

SOME POMOLOGICAL AND CHEMICAL PROPERTIES OF LOCAL PEAR VARIETIES IN UŞAK, TURKEY

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Abstract

This study described some desirable pomological and chemical traits of 10 local pear varieties from Uşak in 2016. In these local pear varieties, some pomological and chemical properties were determined such as fruit weight, fruit height, fruit widths, fruits firmness, total soluble solids, titratable acidity, DPPH (2,2-diphenyl-1-picryl-hydrazyl-hydrate) free-radical values and ascorbic acid content. The values for fruit weights ranged from 93.12 ± 3.26 g to 287.93 ± 8.36 g, fruit height ranged from 6.12 ± 1.37 cm to 11.62 ± 1.15 cm, fruit widths ranged from 4.38 ± 0.82 cm to 8.52 ± 0.63 cm, fruits firmness ranged from 4.26 ± 0.18 lb to 11.19 ± 0.32 lb total soluble solid contents ranged from $\% 8.62 \pm 0.32$ to $\% 17.20 \pm 0.83$ and, titratable acid contents ranged from $\% 0.43$ to $\% 2.63$. DPPH values were determined and varied from 12.37 ± 0.73 to 26.74 ± 1.68 ; ascorbic acid content situated between 108.53 ± 3.12 and 263.37 ± 4.71 mg. We conclude that some local pear varieties may be recommended for the next breeding studies.

Key words: local, pear, dpph, pomological, chemical.

INTRODUCTION

Due to the favorable climate and soil conditions that our country has, it has the chance to grow a large number of species and varieties in terms of fruit.

Today, Turkey is one of the important fruit producer countries of the world in terms of fruit variety and number of varieties and production amount (Güteryüz, 1977; Özbek, 1977).

The number of pear varieties in the world is over 5000 and this number is 600 in Turkey. However, among them, the number of those are high in quality and productivity, and cultivated commercially (Buyukyılmaz, 1993).

Pear is the most mild climate fruit species after apple in the world. Pear fruit can be consumed both fresh and dry. It is also used in pear liquor, vinegar, fruit juice, fruit salad, jam, jelly, dessert, cake, pastry and canned food industry (Özçağiran et al., 2005).

The aim of this research was to determine the some pomological and chemical properties of local pear varieties grown in Uşak region in Middle Eagean of Turkey.

MATERIALS AND METHODS

The climate of the Uşak province shows a transition characteristic between the Aegean and Central Anatolian regions. More continental climate prevails. The summers are warm, the winters are long and hard.

The annual rains is between 430 mm and 700 mm. Most of the rains fall in winter. Summer rainfall is rather low.

The research district is situated between $38^{\circ}40'$ North latitude and $29^{\circ}23'$ East longitude in Middle Eagean of Turkey. Uşak region is nearly 906 meters above sea level (Wikipedia participants, 2017).

The data of microclimates of the research district are presented Table 1.

Fruit material

Local pear genotypes were selected according to fruit sizes. Ten local pear cultivars were harvested in different region of Uşak, Middle Eagean, Turkey, in Semptember-October 2016. The harvested fruits were then transported to the laboratory for analysis.

Table 1. Average monthly air temperature (°C) and total rainfall (kg/m²) in the Uşak – 1916 to 2016.

USAK	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum (°C)	6.8	8.1	12.0	17.0	22.0	27.0	30.0	31.0	26.0	20.0	14.0	8.7
Minimum (°C)	-1.3	-1.0	1.3	5.2	9.2.0	13.0	15.0	16.0	12.0	7.9	3.8	0.6
Rainfall (kg/m ²)	75.0	66.0	59.0	50.0	48.0	28.0	15.0	9.6	16.0	40.0	59.0	82.0

(Source: www.mgm.gov.tr)

Methods

The matured fruits were selected based on morphological characteristics for fruit analyses. Desirable morphological characteristics such as fruit weight (g), fruit height (mm), fruit weight (mm), fruit firmness (lb), total soluble solid content (SSC,%) and acidity (%) were determined according to Cemeroglu (1992).

Determination of vitamin C

After pureeing and filtering, the fruit juices samples were obtained. The juices were used for vitamin C analysis.

The samples were homogenized by centrifuge and 400 µL oxalic acid (0.4 %) and 4.5 ml 2,6 - diclorofenolindofenol solution were added upon supernatant.

The data were read spectrophotometrically at the wavelength of 520 nm against the blank.

Determination of radical – scavenging activity:

In the 1,1-diphenyl-2-picrylhydrazyl (DPPH) assay, antioxidants were capable to reduce the stable radical DPPH• to the yellow coloured diphenylpicrylhydrazine (DPPH-H). The test is based on the reduction of an alcoholic solution of DPPH in the presence of a hydrogen donating antioxidant due to the formation of the non-radical form DPPH-H (Gulcin, 2007). The DPPH radical-scavenging activity was estimated after Blois (1958). Briefly, 0.1 mL of each sample extract was mixed with 0.9 mL of 0.04 mg/mL methanolic solution of DPPH. The mixtures were left for 20 min at room temperature and its absorbance then measured at 517 nm against a blank. All measurements were

carried out in triplicate. The percentage of DPPH scavenging activity was calculated using the following equation:

$$\% \text{ DPPH} = [(A_c - A_s)/A_c] \times 100$$

where A_c was the absorbance of the negative control (contained extraction solvent instead of the sample), and A_s was the absorbance of the samples.

RESULTS AND DISCUSSION

The fruit weight (g), fruit height (mm), fruit width (mm) and fruit firmness (lb) measurement in fruits of 10 local pear genotypes were examined in this study (Table 2).

According to the measurements, among pear genotypes were found to be; for fruit weights ranged from 93,12 ± 3,26 g to 287,93 ± 8,36 g, fruit heights ranged from 6,12 ± 1,37 cm to 11,62 ± 1,15 cm, fruit widths ranged from 4,38 ± 0,82 cm to 8,52 ± 0,63 cm, fruits firmness ranged from 4,26 ± 0.18 lb to 11,19 ± 0,32 lb average.

In the study on pear varieties in Yalova, there were identified fruits in diameters ranging from 42.61 to 83.54, fruit heights ranging from 72.83 to 108.25, fruit weight ranging from 57.26 to 410.75 g, SSC between 11.17 and 14.06 and TA 0.23 to 0.40 g / 100 ml (Akçay et al., 2009). In pear fruit which is very rich in nutritional value, the amount of SSC is 14.63-19.5 % and the titratable acidity value is 0.154-0.462 % (Özbek, 1978; Şen et al., 1992).

Table 2. Pomological characteristics of pear genotypes

Genotypes	Fruit weight (g)	Fruit height (mm)	Fruit width (mm)	Fruit firmness (lb)
64 USAK 01	117.26 ± 5.13	9.52 ± 0.83	5.24 ± 0.68	5.19 ± 0.14
64 USAK 02	287.93 ± 8.36	11.62 ± 1.15	8.52 ± 0.63	7.26 ± 0.56
64 USAK 03	185.83 ± 6.19	6.12 ± 1.37	6.81 ± 0.92	6.84 ± 0.27
64 USAK 04	114.85 ± 9.12	7.26 ± 1.08	4.97 ± 0.47	4.26 ± 0.18
64 USAK 05	247.51 ± 12.75	8.46 ± 0.72	7.16 ± 0.54	9.10 ± 0.59
64 USAK 06	93.12 ± 3.26	10.36 ± 0.78	4.38 ± 0.82	8.74 ± 0.47
64 USAK 07	176.28 ± 15.16	11.35 ± 1.03	8.26 ± 1.04	6.57 ± 0.26
64 USAK 08	139.68 ± 7.28	6.28 ± 0.47	5.26 ± 0.41	11.19 ± 0.32
64 USAK 09	162.44 ± 6.17	8.51 ± 1.25	6.29 ± 0.49	10.23 ± 0.55
64 USAK 10	192.74 ± 9.84	9.84 ± 0.42	8.06 ± 0.82	9.61 ± 0.92

SSC, TA, DPPH and ascorbic acid measurements in genotypes are presented in Table 3. According to the measurements, among pear genotypes were found to be; for total soluble solid contents ranged from % 8.62 ± 0.32 to % 17.20 ± 0.83 and, titrable acid

contents ranged from % 0.43 ± 0.05 to % 2.63 ± 0.12. DPPH values were determined between from 12.37 ± 0.73 to 26.74 ± 1.68 and ascorbic acid content were found between 108.24 ± 3.12 and 263.36 ± 4.71 mg average.

Table 3. Chemical characteristics of pear genotypes.

Genotypes	SSC %	TA %	DPPH	Ascorbic Acid (mg)
64 USAK 01	12.84 ± 0.23	2.63 ± 0.06	21.82 ± 1.26	147.18 ± 2.15
64 USAK 02	16.15 ± 0.56	1.79 ± 0.05	12.37 ± 0.73	162.93 ± 5.24
64 USAK 03	9.62 ± 0.08	1.52 ± 0.09	17.19 ± 1.38	108.53 ± 3.12
64 USAK 04	8.62 ± 0.32	0.82 ± 0.01	16.25 ± 1.24	125.28 ± 4.81
64 USAK 05	11.69 ± 1.24	0.91 ± 0.02	18.22 ± 0.86	263.37 ± 4.71
64 USAK 06	15.27 ± 0.85	0.43 ± 0.15	24.15 ± 1.76	214.26 ± 7.59
64 USAK 07	13.60 ± 0.16	1.35 ± 0.09	26.74 ± 1.68	185.21 ± 4.19
64 USAK 08	17.20 ± 0.83	2.14 ± 0.27	18.21 ± 1.25	192.17 ± 9.14
64 USAK 09	16.21 ± 1.54	2.37 ± 0.11	17.91 ± 1.17	251.66 ± 4.10
64 USAK 10	15.28 ± 0.84	2.18 ± 0.29	13.57 ± 1.19	182.24 ± 6.43

According to the average of the two years in the examined varieties; the total soluble solids ranged from 10.6% (Etrusc) to 15.75% (Hosui). In studies similar to this, the total soluble solid ratio was 14.60% - 19.90% (Gülyüz, 1972). In a study on pear varieties in JAPAN, They were identified as high DPPH radical scavenging activity 19.76% (Ieguchi et al., 2015). Szete et al. (2002) reported an average for ascorbic acid of 60 mg in a study of pear varieties in China.

CONCLUSIONS

As a result, fruit growing culture is based on very ancient histories in Uşak province. For centuries, many civilizations and a large number of local fruit genotypes have hosted in this region, so there has an important selection potential.

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