

DOI: 10.5281/zenodo.4321672

UDC: 634.232:631.526.32

## POMOLOGICAL AND PHENOLOGICAL CHARACTERISTICS OF LOCAL SWEET CHERRY VARIETIES (*PRUNUS AVIUM* L.) GROWN IN ÇANAKÇI (GİRESUN, TÜRKİYE)

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**Abstract.** In this study various local varieties of sweet cherry (*Prunus avium* L.) grown in the province of Çanakçı (Turkey) and facing the danger of extinction were evaluated for their phenological, pomological and morphological characteristics. Eight local types as White cherry, Crisp cherry, Niksar cherry, Buttermilk cherry, Alahnaz cherry, Çal cherry, Tönlük cherry, Orak cherry and 28 ÇN 01 type which is engrafted with Orak cherry were selected for study. The opinions of leader farmers and old people, whose expertise on fruit growing was approved by everyone in the villages, were taken into consideration. The genotypes used in the research were selected from 10-60-year-old cherry trees. Phenological examinations were carried out by taking into consideration the beginning of proliferate, beginning of blooming, full flowering, end of flowering and harvest. Pomological examinations were carried out by taking into consideration fruit dimensions and shape, fruit colour, sensory and chemical properties and seed characteristics. The fruit weight ranges between 2.56 g and 4.83 g; the ratio of fruit flesh – between 89.68% and 92.11%; fruit volume – between 2.30 ml/kg and 4.55 ml/kg; fruit size – between 15.65 mm and 20.46 mm. The flavors of the varieties and types were distributed in four groups as poor, moderate, good, and tasty. As a result of this examination, it was established that 28 ÇN 01 type, Niksar cherry and Orak cherry are more preferable than the other types.

**Key words:** Land varieties; *Prunus avium*; Phenology; Pomology; Çanakçı.

### INTRODUCTION

The common view among the researchers about cherry's homeland is South Caucasus, the Caspian Sea, and Northeast Anatolia (Özbek, 1978). Wild cherry is found in the North Anatolian Mountains and the Taurus Mountains in Turkey (Öz, 1988, Özçağırın et al. 2005). It was determined that cherry has shown the best development in a temperate climate (Webster and Looney, 1996). Although cherry can be grown in almost every region in Turkey, economically produced regions are microclimate areas, which are generally dominated by river valleys or marine climates. Cherry trees can be ripened their fruits in the best quality in the areas where the summers are cool (Özbek, 1978). Cherry fruits are generally consumed fresh in our country, some of them are used in confectionery and local dishes (such as Cherry Pickles).

As it is in many regions of Anatolia, there is also a rich fruit population in the Çanakçı district. In the pottery province, especially pome fruits, local varieties in pears and apples have been preserved, but cherry, sour cherry and local varieties from stone fruits have faced the danger of extinction. In 2019, 25 tons of cherries were produced from 1700 yielding trees in the Çanakçı district. These fruit trees are at the age of scattered fruit, usually local varieties (Anonim a, 2020). In this study, it is aimed to determine the phenological and pomological characteristics of the local cherry varieties and types that are important for the local people which are grown in the region or spontaneously in nature, and to bring the promising varieties and types to our cultivating fruits. Pirlak and Bolat (2001) investigated the phenological and pomological characteristics of 5 cherry varieties in the province of Uzundere in Erzurum. Full bloom in the cultivars examined occurred in early April and early May and lasted approximately 1 week. Harvest started in June in varieties. Fruits properties were examined in terms of; Vitality, total vitamin, vitamin C content, total acid, TSS, sensory index. Edizer and Erdoğan (1997) aimed to determine the phenological and pomological characteristics of some native cherry varieties and to preserve these varieties as genetic resources in the study conducted on nine native cherry varieties in Tokat province center. In all varieties, the fruits were harvested between 05.06.1997 - 02.07.1997, and the fruit weight was changed between 2.76 g (Er Karakiraz) and 4.549 (Sapı Kısa). Orak variety led the content of TSS with 15.67% and, Kara Kirtik variety with the highest value (0.92%) in terms of pH content. Tekintaş et al. (1991) examined the morphological, pomological, and phenological features of five local cherry varieties in and around Van Province. It is determined that the average fruit weights varied between 2.47

g and 3.33 g, TSS values varied between 18 and 23%, and pH value varied between 3.59 and 3.65. These sample harvest dates had been between 9 July and 12 July. Turan (2010) has selected 6 types of cherry types which have superior properties from the 36 cherry types to determine the pomological characteristics of local cherry (*Prunus avium* L.) types grown in the provinces of Gümüşhane province center, Torul, and Kürtün. In the study; the fruit weight of 6 types was 6.8 g and 9.8 g; 94.1% to 95.6% of the fruit meat rate. It was found that the TSS/TA changed between 27.1% and 36.1%.

## MATERIALS AND METHODS

### 3.1. Material

This study was carried out in 2012 and 2013 in the Çanakçı county of Giresun province. The local varieties named with the names of the localities, the genotypes randomly found and not having a specific name is given as 28 ÇN 01.

The genotypes used in the research were selected from 10-60-year-old cherry trees with an altitude of 380-576 m. Phenological observations were carried out as observations of trees from all directions during day-to-day visits. Each one of the trees is represented by a mixture of 100 stemmed fruits and 20 stemmed fruits were randomly picked for use in the pomological measurements.

### 3.2. Method

In the selection of cherries, the opinions of elderly people, who have been approved by the leading farmers and the local experts on the fruit-making in the villages, have been taken into consideration. Harvested fruits were kept in Çanakçı County Food, Agriculture and Animal Husbandry Directorate at 2 C<sup>0</sup> for one day and delivered to Ordu University Agricultural Faculty Research Laboratory for analysis. Phenological observations, pomological and morphological characteristics, and harvest dates were determined in cherry genotypes.

## RESULTS AND DISCUSSIONS

### 4. Results

#### 4.1. Fruit Properties

The average fruit characteristics of the local varieties and types examined are presented in Table 4.1 and Figures 1-8.

Table 4.1. Some fruit properties of cherries

Traits	Unit	Kıtır	Tönlük	Niksar	Alahnaz	Çal	Beyaz	Ayran	Orak	28 ÇN 01
Fruit Weight	g	2.56	3.49	4.15	3.00	2.76	3.55	3.08	4.83	3.39
Fruit Flesh Ratio	%	90.63	89.68	91.80	91.33	90.94	92.11	90.58	91.51	90.26
Fruit Volume	ml/kg	2.30	3.20	4.15	2.90	2.90	3.50	2.95	4.55	3.40
Fruit Length	mm	15.65	18.50	17.78	17.57	16.82	17.99	16.88	20.46	18.11
Fruit Diameter	mm	15.05	16.76	19.03	15.80	16.30	16.90	16.29	18.09	16.33
Fruit Thickness	mm	17.31	19.36	21.22	18.46	17.73	19.09	19.06	21.48	19.35
Fruit Stalk Length	mm	35.52	36.95	42.81	39.12	40.72	39.39	27.49	45.43	33.91

The fruit weight of cherries was between 2.56 g (Kıtır) and 4.83 g (sour); The ratio of fruit flesh was between 89.68% (Tönlük) and 92.11% (Beyaz); Fruit volume between 2.30 ml/kg (Cr) and 4.55 ml/kg (Orak); Fruit size between 15.65 mm (Crimson) and 20.46 mm (Orak); Fruit width between 15.05 mm (Krim) and 19.03 mm (Niksar); The fruit thickness was between 17.31 mm (crispy) and 21.48 mm (sickle); Fruit juice is between 16.00 mm (Crimson) and 20.01 mm (Orak); Fruit stem size between 27.49 mm (Ayran) and 45.43 mm (Orak); The fruit stem thickness ranges from 0.99 mm (Alahnaz and Çal) to 1.30 mm (Niksar).

#### 4.2. Color, Sensory, and Chemical Analyzes

The color, sensory and chemical properties of the local varieties and types examined are summarized in Table 4.2.

**Table 4.2.** Colour, sensory and chemical properties of cherries

Properties	Unit	Kıtır	Tönlük	Niksar	Alahnaz	Çal	Beyaz	Ayran	Orak	28 ÇN 01
Fruit Bark		Bur-		Red-		Red-	Red-	Red-	Red-	
Colour		gundy	Burgundy	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Burgundy
Fruit Flesh		Bur-		Light	Cream-	Light	Light	Light		
Colour		gundy	Burgundy	Yellow	colored	Yellow	Yellow	Yellow	Yellow	Burgundy
Taste		Moderate	Good	Poor	Good	Good	Moderate	Few	Good	Moderate
Aroma		Good	Moderate	Absent	Good	Few	Few	Moderate	Good	Good
Cracking		Few	Moderate	Absent	Absent	Absent	Absent	Absent	Absent	Absent
Juiciness		Moderate	Good	Good	Good	Good	Good	Moderate	Good	Good
pH		4.70	4.40	4.24	4.60	4.89	4.52	5.08	5.23	5.03
TSS	%	16.80	12.50	14.00	17.80	14.50	17.00	17.50	17.00	11.50
TA	%	0.27	0.23	0.47	0.49	0.21	0.43	0.75	0.56	0.57

The cherries showed very good properties in terms of juiciness; 2 varieties of Moderate, 6 of them were good and 28 KÇ 01 types showed three different distributions. In terms of fruit crust color, there were three different distributions as 28 ÇN 01 type and 2 varieties were burgundy, 5 varieties were red - yellow and 1 Variety had red crust color. According to this evaluation, 28 ÇN 01 type and 2 varieties showed burgundy, 4 varieties light yellow, 1 variety yellow, and 1 variety cream-colored characteristic and distributed in four groups in terms of fruit meat color. The samples showed four groups of taste using tastes and tasting methods; 1 Variety poor, 1 Variety few, 28 KÇ 01 and 2 varieties moderate, 3 varieties good and 1 variety had very good taste properties. According to the tasting method, 1 Variety tasteless, 2 varieties little sweet, 2 varieties moderate, and 4 varieties showed tasty characteristics and they were distributed to four groups. When cracking on fruits observed with the naked eye, 1 Variety had less cracking, 1 Variety had moderate cracking and 28 ÇN 01 and 6 varieties had no cracking. pH value changed between 4.24 (Niksar) and 5.23 (Orak); TSS changed between 11.50 % (28 ÇN 01) and 17.80 % (Alahnaz); TA changed in range 0.21 (Çal) and 0.75 (Ayran).

#### 4.3. Seed Properties

Seed properties of examined local variety and types were given in Table 4.3.

**Table 4.3.** Seed properties of cherries

Properties	Unit	Kıtır	Tönlük	Niksar	Alahnaz	Çal	Beyaz	Ayran	Orak	28 ÇN 01
Seed Weight	mm	0.24	0.36	0.34	0.26	0.25	0.28	0.29	0.41	0.33
Seed Length	mm	8.69	10.52	10.30	9.59	8.93	10.11	9.48	11.21	10.01
Seed Diameter	mm	7.36	8.99	8.89	8.22	7.86	8.41	8.26	9.45	9.05
Seed Thickness	mm	5.71	7.12	7.15	6.49	6.19	6.46	6.31	7.22	7.54

The seed weight of the cherries is between 0.24 g (Kıtır) and 0.41 g (Orak); The seed length is between 8.69 mm (Kıtır) and 10.52 mm (Tönlük); The seed diameter is between 7.36 mm (Kıtır) and 9.45 mm (Orak); The seed thickness ranges from 5.71 mm (Kıtır) to 7.54 mm (28 ÇN 01).

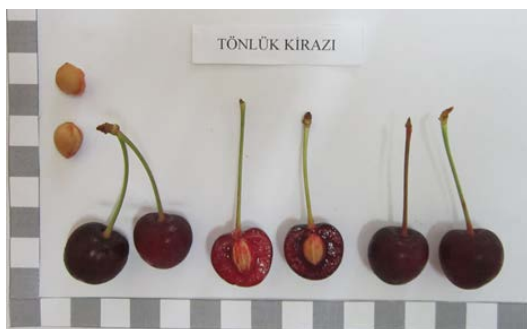
#### 4.4. Morphological Characteristics

The values of the morphological characteristics of the local varieties and types examined are summarized in Table 4.4.

Cherries are aged between 10 (Kıtır, Niksar) and 60 (Beyaz); habitus and developmental strength were determined as vertical-strong or broad-strong; the crown height is between 8 m (Orak, 28 ÇN 01) and 15 m (Beyaz); Crown width between 4 m (Kıtır, Alahnaz) and 10 m (Tönlük, Çal, Beyaz); the circumference of the trunk is between 60 cm (Kıtır) and 170 cm (Tönlük, Çal); the average harvest dates range from June 1 (Kıtır, Tönlük, Niksar) to June 20 (Orak, 28 ÇN 01).

**Table 4.4.** Some morphological characteristics of cherries

Characteristics	Unit	Kıtr	Tönlük	Niksar	Alahnaz	Çal	Beyaz	Ayran	Orak	28 ÇN 01
Age	Year	10	50	10	12	45	60	30	35	35
Habitus and Development		Vertical-Strong	Broad-Strong	Vertical-Strong	Vertical-Strong	Broad-Strong	Broad-Strong	Vertical-Strong	Broad-Strong	Broad-Strong
Crown Height	m	9	9	11	12	11	15	14	8	8
Crown Diameter	m	4	10	5	4	10	10	5	5	5
Trunk Circumference	cm	60	170	70	80	170	140	160	70	70
Harvest Date		01. June	01. June	01. June	07. June	11. June	11. June	14. June	20. June	20. June



**Figure 1.** Fruits of *Tönlük* variety



**Figure 2.** Fruits of *Niksar* variety



**Figure 3.** Fruits of *Alahnaz* variety



**Figure 4.** Fruits of *Çal* variety



**Figure 5.** Fruits of *Beyaz* variety



**Figure 6.** Fruits of *Ayran* variety



**Figure 7.** Fruits of *Orak* variety



**Figure 8.** Fruits of *28 ÇN 01* type

## DISCUSSIONS

In the carried out study, it was determined that the fruit weight of varieties and types varied between 2.56 g (Kıtır) and 4.83 g (Orak). Fruit weight values in other studies; In a study conducted in Van, it was found that 4.59 g in the Bing variety, 3.92 g in the Van variety, 4.27 g in the Lambert variety (Koyuncu et al., 1999), between 2.47 g and 3.33 g (Tekintaş et al., 1991), 2.79 g to 5.77 g (Özçağırın, 1966) in a study carried out in Tokat province between 2.70-4.54 g (Edizer and Erdoğan, 1997) and in a study conducted in Kemalpaşa, In a research conducted in the Pacific Agro-food Research, 9.2 g to 12.8 g (Kappel, 2005), 2.9 g to 7.6 g in a research conducted in Amasya (Demirsoy and Demirsoy, 2004) In a study conducted in Spain, 4.5 g in the local varieties and 6.7 g in the standard varieties (Sanchez et al., 2008), Konya (Naderiboldaji et al., 2008) (Kalyoncu et al., 2009).

The findings we have achieved in our study are generally compatible with the findings that different researchers have obtained in the researches they have conducted in different regions of our country over different years, different types of cherries, and types.

The fruit volume, another criterion, changed between 2.30 ml/kg (Kıtır) and 4.55 ml/kg (Orak). Fruit volume values in other studies; In a study conducted in Iran, 3.96-6.68 cm<sup>3</sup> (Naderiboldaji et al., 2008) were given as 4.35 cm<sup>3</sup> in local varieties and 5.97 cm<sup>3</sup> in standard varieties in Spain (Sanchez et al., 2008) It is seen that the findings we obtained are in parallel with the results of previous studies.

In our study, it was determined that the fruit lengths of varieties and types were changed between 15.65 mm (Kıtır) and 20.46 mm (Orak). Similar fruit size values are determined in a study carried out in Van. It was found that 2.39 cm in the Bing variety, 1.99 cm in the Van variety, 1.92 cm in the Lambert variety (Küden and Sırış, 2001), 1.51 cm and 1.69 cm (Tekintaş et al., 1991) Similarly in a study carried out in Central Taurus, 2.3 cm to 2.5 cm (Küden, 1998), 17.25 mm to 21.44 mm in Kemalpaşa (Özçağırın, 1966), 16.2 in Amasya mm to 24.8 mm (Demirsoy and Demirsoy, 2004).

In our study, it was determined that fruit varieties were changed between 15.05 mm (Crude) and 19.03 mm (Niksar) in terms of fruit diameter. In other studies about this characteristic; it is said that fruit diameters vary between 1.8 cm and 2.5 cm (Küden ve Sırış, 2001), between 18.02 mm and 22.36 mm (Özçağırın, 1966), between 17.25 mm and 28.10 mm (Ergun et al., 2008).

In our study, fruit thickness of varieties and types was found to be between 17.31 mm (Kıtır) and 21.48 mm (Orak). Fruit thickness values in other studies reported; 30.9 mm to 15.6 mm (Turan, 2010); 22 mm to 32 mm (Apostol, 2005).

In our study, it was determined that the TSS ratios (%) of varieties and types varied between 11.50 (28 ÇN 01) and 17.80 (Alahnaz). TSS ratios reported in other studies; between 10.70% and 18.70% (Sütyemez ve Eti, 1995), between 14% and 26% (Küden and Sırış, 2001), between 10.8% and 20.8% (Demirsoy and Demirsoy, 2004).

In our study, it was determined that TA values of varieties and types are between 0.21 (Çal) and 0.75 (Ayran). TA values in other studies; changed 0.8% to 1.02% (Küden, 1998); 0.3% to 1.0% (Demirsoy and Demirsoy, 2004), 0.3% to 1.0% (Turan, 2010).

In our study, it was determined that the fruit flesh of varieties and types varied between 89.68% (Tönlük) and 92.11% (Beyaz). Values of fruit meat ratio in other studies; between 95.6% and 88.2% (Turan, 2010) and between 93.5% and 96.3% (Özçağırın, 1966).

In our study, the flavors of the varieties and types were distributed in four groups as poor, moderate, good, and tasty. Values of fruit taste in other studies; It was determined that Gümüşhane province is very good, good, medium and little (Turan, 2010) and moderate and sweet-sour (Özçağırın, 1966) in Kemalpaşa.

It has been determined that fruit characteristics of cherries show a narrow variation when Tables 4.1, 4.2, 4.3, and 4.4. evaluated all together.

## CONCLUSIONS

Despite of the availability of materials that will form the basis of the Çanakçı county hybridization studies in the northern Anatolian region, which is regarded as the genetic resource of this important agricultural product, which is ranked first in the world cherry production as a country and first in the export (Anonim b, 2020). No studies have been carried out for this purpose.

In Çanakçı county the harvest is done between 1 June and 20 June. There is no closed cherry garden established in the Çanakçı province. There are local cherry trees scattered in hazelnut gardens. Cherries obtained from these trees are consumed for family necessity and sold in local markets. Some cherry trees in the area are planted on the roads for charity purposes. Due to rainfall on the flowering and harvest date, it is clear that economic cherry cultivating can not be done in the pottery province. However, local varieties are an important source of hybridization activities due to their unique taste, aroma, and juiciness.

In this study conducted in 2012 and 2013, 9 types of cherries grown in the province of Çanakçı and facing the danger of extinction there were examined and the phenological and pomological characteristics of these varieties and types were determined and the following suggestions were presented. The most important problem in terms of cherry varieties and types is being cracking. As it can be seen from the review of Annex 3, the fact that there is no problem of cracking in some local cherries grown in the province of Çanakçı shows that these local varieties and types can also be used for crossbreeding purposes to develop new cherry varieties.


Due to the increasing demand for natural fruit nutrition as a result of the consciousness of the consumers, it has begun to come to the foreground of its special flavor, aroma, and juiciness except for its attractiveness and size. As the day goes by protecting our place in the world's cherry trade it depends on transferring local flavor, aroma, and juiciness of local varieties to new varieties in the direction of demand of consumers. Therefore, for the development of the national cherry gene bank, some efforts should be made to reveal new local types in the entire province of Giresun is the motherland of the cherry., which will become a trademark.

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Received: 10.11.2020

Accepted: 09.12.2020