In this study, it was aimed to determine some morphological characteristics of olive genotypes in Kahramanmaraş, which has rich olive diversity. Especially with the increase in urbanization in this city, the old olive populations around the city are being lost. With this study, it may be possible to protect and evaluate valuable materials without being lost.

2. MATERIALS AND METHODS

In this study, some morphological characteristics were investigated in olive populations in Kahramanmaraş region, which has a significant diversity. Within the olive populations, kernel and leaf characteristics were revealed in 44 genotypes that were visually different and over 50 years of age. Thirty leaf and kernel samples were taken from the genotypes at the commercial harvest time. Some leaf and kernel characteristics *(leaf height, leaf width, kernel weight, kernel height, kernel width etc.)* were measured. Seed and leaf data were analysed using JMP 5.0 (SAS Institute Inc., Cary, NC, USA) and means separated and grouped using Tukey's test ($p<0.05$). At the same time, the standard deviations in the data were determined with the Microsoft Excel program.

3.RESULTS AND DISCUSSIONS

Statistical differences were found between genotypes in terms of all parameters studied. So high level of variation found in olive populations studied. The kernel weights of the genotypes varied between 0.76-0.38 g. KMZ 19 had the highest kernel weight whereas KMZ1 had the lowest value (Table 1). Kernel length and width values were measured as 16.10-12.21 mm and 10.07-8.01 mm, respectively. The highest leaf length of the genotypes was 7.42 cm (KMZ5) and the lowest 5.63 cm (KMZ11). Leaf widths were investigated as 15.82 (KMZ18)-8.49 mm (KMZ2). Kaya (2006) found leaf length 7.28 cm, leaf width 1.10 cm, and seed weight 1.20 g in Yamalak Sarısı olive variety in the study carried out in Aydın province. Ay (2018) determined that in the local olive genotypes of the Mardin region, the seed length ranged between 12.35 mm and 23.36 mm, and the seed weight varied between 0.44 g and 1.05 g. While our results were generally in agreement with previous studies, there were some differences. The reasons for this may be the ecologies studied, genetic differences between genotypes and different number of materials.

The results revealed that there is a significant olive diversity in Kahramanmaraş region (Figure 1). Figure 1 shows the variations in tree form, leaf, fruit and seed in the two genotypes used.

4. CONCLUSIONS

With the study, it has been seen that Kahramanmaraş region is an important gene source region for olives. However, the areas where the genotypes are found are under the pressure of construction and the trees are lost over time. For this reason, it is important to evaluate and protect these valuable materials as soon as possible. Also it is important to evaluate this richness and use it in breeding and genetic studies.

*Corresponding author, E-mail address: uzun38s@yahoo.com

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Table 1. Seed amd leaf parameters of genotypes studied

Genotype	Kernel Weight (g)	Kernel Width (mm)	Kernel Lenght (mm)	Leaf Width (mm)	Leaf Lenght (cm)
KMZ1	0,38±0,38^{pr}$_{x}$	8,27±0,40^{j-m}	13,81±0,81^{j-p}	15,59±1,02^{bcd}	6,67±0,24^{d-k}
KMZ2	0,44±0,60^{i-r}	8,77±0,29^{c-i}	14,42±1,42^{f-n}	8,49±2,45^{l}	6,61±0,28^{d-l}
KMZ3	0,44±0,62^{h-r}	8,45±0,33^{f-m}	12,21±0,70^{r}	14,79±1,28^{b-g}	6,90±0,54^{b-e}
KMZ4	0,47±0,57^{g-n}	8,48±0,36^{e-m}	13,03±1,13^{o}	14,02±1,92^{c-i}	5,93±0,44^{p-t}
KMZ5	0,41±0,54^{l-r}	8,07±0,93^{l-m}	14,21±0,89^{h-o}	12,87±0,69^{g-k}	7,42±0,43^{a}
KMZ6	0,46±0,94^{h-p}	8,31±0,39^{i-m}	14,19±0,77^{h-o}	16,80±1,59^{a}	6,58±0,36^{e-l}
KMZ7	0,48±0,71^{f-m}	8,43±0,44^{g-m}	13,64±0,74^{l-p}	14,45±1,75^{b-g}	6,33±0,37^{i-r}
KMZ8	0,66±0,98^{b}	9,64±0,20^{b}	14,29±0,89^{f-n}	13,51±1,51^{d-j}	5,90±0,43^{rst}
KMZ9	0,51±0,51^{d-i}	9,07±0,44^{c}	14,33±0,82^{f-n}	13,51±1,51^{d-j}	5,90±0,43^{rst}
KMZ10	0,49±0,41^{f-l}	8,94±0,28^{c-f}	14,25±0,83^{g-n}	15,78±1,85^{abc}	7,05±0,30^{a-d}
KMZ11	0,46±0,80^{h-p}	8,66±0,43^{c-k}	13,57±0,52^{m-p}	12,43±1,72^{ijk}	5,63±0,44^{t}
KMZ12	0,41±0,73$^{\mathbf{m-r}}$	8,92±0,23^{c-g}	14,57±0,74^{e-l}	13,85±0,81^{c-i}	6,52±0,30^{e-l}
KMZ13	0,43±0,49$^{\mathbf{j}-r}$	8,72±0,36^{c-j}	13,95±0,64^{i-p}	13,95±1,36^{f-k}	5,82±0,39st
KMZ14	0,45±0,71^{h-r}	8,34±0,35^{h-m}	14,71±0,89^{e-j}	13,37±1,62^{c-i}	6,60±0,29^{d-l}
KMZ15	0,39±0,69^{opr}	8,66±0,43^{c-k}	13,52±0,90^{nop}	12,51±1,97^{d-j}	5,70±0,28^{t}
KMZ16	0,44±0,65^{h-r}	8,70±0,24^{c-j}	13,58±0,97^{m-p}	13,63±0,96^{h-k}	5,77±,57st
KMZ17	0,38±0,52^{r}	9,03±0,55^{cd}	15,20±1,02^{b-f}	13,79±1,70^{d-i}	6,66±0,35^{d-l}
KMZ18	0,48±0,40^{f-m}	10,07±0,62^{a}	15,88±0,76^{abc}	15,82±1,88^{d-i}	6,87±0,43^{b-g}
KMZ19	0,76±0,79^{a}	9,77±0,63^{ab}	15,74±0,63^{a-d}	14,47±0,86^{ab}	6,97±,51^{b-e}
KMZ20	0,48±0,64^{f-m}	8,56±0,52^{d-k}	14,10±0,48^{h-o}	13,12±2,93^{b-g}	6,42±0,46^{f-n}
KMZ21	0,82±0,96^{a}	10,03±0,41^{ab}	16,10±0,89^{a}	14,44±2,40^{e-j}	7,18±0,57^{abc}
KMZ22	0,44±0,64^{i-r}	8,84±0,21^{c-h}	13,85±0,88^{j-p}	14,14±1,20^{b-h}	5,94±0,42^{o-t}
KMZ23	0,48±0,10^{f-m}	8,77±0,56^{c-i}	14,33±0,72^{f-n}	13,25±1,46^{b-i}	6,92±0,76^{b-e}
KMZ24	0,51±0,55^{d-j}	8,71±0,33^{c-j}	14,48±0,65^{e-n}	14,98±1,42^{d-j}	6,55±0,25^{e-l}
KMZ25	0,46±0,57^{h-p}	8,20±0,49^{klm}	14,27±1,23^{g-n}	14,83±4,40^{b-f}	6,19±0,42^{l-s}
KMZ26	0,58±0,56^{cd}	9,04±0,34^{cd}	13,86±0,90^{j-p}	13,80±1,87^{b-f}	7,21±0,36^{abc}
KMZ27	0,51±0,62^{d-j}	8,68±0,30^{c-k}	14,32±0,39^{f-n}	14,11±1,63^{c-i}	6,30±0,30^{k-r}
KMZ28	0,44±0,67^{h-r}	8,34±0,39^{h-m}	14,27±0,86^{g-n}	14,38±1,52^{b-i}	6,20±0,50^{k-s}
KMZ29	0,54±0,77^{c-f}	8,77±0,51^{c-i}	14,86±1,3^{e-i}	13,27±1,76^{b-i}	6,54±0,30^{e-l}
KMZ30	0,60±0,74^{bc}	8,82±0,32^{c-h}	15,35±0,84^{a-e}	14,12±2,31^{d-j}	6,80±0,47^{c-i}
KMZ31	0,42±0,40^{k-r}	8,59±0,33^{c-k}	13,31±0,92^{op}	15,81±1,40^{b-i}	6,31±0,68^{i-r}
KMZ32	0,46±0,74^{g-o}	8,86±0,45^{c-g}	13,71±0,78^{o}	11,36±0,99^{ab}	6,57±0,38^{e-l}
KMZ33	0,49±0,12^{f-l}	8,82±0,62^{c-h}	14,11±0,71^{k-p}	13,50±1,29^{k}	5,99±0,57^{n-t}
KMZ34	0,48±0,57^{f-m}	8,91±0,58^{c-g}	13,56±1,02^{h-o}	13,44±0,91^{d-j}	6,03±0,48^{n-t}
KMZ35	0,39±0,4^{n-r}	8,75±0,41^{c-j}	13,81±0,79^{m-p}	13,49±0,93^{d-j}	6,34±0,27^{i-r}

^{x}Mean separation within columns by Tukey's multiple range tes, P<0.05

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Table 1. Continued

Genotype	Kernel Weight (g)	Kernel Width (mm)	Kernel Lenght (mm)	Leaf Width (mm)	Leaf Lenght (cm)
KMZ36	0,42±0,40^{l-r}	8,59±0,73^{c-k}	15,15±1,34^{j-p}	13,58±1,49^{d-j}	6,78±0,22^{c-j}
KMZ37	0,57±0,1^{cde}	8,81±0,44^{c-h}	14,24±0,69^{c-g}	13,53±1,07^{d-j}	6,39±0,43^{h-p}
KMZ38	0,41±0,08^{m-r}	8,70±0,40^{c-j}	14,91±0,96^{g-o}	14,08±1,38^{d-j}	6,84±0,27^{b-h}
KMZ39	0,55±0,91^{c-f}	8,73±0,41^{c-j}	14,16±0,38^{d-h}	15,08±1,82^{b-i}	6,06±0,74^{m-t}
KMZ40	0,41±0,63^{m-r}	8,01±0,31^{m}	13,85±0,62^{h-o}	11,74±0,79^{b-e}	5,72±0,31^{t}
KMZ41	0,47±0,45^{g-n}	8,52±0,36^{e-l}	16,03±0,98^{j-p}	14,09±0,67^{jk}	6,89±0,28^{b-f}
KMZ42	0,52±0,85$^{\mathbf{d-h}}$	8,60±0,47^{c-k}	14,60±1,03^{ab}	13,49±1,55^{b-i}	7,28±0,69^{ab}
KMZ43	0,50±0,10^{e-k}	8,96±0,51^{cde}	14,51±0,54^{e-k}	13,90±1,28^{d-j}	6,40±0,37^{g-o}
KMZ44	0,51±0,05^{d-i}	8,72±0,35^{c-j}	14,27±1,13^{e-m}	13,82±2,07^{c-i}	6,03±0,22^{n-t}

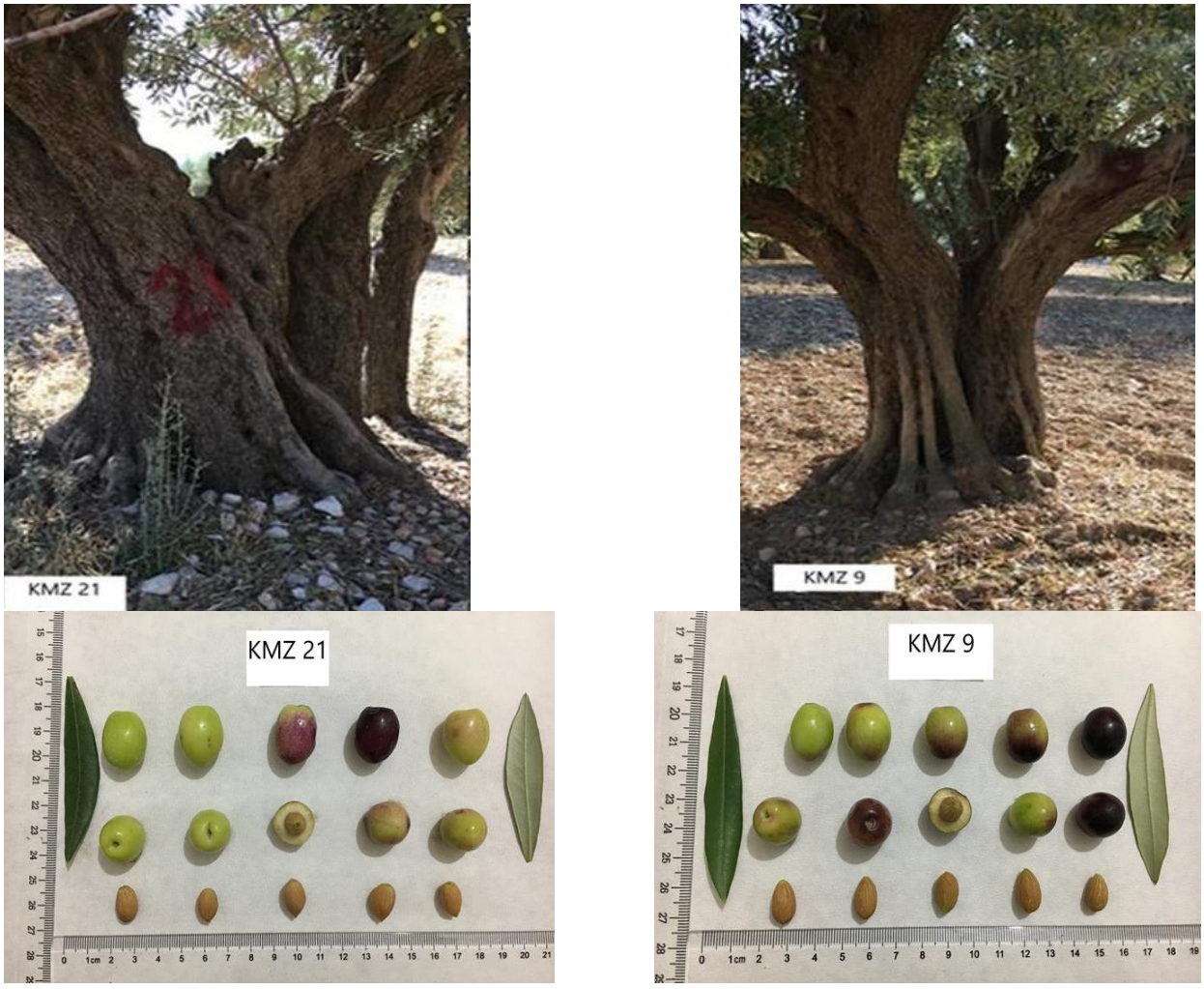

Figure 1. Tree, leaf, fruit and seed variations in KMZ9 and KMZ21 genotypes

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*Corresponding author, E-mail address: uzun38s@yahoo.com

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*Corresponding author, E-mail address: uzun38s@yahoo.com