

DETERMINATION OF LEAF AND FRUIT CHARACTERISTICS OF ALMOND VARIETIES OF FOREIGN ORIGIN CULTIVATED IN CAPPADOCIA REGION

Hasan Talha Ünsal¹, Borak Erkek¹, Mehmet Yaman^{1*}

¹ Erciyes University, Faculty of Agriculture, Department of Horticulture, Kayseri, Turkey



Abstract

Almond is a type of fruit that grows both economically and naturally in many regions of Turkey. In this study, leaf and fruit characteristics of 3 different almond varieties of foreign origin grown in Ürgüp district of Nevşehir province in the Cappadocia region in 2021 and 2022 were determined. Ferragnes variety with a value of 23.47 mm in terms of leaf width, Ferragnes variety with a value of 67.9 mm in leaf length, and Ferraduel variety with a value of 13.62 in terms of petiole length formed the highest values in the leaf characteristics examined. Considering the fruit data, it was determined that Ferragnes variety had the highest value in terms of fruit length with 40.62 mm, Ferragnes variety had the highest value in fruit width values with 23.99 mm, and Ferragnes variety had the highest value in terms of fruit weight with 6.24 g. When the kernel weight data were examined, the highest value was found in Ferragnes variety with 1.61 g, and when the kernel width and kernel length data were examined, the highest values were determined in Ferragnes variety with 14.55 mm and 27.70 mm, respectively. The results of the study are thought to be important in terms of shedding light on future studies, especially since limited studies have been carried out in this region.

Keywords: almond, Cappadocia, fruit

1. INTRODUCTION

Turkey has an ecologic diversity that different fruit species can be cultivated (Bayram et. al., 2010). Our country, homeland of many different species, connects Europe, Asia and Africa, has an important economic potential. Almond (*Prunus amygdalus*) is a subgenus of the Rosaceae family, in the order Rosales. Almond is a nut has an important economic value, cultivated in many different regions in the World. Our country is one of the homelands of almond and many different almond cultivars are grown economically (Bayazit, 2007). Turkey has an important place in the world almond production. One of the important thing in the almond breeding is breeding a cultivar that is appropriateto ecological conditions. Its been reported that cultivars that suitable for ecological conditions are producing good pomologic quality and are resistant to diseases (Pınar et. al., 2010; Asma, 2012; Moustafa and Cross, 2019).

According to the 2021 data, 400.000 thousand tonnes of shelled nuts were produced approxiamtely. 180 thousand tonnes of this production of this were in Turkey. Turkey took 7th row in World almond production. According to the data of the last 10 years, almond production in Turkey increased importantly, being an important fruit for our country (FAOstat, 2021; TÜİK, 2021).

Almond is seriously affected from spring late frosts because its blooming early. In the first stages, almond productions were made in small orchards and with plants from seeds, this resulted with low yield and low fruit quality. Because of that, the attention has not been given to almond production in our country (Alaz and Bayazit, 2022). But after realising its nutritive value and economic importance, with foreign originated cultivars and suitable cultural applications, almond production in our country has risen significantly.

In the regions where the orchard will be established, difficulties are encountered in the selection of varieties because it is not known how the foreign-origin varieties in our country perform in which ecology. While establishing an orchard, the initial establishment costs are quite high. Considering that the youth sterility of fruit trees is long, it will be understood too late whether the variety used in the orchard plant is compatible with that ecology. While establishing an orchard, the characteristics of the variety, the ecology of the region where the orchard will be established, and the stress factors that may occur in the region should be taken into consideration. Therefore, it is very important how the variety used in the orchard performs in that region. For this reason, in this study, leaf and fruit characteristics of 3 different almond varieties grown in the Cappadocia region were examined.

2. MATERIALS AND METHODS

This study was carried out at Erciyes University in 2020 and 2021. Ferragnes, Ferraduel and Laurene almond varieties were used as plant material, and these plant materials were collected from an orchard in the town of Ürgüp in Nevşehir province in the Cappadocia region. These plant materials were obtained from different parts of the tree. In the study, 30 materials from each variety were collected, 10 leaves and 10 fruits from each tree.

Table 1. Meteorological Data of Nevşehir Province Between 1959-2022

Month	Average Highest Temperature (°C)	Average Lowest Temperature (°C)	Average Temperature (°C)	Precipitation (mm)
March	10.2	0.5	4.9	47.4
April	15.9	5.1	10.1	49.5
May	20.6	8.8	14.5	56.9
June	24.9	11.6	18.3	36.6
July	28.5	13.6	21.3	9.7
August	28.5	13.5	21.2	8.0
September	18.3	10.4	17.3	13.7

Leaf width, leaf length, petiole thickness and petiole length data on leaves, fruit width, fruit length, fruit weight, kernel almond width, kernel almond length and kernel weight data were determined in fruits. Length data were measured in millimeters (mm) with a digital caliper, and weight data were measured with the help of precision balances.

In the province of Nevşehir, where the study was conducted, the climate features cold and snowy winters along with hot and dry summer months. Based on meteorological data collected for Nevşehir province from 1931 to 2022, it was observed that the lowest temperature occurred at 0.6 degrees Celsius in March, while the lowest temperature in April reached 5.0 degrees Celsius.

Statistical Analysis

The study was designed with three replications. Statistical analyses were conducted using the Duncan multiple comparison test in the SPSS program, and all statistical significance levels were set at $p < 0.05$.

3. RESULTS AND DISCUSSIONS

In the study, some leaf and fruit characteristics of Ferragnes, Ferraduel and Laurene almond cultivars were investigated. Looking at the leaf characteristics data, the highest values were determined in Ferragnes cultivar. However, no significant difference was determined between Ferragnes and Ferraduel cultivars. However, significant differences were determined between these two cultivars and Laurene cultivar.

In the petiole thickness data, the thickest petiole was determined as 1.14 mm in Ferragnes cultivar, and no difference was found between them and Ferraduel cultivar. It was determined that Laurene cultivar had the shortest petiole thickness with 0.71 mm (Table 2). Looking at the petiole length data, Ferraduel cultivar was the cultivar with the longest petiole with 13.62 mm, and no difference was found between it and other cultivars (Table 2). Ferragnes cultivar was found to be the cultivar with the longest leaf width with 23.47 mm. No difference was determined between the Ferraduel and Ferragnes varieties. The difference between the Laurene variety and the Ferragnes variety is significant, while the difference between the Laurene variety and the Ferraduel variety is insignificant (Table 2). In the leaf length data, Ferragnes variety has the longest leaf length with 67.9 mm, the difference between it and Ferraduel variety is insignificant. Laurene cultivar had the shortest leaf length with 50.58 mm, and the difference between the other two cultivars was significant (Table 2).

Table 2. Leaf Data

Variety	Petiole Thickness (mm)	Petiole Length (mm)	Leaf Width (mm)	Leaf Length (mm)
Ferragnes	1.14±0.02 ^a	12.58±0.53 ^a	23.47±0.91 ^a	67.9±1.47 ^a
Ferraduel	1.10±0.06 ^a	13.62±2.29 ^a	20.21±2.32 ^{ab}	64.8±5.36 ^a
Laurenne	0.71±0.03 ^b	12.49±0.57 ^a	16.66±0.9 ^b	50.58±1.74 ^b
Mean	0.97±0.04	12.81±0.63	20.10±0.93	60.68±2.17

Considering the fruit width, Ferragnes cultivar had the longest fruit width with 23.99 mm, followed by Ferraduel and Laurene cultivars, and no difference was determined between these three cultivars (Table 3). Ferragnes cultivar was determined to be the cultivar with the highest fruit length with 40.62 mm. While there was no difference between it and Ferraduel cultivar, it was determined that the difference between these two cultivars with Laurene cultivar was significant (Table 3). With 6.24 grams, Ferragnes cultivar was the cultivar with the highest fruit weight, followed by Ferraduel and Laurene cultivars, respectively. While no difference was found between Ferragnes and Ferraduel cultivars, the difference between these two cultivars and Laurene cultivar is significant (Table 3). Ferragnes cultivar was the cultivar with the highest fruit values. Ferragnes cultivar was followed by Ferraduel cultivar, and the difference between them was determined to be statistically insignificant. Laurene variety is the variety with the lowest values in fruit data, and the difference between Ferragnes and Ferraduel varieties with Laurene variety is statistically significant.

Looking at the kernel almond data, it is seen that the variety with the highest data is Ferragnes variety. No significant difference was determined between Ferragnes and Ferraduel cultivars, but it was determined that the difference between these two cultivars and Laurene cultivar was significant. It was determined that Ferragnes cultivar had the highest values of kernel almond width, kernel length and kernel weight with 14.55 mm, 27.70 mm and 1.61 grams, respectively. This cultivar was followed by Ferraduel cultivar with 13.56 mm, 27.08 mm and 1.38 grams, respectively, and no difference was detected between them. Laurene cultivar was the cultivar with the lowest values in these data. While there was no difference between Ferragnes and Ferraduel cultivars, it was determined that the difference between these two cultivars and Laurene cultivar was significant. When we look at the leaf and fruit data in general, the variety with the highest values was Ferragnes, followed by Ferraduel and finally Laurene.

Table 3. Shelled Nut Data

Variety	Fruit Width (mm)	Fruit Length (mm)	Fruit Weight (g)
Ferragnes	23.99±0.47 ^a	40.62±0.99 ^a	6.24±0.39 ^a
Ferraduel	23.96±0.41 ^a	38.79±0.55 ^a	5.63±0.18 ^a
Laurenne	22.68±0.77 ^a	33.83±0.51 ^b	2.06±0.49 ^b
Mean	23.54±0.34	37.74±0.66	4.64±0.40

Table 4. Kernel Almond Data

Variety	Kernel Almond Width (mm)	Kernel Almond Length (mm)	Kernel Almond Weight (g)
Ferragnes	14.55±0.48 ^a	27.70±0.55 ^a	1.61±0.13 ^a
Ferraduel	13.56±0.31 ^a	27.08±0.43 ^a	1.38±0.05 ^a
Laurenne	11.53±0.54 ^b	23.35±0.89 ^b	0.35±0.17 ^b
Mean	13.21±0.34	26.04±0.51	1.11±0.12

In different studies, it was determined that higher leaf width and height, leaf stem thickness and length data were obtained in different ecologies, in the same or different species and varieties with the cultivars used in this study. Likewise, there have been differences in fruit data, and these differences are thought to be due to different ecologies, different species and varieties, and different growing conditions (Alkan and Seferoğlu 2014; Bayazıt and Çalışkan 2021; Alaz and Bayazıt 2022; Yıldırım 2022). As a result, Ferragnes and Ferraduel varieties are the varieties that will best adapt to the Cappadocia region among the three varieties examined in the study. However, it is thought that the Laurenne variety is not as well adapted to the Cappadocia region as Ferragnes and Ferraduel varieties. In addition, the study will be a pioneer for future studies since similar studies have not been carried out in the Cappadocia region before.

4. CONCLUSIONS

In summary, this study aimed to investigate the leaf and fruit characteristics of three distinct almond cultivars cultivated in the Cappadocia region during the years 2020 and 2021. The findings indicate that there were no significant differences in leaf and fruit data between the Ferragnes and Ferraduel cultivars. However, a significant distinction was observed between these two cultivars and the Laurenne cultivar. Notably, considering the ecological factors' impact on pomological and plant

attributes, especially the Ferragnes and Ferraduel varieties demonstrated noteworthy differences. These results are expected to serve as a valuable reference for almond production and the establishment of new orchards within the region.

5. REFERENCES

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