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INVESTIGATION OF FRUIT CHARACTERISTICS OF SOME AVOCADO CULTIVARS IN MERSIN-TÜRKİYE CONDITIONS

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Abstract

Avocado (*Persea americana* Mill.) is a subtropical fruit species originating from Central America. It is one of the most important fruit species economically cultivated in subtropical and tropical climate conditions in the world. It is important in human nutrition in terms of the vitamins, minerals, fat and protein it contains. World production is approximately 10 million tons and the most important producer country is Mexico. Production in Turkey has been increasing rapidly in recent years and there has been a 20-fold increase in production in the last decade. Cultivation is carried out especially in Antalya, Mersin and Adana provinces in Türkiye. In this study, fruit characteristics were examined in 9 different avocado cultivars in Erdemli-Mersin conditions and the performances of the cultivars were compared. Accordingly, significant differences were determined in terms of fruit characteristics among the varieties. While Pinkerton ranked first with 310 g in terms of fruit weight, Hass was found to have small fruit weight (133 g). The highest shell thickness value was determined in Anaheim (1.91 mm) cultivar and the lowest in Wurtz and Ettinger cultivars. Pinkerton had the highest flesh content (92%), while Lula had the lowest flesh content (71%). Total soluble solid contents of the cultivars varied between 7,53% (Fuerte) and 12,08% (Pinkerton). The results obtained are informative for planning avocado cultivation and cultivar selection in the Mersin region.

Keywords: Avocado, fruit quality, selection

1. INTRODUCTION

Avocado (*Persea americana* Mill.) is a dicotyledonous plant species belonging to the Lauraceae family (Yahia and Woolf, 2011). Avocado cultivation in the world can be done in subtropical and tropical regions ranging from regions close to desert climates to cool mist-belt conditions (Bower and Cutting, 1988). It is one of the most important fruit species economically cultivated in subtropical and tropical climate conditions in the world.

World avocado production is nearly 10 million tons and Mexico, Dominican Republic, Peru and Colombia are important producing countries. Avocado production and consumption have been

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increasing in recent years, and Mexico undertakes approximately 30% of the world's avocado production and 40% of the export (FAO, 2024).
It is frequently used in areas such as food, pharmacy and cosmetics industries with its high lipid content. In addition, it is also used in traditional medicine for the treatment of some diseases (Mensah et al., 2009). Avocado is a very rich food source in terms of carbohydrates, fat, protein, fiber, minerals and other various bioactive compounds (Araujo et al., 2020).
Some areas of the Mediterranean coastline in Türkiye have been identified as suitable for avocado production. Avocado production in these regions has started to increase since the 1980s (Demirkol, 1998; Bayram and Tepe, 2019). Avocado cultivation experienced a rapid spread starting in the mid-1980s in the Mediterranean region of Turkey. Avocado production in Turkey has been increasing rapidly in recent years and there has been a 20-fold increase in production in the last decade. Cultivation is carried out especially in Antalya, Mersin and Adana provinces.
Research on avocado in Türkiye began in the 1970s with the process of bringing Bacon, Fuerte, Hass and Zutano varieties from California. Studies have determined that these varieties are adapted to the Mediterranean region of Türkiye (Demirkol, 1997; Bayram and Tepe, 2019). In parallel with increasing production and consumption, the adaptation of new varieties to the region needs to be examined. This study aims to determine the fruit characteristics of some avocado varieties in Mersin-Erdemli district. In this context, the performance of the varieties in the region will be determined and adapted varieties can be suggested for production.

2. MATERIALS AND METHODS

This study aims to determine the fruit characteristics of some avocado varieties in Mersin-Erdemli district. In this context, the performance of the varieties in the region will be determined and the adapted varieties can be suggested for production.
In the study, 9 avocado varieties (Anaheim, Bacon, Ettinger, Fuerte, Hass, Lula, Pinkerton, Regina, Wurtz) located in the field of Alata Horticultural Research Institute in Mersin-Erdemli were used as material. The varieties are located in the field with 3 replications. The pomological characteristics specified below in avocado varieties were carried out in 3 replications and 10 in each replication, totaling 30 fruits. Fruit samples were taken in February for the Hass variety, in December for Anaheim, and in November for the other varieties.
Fruit and seed weight (g): Measurements were made with a precision scale sensitive to 0.01 grams.
Fruit length, diameter and rind thickness (mm): Measured for each fruit using a digital caliper.
Total soluble solids (%): Measured with hand refractometer
Acidity (%): Determined by NaOH titration.
Data were analyzed using JMP 5.0 (SAS Institute Inc., Cary, NC, USA) and means separated and grouped using Tukey's test ($p<0.05$).

3. RESULTS AND DISCUSSIONS

Differences were found between genotypes in terms of the all fruit characteristics examined as shown in Table 1 While Pinkerton ranked first with 310 g in terms of fruit weight, Hass was found to have small fruit weight (133 g). Lula and Fuerte were also varieties with large fruits. In a study conducted in Ghana, most of the avocado trees randomly identified had fruit weights of 170-420 g (Abraham et al. 2018). In a study conducted in Nepal, it was determined as 143-403 g (Poudel et al. 2018). In a study conducted in Antalya-Türkiye, fruit weights were determined as 208-349 g in the Bacon variety harvested at different periods, and 204-333 g in the Fuerte variety (Bayram and Tepe,

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2019). Although there are some differences in terms of fruit weight between the studies, the compatibility is higher since the numerical variation is high. The variety differences and ecology used in the studies explain the differences. Lula had the highest fruit width (75.9 mm) and Pinkerton had the highest fruit length (122.13 mm). Hass had the smallest fruit width and length. In the study conducted in Indonesia, fruit width and height values were found to be 75.7 and 96.7 mm, respectively, which are consistent with the results of our study (Sari et al. 2024). Among the cultivars rind thickness was ranged between 0.67-1.91 mm.

Table 1. Some fruit characteristics obtained from avocado cultivars

Cultivars	F. Weight (g)	F. Width (mm)	F. Lenght (mm)	Rind Thickness (mm)
Anaheim	261.53 ± 8.06 c	68.47 ± 2.64 b	108.62 ± 8.74 d	1.91 ± 0.23 a
Bacon	212.58 ± 11.09 d	64.29 ± 1.86 de	93.19 ± 4.21 e	0.77 ± 0.03 c
Ettinger	250.23 ± 23.99 c	65.67 ± 5.66 cd	111.77 ± 6.14 cd	0.67 ± 0.04 c
Fuerte	275.53 ± 15.68 b	67.13 ± 1.31 bc	115.28 ± 4.24 bc	0.76 ± 0.05 c
Hass	133.03 ± 15.53 f	54.32 ± 3.02 g	85.03 ± 5.77 f	1.41 ± 0.41 b
Lula	298.15 ± 13.9 a	75.9 ± 3.57 a	114.54 ± 4.67 bc	1.51 ± 0.11 b
Pinkerton	310.65 ± 18.14 a	60.85 ± 3.8 f	122.13 ± 9.41 a	0.73 ± 0.11 c
Regina	187.89 ± 11.8 e	62.21 ± 1.6 ef	95.05 ± 7.74 e	0.74 ± 0.06 c
Wurtz	218.13 ± 19.75 d	59.51 ± 3.11 f	119.24 ± 4.78 ab	0.67 ± 0.04 c

Seed weight was significantly different among the cultivars (Table 2). Lula had the highest seed weight (84.35 g), while Hass had the smallest seed weight (21.56 g). Poudel et al. (2018) determined the seed weight as 18.93-63.78 g, slightly lower than the results in our study. Pinkerton had the highest flesh ratio (92%), while Lula had the lowest flesh content (71%).
Total soluble solid contents of the cultivars varied between 7.53% (Fuerte) and 12.08% (Pinkerton). In a previous study conducted in Lebanon, Fuerte had the lowest TSS ratio (6.7%) as in our study, while Hass and Lambhass had the highest TSS (10.2%) (Salameh et al. 2022).

Table 2. Seed weight, flesh ratio, TSs and acidity values of avocado cultivars

Cultivars	Seed Weight (g)	Flesh Ratio (%)	TSS (%)	Acidity (%)
Anaheim	41.48 ± 4.89 d	84.14 ± 1.81 b	9.43 ± 1.07 d	0.14 ± 0.03 ef
Bacon	34.77 ± 2.71 e	83.6 ± 1.55 b	10.5 ± 1.4 c	0.16 ± 0.02 e
Ettinger	52.09 ± 6.34 b	79.01 ± 3.28 cd	12.75 ± 1.61 a	0.24 ± 0.03 c
Fuerte	39.87 ± 1.55 de	85.46 ± 1.16 b	7.53 ± 0.57 e	0.12 ± 0.01 f
Hass	21.56 ± 4.35 f	83.69 ± 3.41 b	9.58 ± 0.29 d	0.2 ± 0.01 d
Lula	84.35 ± 12.58 a	71.71 ± 3.96 e	7.28 ± 0.42 e	0.12 ± 0.03 f
Pinkerton	21.84 ± 4.03 f	92.95 ± 1.35 a	12.08 ± 0.3 ab	0.32 ± 0.04 a
Regina	35.35 ± 5.02 e	81.08 ± 3.15 c	10.73 ± 0.47 c	0.27 ± 0.06 b
Wurtz	46.5 ± 5.76 c	78.42 ± 4.02 d	11.89 ± 0.59 b	0.21 ± 0.03 cd

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4. CONCLUSIONS

The beneficial substances found in avocados have an important place in human nutrition. Avocado production is increasing in Türkiye. Such studies are important for determining varieties that adapt to regions. In this study, significant differences were detected in terms of fruit quality parameters between varieties grown in the same field. These results will provide information on which varieties can be grown more successfully in the region.

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