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Olive (Olea europaea) Selection Studies in East Mediterranean Region

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Abstract

Olive (*Olea europaea* L.) is a fruit grown especially in countries with a coast to the Mediterranean and used as a table and oil (Arsel and Sefer, 2006). Studies show that the homeland of Olive is the region covering the provinces of Mardin, Kahramanmaraş, and Hatay. The region is an important study area as an olive genetic resource. In this region where many civilizations lived, we see that fertile local olive genotypes are grown. Many important local olive genotypes have started to disappear due to changing times and urbanization planning. This project, it was aimed to determine these olive genotypes that are disappearing in the Kahramanmaraş region. In the observation made, 120 different local types were determined, and the observations of these types, which were sampled, were continued in the locations. Then, proximity to settlements, etc. It was decided to make a weighted grading in 47 genotypes by deducting the genotypes that were destroyed due to reasons and also found to be standard varieties. It was determined that the average fruit weights were between 1.64-5.97 g in the genotypes observed in the study, and the highest fruit weights were in the GN-50 (5.987 g), GN-30 (5.80 g) and GN-27 (5.26 g) genotypes. The lowest fruit weights were found in GN-6 with 1.87 g, GN-15 with 1.75 g, and GN-14 with 1.64 g. The oil ratio was found to be between 8.77-25.82% in the olive genotypes selected in fruit oil ratios. The highest oil ratios were found in GN-72, GN-85, and GN-52 genotypes with 25.82%, 25.09%, and 24.13%, respectively. The lowest oil ratios were found in GN-45 (11.80%), GN-14 (10.60%), and GN-44 (8.77%) genotypes. As a result of the weighted grading, it was determined that 15 genotypes were important as cultivar candidates. As of December 2020, 15 selected cultivar candidates were planted on the Institute land at a distance of 5x5 m, with 3 replications in the Random Blocks Trial Design, with 4 plants in each replication. The next part of the study, it is aimed to determine all the characteristics of these selected cultivar candidate genotypes with the control cultivars and to develop new olive cultivars/varieties.

Key words

Olea europeae, olive, selection.

Introduction

The olive tree, whose fruit we use today, is included in the Olea europeae sativa subspecies of Olea europeae L. species of the Oleaceae family (Baldoni et al. 2009). Olive which is the most important factor in the breakfast menu of all world cuisines, is indispensable for countries with a coast to the Mediterranean. Olive (Olea europaea L.) fruit contains plenty of antioxidants. Oleuropein is known to be a powerful antioxidant against inflammation. It has been determined that antioxidants can prevent oxidative damage in the human body, and the intake of antioxidants in diets has a therapeutic effect on chronic diseases (Susamci et al.2011). Olive (Olea europaea L.) has been the symbol of the civilizations of these countries. It has been one of the seed values of the cultures established in this region throughout history. The sacred fruit olive, which is mentioned in the sacred texts, started to be grown 6000 years ago and its products are still used. It is known that olive leaf is widely used in traditional treatment, especially in European and Mediterranean countries. This fruit previously found a habitat between Southeastern Anatolia and the Eastern Mediterranean Region. From there, it spread to European countries that have a coast on the Mediterranean. Olive cultivation is carried out in 37 countries, most of which have a coast on the Mediterranean (Sakar 2017; Bostan 2009; Seker 2012). An average of 20 million tons of olives are produced from approximately 1 billion olive trees. Important olive-producing countries are Spain, Greece, Italy, and Turkey, respectively. The number of olive trees in Turkey is 177,843,000 and the production is 1,738,680 tons. The provinces where olives are produced intensively in the Eastern Mediterranean and Southeastern Anatolia Regions are Kahramanmaras, Hatay, Adana, Osmaniye, Gaziantep, Kilis, Mardin, and Adıyaman (FAO, 2023).

Although Kahramanmaraş has a great potential in terms of olive cultivation as a region, excessive windy days affect the olive cultivation negatively (Akıllıoglu et al. 2000). It is seen that standard olive varieties brought from outside the region and whose adaptation studies have not been completed have adaptation problems to the region. However, it is known that there are local olive genotypes that have adapted to the region and have economic value in the region where olive cultivation has continued from the past to the present. The fact that these old and local genotypes are mostly found in urban areas has led to the extinction of many high-quality genotypes. This study carried out in Kahramanmaraş, it was aimed to expand the traditional olive cultivation from the past by preserving the old and local olive genotypes that are in danger of extinction.

This study is an olive selection study and was carried out in the Kahramanmaraş region from 2016-2021 years. All analyses and examinations were carried out in the physiology laboratories of the Eastern Mediterranean Transition Zone Agricultural Research Institute, Department of Horticulture.

Materials and Methods

Materials

The material of the study consisted of local aged olive genotypes selected from counties of Onikisubat and Dulkadiroglu in Kahramanmaras and their connected villages and cultivated since long years.

Methods

Pomological analyzes were performed in 3 replications, with 30 fruits in each group. In this context, fruit number (pieces/kg), fruit weight (g), fruit width (mm), fruit length (mm), fruit index (length/width), fruit shape, seed weight (g), seed width (mm), seed length (mm), mesocarp seed ratio (%) and ripening indexes were determined.

Fruit and Seed Weight (g): For each variety, in 3 replications and each replication, 30 fruits and seeds were determined by weighing with a precision balance of 0.01 g (Baccouri et al 2009).

Fruit Width, Length, and Seed Width, Length (mm): For each variety, the width and length of fruits and seeds were measured with a digital caliper with a precision of 0.01mm in 30 fruits and seeds in each replication (Baccourı et al 2009).

Ripening Index: This test was applied only to the selected olive variety candidate genotypes and was not used in the scaled grading stage. It was determined in 100 randomly selected fruits for each variety according to the method prescribed by the International Olive Oil Council (IOOC, 2007). In this method, the ripening index is determined based on the color of the fruit skin and the color of the fruit flesh. 100 olives were taken from the olive samples and the number of olives graded between 0-7 according to the color of the skin and fruit flesh was determined and the ripening index was

calculated with the help of the equation given below (Solinas, 1990).
Ripening Index= [(0 x n0) + (1 x n1) + (2 x n2) +.... (7 x n7)] / 100

Where: n0, n1, n2,……,n7 is the amount of olives for each of the 8 categories below.

Table 1. The ripening categories used in the olive ripening index

0: Olives with dark green skin color
1: Olives with yellow or yellowish-green skin color
2: Olives with less than half of the rind color yellowish with reddish spots
3: Olives with more than half of the rind color reddish or light violet
4: Olives whose skin is completely black and the mesocarp is still completely green or white
5: Olives with a completely black skin color and a violet color up to half the thickness of the flesh
6: Olives with a completely black skin color and a violet color from the mesocarp to the seed
7: Olives with a completely black skin color and completely dark flesh and pits

Table 3. Ranges of values based on scoring criteria for table and olive oil

Fruit Weight		
Minimum	**Maximum**	**Mean**
1,64	5,97	0,43
1	1,64	2,07
2	2,08	2,52
3	2,53	2,96
4	2,97	3,40
5	3,41	3,85
6	3,86	4,29
7	4,30	4,73
8	4,74	5,17
9	5,18	5,62
10	5,63	<

Mesocarp Seed Ratio		
Minimum	**Maximum**	**Mean**
1,3	5,66	0,44
1	1,3	1,74
2	1,75	2,18
3	2,19	2,63
4	2,64	3,07
5	3,08	3,52
6	3,53	3,97
7	3,98	4,41
8	4,42	4,86
9	4,87	5,30
10	5,31	<

Yield		
Minimum	**Maximum**	**Mean**
1	3	0,20
1	1	1,20
2	1,21	1,41
3	1,42	1,62
4	1,63	1,83
5	1,84	2,04
6	2,05	2,25
7	2,26	2,46
8	2,47	2,67
9	2,68	2,88
10	2,89	<

Fat Ratio		
Minimum	**Maximum**	**Mean**
8,77	25,82	1,71
1	8,77	10,48
2	10,49	12,19
3	12,20	13,91
4	13,92	15,62
5	15,63	17,34
6	17,35	19,05
7	19,06	20,77
8	20,78	22,48
9	22,49	24,20
10	24,21	<

The pomological characteristics of the genotypes obtained by selection were subjected to a weighted scale grading in two different ways, as table and oil, according to the following evaluation tables. The scores obtained by multiplying the values obtained by dividing the minimum and maximum values of the measured characteristics of the selected genotypes by 10 with the percentage values that are the basis for scoring were accepted as the point value of that genotype. The measurements of the characteristics of the criteria consisted of the arithmetic average of at least two years' values (Uğur and Kargı, 2017). In other words, each genotype was subjected to weighted scale grading for at least two years. After two years of weighted scaled grading, a scoring ranking was made and 15 suitable and promising genotypes were selected.

Table 2. Relative values of weighted grading to be applied in olives for oil

Criteria	**Score (%)**	
	In Oil Olives	**In Table Olives**
Fruit Weight	10	20
Mesocarp Seed Ratio	10	15
Yield	30	30
Periodicity	15	15
Fresh Fruit Fat Ratio	35	20
Total point	**100**	

Results

Observations were taken by the study method in 120 genotypes determined in the first stage, and their locations were marked with GPS in the study (Picture 1). During these observations, signs of disease in olive genotypes, standard varieties, and different situations arising from urbanization were encountered. Since these genotypes determined 2016-2017 also have periodicity barriers, it was decided to take samples from 47 of them and the evaluation to be made in this way would be by the current method of the study. From 2018-2021, fruit samples were taken in 2 vegetation periods from 47 genotypes and the evaluations were made by taking the average of the sampling periods. A modified weighted scale was applied to the obtained results.

Figure1. An example of GPS marking of olive genotypes that were weighed in the study and considered promising.

It was determined that the fruit weight values of the genotypes varied between 1.64 and 5.97 g. In the study in which 6 genotypes with 5 g and above fruit weight values were examined, it was determined that the highest fruit weight values were GN-50 (5.987 g), GN-30 (5.80 g), and GN-27 (5.26 g). It was revealed in the study that GN-25, GN-71, and GN-12 genotypes followed these values with 5.15 g, 5.07 g, and 5.05 g values, respectively. The lowest fruit weights were determined as GN-6 with 1.87 g, GN-15 with 1.75 g, and GN-14 with 1.64 g. When the distribution of average fruit weight values in all genotypes is examined in general, it is understood that 26 of 47 genotypes have fruit weight values of 3 g and above (Table 4). Canozer (1991) reported that the fruit weights of olive varieties grown in our country ranged from 1.76 g to 7.50 g. Pannelli et al. (1993) stated that the fruit weights of local varieties in Italy varied between 1.23 g and 3.12 g. Gundogdu et al. (2016), in their study examining the pomological characteristics of some foreign olive cultivars (Arbequina, Hojiblanca, and Verdial) in Edremit Bay conditions, stated that the fruit weight values of these cultivars vary between 1.75 g and 5.13 g depending on the variety. In the study conducted by Bostan (2009) on 13 local olive genotypes selected in the Black Sea region, it was determined that the fruit weight values were between 3.17 g and 6.36 g, and 7 genotypes were larger than the Gemlik variety. Bolat and Guleryuz (1995) found fruit weight values between 2.92 g and 6.25 g in their study with local olive genotypes in the Coruh Valley. Mizgin (2018) reported that the local olive genotypes of Mardin varied between 1.14 g and 3.16 g. When the findings obtained from this study are compared with the values obtained in the literature studies, it is seen that there is no difference in fruit size and higher values are observed in the literature compared to olives grown in some regions.

It is understood that the seed weight values in the selected local olive genotypes show a slightly different distribution from the fruit weight values. However, it is striking that the seed weight values are parallel to the fruit weight values. In the study where the highest seed weight value was determined in GN-30 (1.65 g), GN-50 (1.62 g), and GN-25 (1.53 g) genotypes, the lowest seed weights were 0.49 g in GN-65, GN-29 and GN-75 genotypes, respectively. , was determined as 0.47 g and 0.41 g. When the distribution is examined in general, it is seen that the seed weight is over 1 g in 11 genotypes, while the majority of the genotypes have a seed weight between 0.6-0.8 g (Table 4). Gezerel (1980) reported that the pit weight of olives can vary according to the varieties, and he said that it is 1.18 g in the Adana Topağı variety and 0.50 g in the Nizip Yağlık variety. Sugar et al. (2012) added that the differences in seed weight may vary according to the place where the variety is grown, cultural care processes, and fruit size.

Canozer (1991) determined that the seed weights were 0.527 g in the Gemlik variety. They found 0.538 g in the Ayvalık variety and 0.560 g in the Memecik variety, Bolat and Guleryuz (1995) 0.92 g in the Otur variety, 0.44 g in the Sati variety and 0.46 g in the Butko variety. Sugar et al. (2012) reported in their study on local olive genotypes in the Yusufeli region that the highest olive seed weights were obtained from Otur (0.87 g) and the lightest from Butko (0.46 g).

The mesocarp/seed ratios varied between 1.30 and 5.66, the highest mesocarp/seed ratio was found in GN-52 (5.66), GN-34 (5.15), and GN-73 (4.82) genotypes. The lowest mesocarp seed ratio ratios were found in GN-15 (1.82), GN-23 (1.77), and GN-44 (1.30) genotypes in the study. The fact that more than half of the genotypes in the distribution had a mesocarp seed ratio above 3 was seen as a promising result in the study (Table 4).

The fruit oil ratios in the selected olive genotypes were between 8.77-25.82%. While the highest oil ratios were found in the GN-72, GN-85, and GN-52 genotypes at 25.82%, 25.09%, and 24.13%, respectively, the total oil ratios of the GN-84 (22.9%) and GN-75 (22.8%) genotypes were also positive. seen. The lowest oil ratios were found in GN-45 (11.80%), GN-14 (10.60%), and GN-44 (8.77%) genotypes. When the distribution of the oil ratios of the selected local olive genotypes was examined in general, it was determined that the average oil ratio of 36 genotypes was 15% and above, and 10 of them had an oil ratio of 20% and above. It was thought that the fat ratios of these genotypes were positive in conditions where breeding techniques were not applied sufficiently.

The scores obtained as a result of the weighted grading of 47 local olive genotypes selected by the criteria determined in the method part of the study were handled in two different categories as olive oil and table olives. As a result of scoring according to these categories, it was seen that some genotypes gave positive results in both oil and table usage areas, while some genotypes were more suitable for oil or table use.

It is understood from Table 4 that olive genotypes score 145-825 in the scoring of olives for oil. In the study where the highest olive oil scores were determined as GN-52 (825), GN-72 (820), GN-34 (810), and GN-27 (765), the lowest scores were in GN-13, GN-44, and GN-14 genotypes. 255, 200, and 145 respectively.

It is understood that the scoring of table olives varies between 150 and 845 (Table 4). In the study where the highest table olive scores were determined as GN-52 (845), GN-72 (840), and GN-34 (820), the lowest table olive scores were GN-13 (245), GN-44 (200), and GN-14. (150) genotypes.

Conclusions

In the study carried out in Kahramanmaraş provinces and districts in 2016-2020 years, a total of 120 olive genotypes, which are one of the important settlements in terms of olive potential, were studied. In the determined genotypes, in 2017-2019, fruit weight, number of grains per 100 g, mesocarp seed ratio, and fat ratio were evaluated according to the 'Weighed grading' method and as a result of 'Weighed grading', a total of 15 types were selected as candidate varieties (Table 5). Fruit structures play a very important role in determining olive characteristics. Fruit shape and characteristics and seed characteristics show the characteristics of the variety and type. In this study, fruit and seed characteristics of 120 genotypes were determined. Similar results were obtained in various selection studies on olives. Ferrara and Lamparelli (1995) found the highest fruit weight in Termire di Bietto with 7.1 g, and the lowest fruit weight in Perranzana (with 3.2 g). According to Lavee et al. (1999) reported that there were even differences in the fruit weight of olive cultivars from tree to tree. Researchers examining the effect of irrigation on fruit size determined that the fruit size, which was 1.9 g in Maloot, 2.6 g in Souri, and 2.3 g in Barnea, increased to 2.3 g, 5.4 g, and 2.9 g with irrigation, respectively, under non-irrigated conditions. Ganino and Fabbri (2005) investigated the pomological and morphological characters of 5 genotypes obtained as a result of crossbreeding to increase the quality of table olives in the Tuscana region and their fruit weights were respectively 3.35 g in Leko 3, 5.6 g in Leko 4, 7.77 g in Leko 5. They determined it as 5.76 g in Leko 6 and 1.81 g in Leko 7. Seed weights were determined as 0.49, 0.66, 0.73, 0.58, and 0.37 g. Gregorio (2006) determined that the highest fruit weight was in the Kiti clone (6.7 g) and the lowest fruit weight was in Lagoudera with 3.4 g in

the study of determining the genetic differences of 31 clones in Ladoelia, a Cyprus native variety.

Table 4. Weighted grading results of pomological analyzes and scores obtained from fruit samples taken from selected local olive genotypes

No	Genotype	Fruit Weight	Seed Weight	Mesocarp Weight	Free Seed	Mesocarp Thick	Seed Diam.	Seed Length	Fruit Width	Fruit Length	Altitude	Oil Point	Table Point
1	**GN-3**	3,61	0,98	2,63	4	3,80	9,89	15,36	16,08	18,81	578	**405**	**410**
2	**GN-6**	1,87	0,60	1,27	4	2,86	8,02	12,89	14,00	16,50	590	**395**	**430**
3	**GN-10**	2,22	0,74	1,48	4	3,18	7,40	13,75	14,31	17,92	652	**325**	**335**
4	**GN-11**	2,98	0,62	2,36	4	3,97	8,19	13,67	15,74	19,75	654	**515**	**525**
5	**GN-12**	5,05	1,31	3,74	3	5,38	9,75	15,00	19,95	22,14	680	**570**	**555**
6	**GN-13**	3,37	1,00	2,37	4	2,97	8,69	17,02	16,02	22,07	680	**255**	**245**
7	**GN-14**	1,64	0,52	1,12	4	3,26	6,54	13,98	13,33	16,16	682	**145**	**150**
8	**GN-15**	1,75	0,62	1,13	4	3,70	8,81	11,65	15,44	17,67	668	**270**	**280**
9	**GN-16**	3,15	0,91	2,24	3	4,83	8,34	17,81	15,87	23,90	789	**430**	**435**
10	**GN-19**	3,90	1,26	2,64	3	4,64	7,24	17,42	17,22	25,56	791	**470**	**465**
11	**GN-20**	3,25	0,87	2,38	5	4,35	8,65	13,32	16,37	20,04	793	**475**	**485**
12	**GN-22**	2,83	0,78	2,05	4	3,43	7,83	13,74	14,62	18,76	830	**550**	**565**
13	**GN-23**	3,55	1,28	2,27	3	4,15	10,80	15,29	18,28	21,24	813	**440**	**440**
14	**GN-24**	2,80	0,80	2,00	5	3,89	7,20	14,43	15,34	19,94	814	**550**	**565**
15	**GN-25**	5,15	1,53	3,62	3	5,75	9,09	19,90	20,83	26,14	952	**575**	**565**
16	**GN-26**	2,65	0,83	1,82	2	3,77	8,39	16,36	14,65	21,67	953	**375**	**380**
17	**GN-27**	5,26	1,10	4,16	3	5,63	10,78	13,85	21,99	22,53	903	**765**	**745**
18	**GN-28**	2,89	0,67	2,22	4	3,41	7,92	15,71	15,34	20,24	893	**565**	**575**
19	**GN-29**	1,90	0,47	1,43	5	4,31	6,91	12,93	14,58	17,95	901	**285**	**310**
20	**GN-30**	5,80	1,65	4,15	3	5,48	8,05	16,05	17,9	23,96	913	**635**	**615**
21	**GN-31**	3,61	0,78	2,83	3	5,42	8,14	16,13	17,64	23,08	912	**570**	**580**
22	**GN-33**	2,57	0,59	1,98	4	4,53	7,53	15,03	16,50	19,57	929	**590**	**605**
23	**GN-34**	4,12	0,67	3,45	5	6,47	7,78	15,22	18,52	23,47	722	**810**	**820**
24	**GN-35**	2,71	0,78	1,93	4	3,55	7,25	14,80	15,25	21,00	720	**400**	**410**
25	**GN-36**	3,30	0,63	2,67	4	4,49	6,64	10,80	16,34	19,94	722	**460**	**455**
26	**GN-38**	3,66	0,70	2,96	4	4,95	8,83	14,23	17,25	21,50	859	**565**	**570**
27	**GN-39**	2,85	0,74	2,11	4	3,98	8,37	14,19	15,98	19,91	808	**470**	**490**
28	**GN-43**	3,71	0,93	2,78	4	3,79	8,45	19,46	16,53	24,94	662	**530**	**540**
29	**GN-44**	1,93	0,84	1,09	3	4,34	6,47	13,17	17,88	14,58	670	**200**	**200**
30	**GN-45**	4,48	1,21	3,27	4	5,36	10,02	17,97	18,74	24,77	667	**465**	**440**
31	**GN-47**	2,96	0,86	2,10	4	3,20	8,49	15,06	14,52	19,28	665	**330**	**335**
32	**GN-49**	4,25	0,89	3,36	4	4,32	8,95	14,94	17,50	21,91	638	**575**	**575**
33	**GN-50**	5,97	1,62	4,35	2	4,69	9,94	21,80	18,67	28,82	650	**605**	**575**
34	**GN-52**	3,53	0,53	3,00	5	3,97	7,38	14,74	17,25	22,60	710	**825**	**845**
35	**GN-65**	1,96	0,49	1,47	5	2,83	7,36	13,21	14,76	18,18	670	**560**	**595**
36	**GN-70**	3,61	0,75	2,86	5	4,51	8,46	16,91	17,25	22,68	666	**720**	**735**
37	**GN-71**	5,07	1,06	4,01	4	4,70	9,48	18,25	20,11	25,55	670	**685**	**660**
38	**GN-72**	4,14	0,82	3,32	4	4,55	9,00	15,87	18,82	22,79	672	**820**	**840**
39	**GN-73**	3,26	0,56	2,70	3	3,75	7,80	15,69	15,64	21,29	676	**580**	**570**
40	**GN-74**	3,63	0,85	2,78	3	3,95	9,00	17,40	16,60	23,34	680	**600**	**595**
41	**GN-75**	1,88	0,41	1,47	4	2,68	6,68	13,79	13,72	18,21	673	**625**	**665**
42	**GN-76**	2,23	0,72	1,51	2	3,18	8,74	14,32	15,10	19,07	685	**535**	**550**
43	**GN-77**	4,47	1,05	3,42	2	3,55	8,57	19,93	17,68	27,49	690	**710**	**705**
44	**GN-78**	3,31	0,81	2,50	2	3,26	8,36	19,22	15,93	24,84	655	**595**	**600**
45	**GN-79**	2,18	0,80	1,38	2	2,68	9,10	15,17	14,59	18,38	669	**490**	**500**
46	**GN-84**	3,41	0,77	2,64	4	3,75	8,71	15,40	17,99	20,54	820	**725**	**745**
47	**GN-85**	2,73	0,51	2,22	4	3,98	7,48	14,04	16,72	21,16	820	**730**	**765**

According to Jibara et al. (2006), in the study in which they examined the fruit and oil characteristics of Syrian varieties, fruit weights, and fat ratios were determined as 4.7 g, 16.5% in Qaisi variety, 2.2 g, 27.3% in Zeiti variety, 2.9 g, 14.8% in Dan variety, 3.5 g, 19.5% in Karamani variety.

Sorani cultivar 3.1 g, 26.3% were determined. In the studies carried out in our country, Canozer (1991) obtained the heaviest fruits from İzmir Tableware (7.5 g), Karamursel Su (7.1 g), and Çelebi (7.1 g) varieties, while the lightest fruits were obtained from Kilis Yaglik (1.76 g) varieties.), Nizip Yaglik (2.17 g) and Kalembezi (2.22 g) varieties were reported. Ozelbaykal (1995) reported that the Gemlik olive variety has an average fruit weight of 4.45 g in Adana ecological conditions. Kaynas et al. (1996). When evaluated as black, he stated that the 100-grain weight was determined as the lowest in Edincik Su and the highest in Karamursel Su. Kaynas et al. (1996), in their study, determined the fruit mesocarp seed ratio as 2.10% in the Meski variety, which is considered green, 4.90% in the Domat variety, 4.50% in the Edincik Su variety, which is considered black, and 6.90% in Gemlik. In a study conducted in the Hatay region, Koleksiyon (2000) determined the 3-year average fruit weight of some cultivars and determined the heaviest fruits in Gemlik (3.85 g), while the lightest fruits were found in the Kargaburnu cultivar (2.67 g). Ulaş (2001) stated that in Adana conditions, the heaviest fruits were determined in Mavi (6.68 g) and Sarı Ulak (5.87 g), while the lightest fruits were determined in Kilis Yağlık (1.56 g) and Kunculu (1.62 g). In our selection study, the size of the fruits obtained from trees grown in anhydrous conditions is similar to the results of the research, and there are even larger fruits in some types. (GN 71 5.07 g).

A sufficient number of seedlings were propagated from the selected genotypes control plants for selection-II studies. In the next part of the study, experimental plots consisting of 15 selected genotypes and control plants were created and it is planned to develop commercial olive varieties according to the results to be obtained from this.

Table 6. Pomological analysis results of 15 local olive genotypes are considered promising according to the results of the weighted grading of the selected local olive genotypes.

Genotype	Fruit Weight (g)	Seed Weight (g)	Mesocarp Thickness (mm)	Mesocarp /Seed	Ripening index	Fat (%)
Gemlik	3,49	0,64	2,85	4,43	244	28,09
GN-52	3,54	0,53	3,00	5,63	108	30.62
GN-27	4,45	0,82	3,63	4,42	249	12,28
GN-65	1,96	0,49	1,47	2,98	126	22,42
GN-70	3,61	0,75	2,86	3,80	115	27,99
GN-71	5,07	1,06	4,01	3,77	193	17,30
GN-72	4,14	0,82	3,32	4,03	308	29,55
GN-73	3,26	0,56	2,7	4,79	300	12,25
GN-74	3,63	0,85	2,78	3,27	204	19,25
GN-75	1,88	0,41	1,47	3,61	108	26,17
GN-76	2,23	0,72	1,51	2,11	124	18,49
GN-77	4,48	1,05	3,42	3,25	215	26,17
GN-78	3,32	0,81	2,5	3,08	170	21,00
GN-79	2,18	0,8	1,38	1,71	102	20,13
GN-84	3,41	0,77	2,64	3,41	114	28,76
GN-85	2,73	0,51	2,22	4,31	95	12,41

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Statement of Conflict of Interest
The authors declared that for this research article, they have no actual, potential or perceived conflict of interest.

Author contribution
The contribution of the authors to the present study is equal.
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