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Some Characteristics of Native Sour Cherry Genotypes Grown by Seed in Van Region

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Abstract: In this study, some physical and chemical characteristics of 50 genotypes of sour cherry, which are grown by seed in Van and its province, were investigated by considering their technological future. According to the results obtained from local sour cherries; fruit weights of the sour cherry were between 1.93 and 3.39 g, lengths of the seed 0.70±0.19 and 0.96±0.05, weights of seeds 0.17 and 0.32 g, pH of the fruit 3.41 and 3.83, total soluble solid content (TSS%) 9.80 and 15.60 %. Sensorial analysis showed that most of the fruits taste were in the range of moderate-sourness. In addition to these; morphological characteristics like the lengths of trees and the diameter of stem were measured between 247-575 cm; and 2.38-12.93 cm, respectively. It was stressed that these some natural types should be studied in more detail in order to put forward their related to good fruit properties and resistance to cold climatic conditions.

Key words: Sour cherry, genotype, Van

Van Yöresinde Tohumdan Yetişmiş Vişne Genotiplerinin Bazı Özellikleri

Özet: Bu çalışmada Van ve çevresinde tohumdan yetişmiş 50 vişne tipinin teknolojik durumları ön planda tutularak fiziksel ve kimyasal özelliklerine yer verilmiştir. Yapılan analizler sonucu meyve ağırlıkları 1.93 - 3.39 g, çekirdek boyları 0.70±0.19 - 0.96±0.05 cm, çekirdek ağırlıkları 0.17-0.32 g, pH 3.41-3.83, SÇKM %9.80-%15.60 arasında belirlenmiştir. Duyusal değerlendirmelerde tat, kabuk altı rengi, meyve eti rengi gibi gözlemler dikkate alınmıştır. Ayrıca ağaçların taç uzunluğu (247-575 cm), gövde çapı (2.38-12.93 cm) gibi morfolojik özellikleri de belirlenmiştir. Duyusal analizlerde meyvelerin çoğunun tadı orta ekşi olarak belirlenmiştir. Bazı genotiplerin ıslah çalışmaları için meyve özellikleri ve soğuklara dayanım yönünden daha detaylı araştırmalarla ele alınması vurgulanmıştır.

Anahtar kelimeler: Vişne, genotip, Van

Introduction

It is assumed that sour cherry (*Prunus cerasus* L.) is indigenous to an area located between Caspian Sea and North Anatolia Mountains (Özçağıran, 1977). According to another opinion, the sour cherry originated from an area around the Caspian Sea and close to İstanbul. Other authorities have disputed this as being too restrictive, suggesting origins in an area stretching from Switzerland to the Adriatic Sea in one direction and the Caspian Sea to the far north of Europe in the other direction. It is not found is such abundance as the wild sweet cherry in any of its areas of origin and its natural spread is not nearly so extensive (Webster 1996). It was widely spreaded out from Amasya, Tokat, Van and Kars provinces in Anatolia, and still these provinces are the genetic sources of sour cherry (Öz, 1988). Turkey is the 5th sour cherry producing country in the world. According to the State statistics, 3.690.000 sour cherry trees are available and 120.000 tons (metric) of sour cherry fruits is produced in Turkey annually. 20.498 tons of this production is obtained from Ankara province, 10.184 tons from Konya, 10.667 tons from Kütahya province, and 2.211 tons from Amasya provinces. In case of Van province, 42 tons of sour cherry fruit is harvested from 2510 trees (Anonymous, 1997). Beside it's fresh consumption; the important part of the production is processed into the juice while some part of the production is used as raw material for jam and syrup in Turkey. Moreover, some of the fruits are dried by various of techniques such as drying under the sun or in the ovens. In the other countries, it is possible to see the other usage areas such as pastry and ice cream industry (Önal and Gönülşen, 1992). When these usage areas are taken into consideration, the bigness, attractiveness and consumer acceptances of sour cherry fruits carry an important role (Karaca et al., 1995).

Yield per tree, separation ease of seed from fruit flesh, fitness to the mechanical harvest, and resistance to diseases and insects are important criteria in sour cherry cultivars (Fogle, 1975).

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The fruit quality and yield characteristics are important aspects in the sour cherry breeding programmes. The fruit quality changes according to the objective of usage. Tree and fruiting structure, flower characteristics and abiotic and biotic stress tolerance have effects on the yield (Lezzoni, 1996).

As mentioned in the above, one of the most important factors limiting the sour cherry culture is low temperature. Low winter temperatures cause a decrease in fruit yield even in dormancy period, especially in those species that their leaves fall down. Because of that, cold hardiness of sour cherry wood and flower buds is considerable for the colder areas, as well (Lezzoni, 1996). Thus, it also causes economical decrease in fruit yield (Ashworth, 1989). In order to get optimum yield and to keep the loses in a minimum level, some of the cultural applications should be considered (Westwood, 1978; Burak et al., 1993). However, the most important thing is to select the sour cherries resistant against to cold climate (Reisch, 1991) or is to find and introduce these species already available species.

In Van province (Edremit local area), only one study was found on sour cherry and it was conducted by Tekintaş et al. (1991). They found that fruit weights, mean fruit diameter, fruit length of 5 local sour cherry types were reported between 1.90 and 3.63 g, 1.27 and 1.77 cm, 1.38 and 1.83 cm, respectively.

In this study which was carried out in Van province that is located at 1725m altitude and has 5-6 months winter-period, the fruit and tree characteristics of 50 sour cherry genotypes were investigated in order to develop them as standard varieties. The local sour cherry genotypes which have been decreasing day by day in number could, therefore, be evaluated and promising genotypes will be introduced.

Materials and Methods

This study was carried out on 50 sour cherry trees grown by seed in the growth period and at harvest season of 1999 in Van province. The whole seedling sour cherry trees were inspected. Fifty cherry types were pre-selected and their fruit and tree characteristics were determined. The diameter of tree stem was measured by a 0.05 mm sensitive-calliper compass, the length and wideness of the trees were measured by tape measure. The harvested fruits were brought to the laboratory, and 20 samples from each tree were analysed by physical and chemical methods. Weights of fruits and seeds were determined by a 0.01 g sensitive balance. The measurement of length and diameter of fruits, the length and diameter of seeds, the length and diameter of fruit stalk was done by using a 0.05 mm sensitive-calliper compass. The amount of total soluble solid content (TSS%) was determined by a refractometer and pH values of the fruits were taken by a pH meter. The ratio of fruit/seed was calculated by considering the means of seeds weight and fruit weight. The skin colour and flesh colour of fruit, fruit flesh skin colour were evaluated by a scale within the selected types and stated as red, dark red and light red. The state of the separation of flesh from seed were evaluated as easy, moderate and difficult. The taste of fruits were stated as middle sour and sour.

Results and Discussion

Today it is known that there are 600 varieties of sour cherry in the world, and its culture is done for industry processing in Turkey and in the other countries, as well (Lezzoni et al., 1991). They are used to produce juice and nectar, jams and jellies, are canned and frozen whole or further prepared as filling for use in a wide variety of bakery products. Many fruit and tree characteristics may prove important when selecting a cultivar for use in processing. For example, fruit size, appearance, colour, flavour, juiciness, flesh percentage, and flesh firmness after processing are of central importance (Önal and Gönülşen, 1992; Kaack et al., 1996). Particularly it is important to improve hardy cultivars which are suitable to the harsh ecological conditions as seen in Van province. For that reason, this study was aimed to find out some physical and chemical characteristics of 50 promising sour cherries grown in Van province. The results are presented in Table 1 and 2.

As is seen from the tables; the weights of sour cherries changed between 1.93 and 3.39 g, and mean value was found as 2.70 g. This value was lower than those of Early Richmond and Kütahya 1355 varieties, which was reported by Karaca et al. (1995) as 2.54 and 4.41 g, respectively.

The lengths of fruits were obtained between 1.25±0.07 and 1.55±0.05 cm and diameter of fruits 1.40±0.10 and 1.68±0.15 cm, lengths of seeds 0.70±0.21 and 0.96±0.05 cm, diameters of seeds 0.70±0.19 and 0.89±0.06 cm, weights of seeds 0.17 and 0.32 g (Table 1). Similar results were reported by Tekintaş et al. (1991) for the varieties from Edremit local area. According to the results obtained from organoleptical analysis, the skin colour of fruit of 14 types was red, of 35 types was dark red, and of 1 type was light red. The flesh colour of fruit of 6 types was light red, of 9 types was red, and of 35 types was dark red. The fruit flesh colour was determined as light red for all types investigated. The mean length and diameter of fruit stalk were 5.28 cm and 0.77 mm, respectively. The length of fruit-stalk of the 34 genotypes was over 5 cm, and these are in the category of the varieties having long fruit-stalk as stated by Christensen (1984).

Table 1. The characteristics of fruit, seed, and tree of promising sour cherry genotypes selected in Van region

Tree No	TSD (cm)	TCL (cm)	TCD (cm)	FW (g)	FL (cm)	FD (cm)	SW (g)	SL (cm)	SD (cm)	SS
65-1	5.80	530	290.0	2.57	1.38±0.04	1.56±0.17	0.23	0.83±0.05	0.76±0.06	E
65-2	4.74	450	255.0	2.07	1.29±0.08	1.40±0.10	0.27	0.82±0.07	0.81±0.05	E
65-3	5.70	340	252.5	2.58	1.40±0.06	1.55±0.11	0.30	0.87±0.10	0.84±0.08	E
65-4	5.07	480	312.5	2.23	1.33±0.04	1.43±0.05	0.26	0.78±0.05	0.74±0.08	E
65-5	7.17	520	322.5	2.54	1.39±0.06	1.51±0.10	0.28	0.84±0.07	0.82±0.05	E
65-6	3.82	416	175.0	2.67	1.39±0.08	1.54±0.06	0.25	0.85±0.06	0.77±0.05	E
65-7	3.39	425	152.5	2.43	1.40±0.04	1.49±0.06	0.26	0.83±0.05	0.78±0.06	E
65-8	3.78	430	205.0	2.87	1.35±0.06	1.53±0.09	0.29	0.88±0.04	0.82±0.05	E
65-9	5.10	450	285.0	2.73	1.35±0.11	1.52±0.13	0.24	0.84±0.04	0.81±0.04	E
65-10	2.98	330	192.5	2.19	1.27±0.08	1.41±0.07	0.23	0.77±0.05	0.73±0.05	E
65-11	4.36	430	197.5	2.58	1.35±0.07	1.46±0.07	0.22	0.81±0.05	0.75±0.03	M
65-12	6.55	305	270.0	2.53	1.34±0.06	1.50±0.05	0.23	0.76±0.03	0.75±0.03	E
65-13	9.30	500	255.0	2.35	1.36±0.09	1.47±0.05	0.24	0.82±0.02	0.78±0.03	D
65-14	3.20	305	175.0	2.92	1.43±0.07	1.56±0.06	0.27	0.70±0.02	0.70±0.01	D
65-15	3.47	475	192.5	2.75	1.36±0.09	1.55±0.08	0.25	0.82±0.05	0.79±0.03	E
65-16	5.93	340	280.0	2.63	1.36±0.08	1.53±0.10	0.30	0.84±0.06	0.86±0.03	D
65-17	5.30	370	305.0	2.36	1.34±0.04	1.48±0.07	0.26	0.79±0.03	0.81±0.03	E
65-18	7.55	372	370.0	2.86	1.41±0.06	1.58±0.07	0.30	0.86±0.03	0.89±0.03	M
65-19	4.88	325	320.0	2.42	1.33±0.07	1.47±0.07	0.29	0.85±0.03	0.85±0.04	E
65-20	4.50	280	215.0	2.78	1.35±0.05	1.51±0.09	0.29	0.88±0.03	0.88±0.04	E
65-21	6.57	475	280.0	2.71	1.38±0.07	1.51±0.05	0.30	0.85±0.04	0.87±0.03	E
65-22	5.34	515	277.5	2.65	1.32±0.08	1.52±0.08	0.31	0.85±0.04	0.85±0.05	E
65-23	6.42	470	397.5	2.54	1.34±0.08	1.52±0.06	0.32	0.86±0.05	0.85±0.04	E
65-24	5.21	370	345.0	2.14	1.25±0.07	1.40±0.08	0.25	0.80±0.04	0.80±0.05	E
65-25	3.69	271	347.5	2.76	1.37±0.09	1.56±0.10	0.30	0.86±0.04	0.86±0.03	M
65-26	9.35	460	334.5	3.39	1.52±0.08	1.67±0.09	0.21	0.91±0.04	0.83±0.03	M
65-27	4.05	267	187.0	3.16	1.52±0.12	1.62±0.10	0.26	0.96±0.05	0.84±0.05	E
65-28	5.78	340	239.5	2.89	1.40±0.08	1.58±0.08	0.29	0.92±0.02	0.89±0.04	E
65-29	9.34	533	410.0	3.25	1.50±0.08	1.68±0.15	0.26	0.88±0.02	0.83±0.06	E
65-30	2.85	327	146.5	3.16	1.49±0.08	1.61±0.13	0.24	0.83±0.05	0.79±0.05	E
65-31	2.79	285	135.0	3.09	1.50±0.06	1.61±0.06	0.24	0.81±0.17	0.77±0.05	E
65-32	3.13	385	133.5	2.97	1.47±0.06	1.58±0.04	0.24	0.83±0.05	0.76±0.05	D
65-33	5.18	443	192.5	3.01	1.49±0.13	1.51±0.12	0.26	0.82±0.03	0.74±0.01	E
65-34	3.72	248	180.0	3.00	1.45±0.10	1.56±0.11	0.24	0.82±0.05	0.77±0.04	E
65-35	7.43	490	243.3	3.23	1.49±0.17	1.63±0.18	0.29	0.87±0.04	0.81±0.02	E
65-36	2.38	258	115.0	3.04	1.47±0.06	1.62±0.05	0.25	0.82±0.05	0.74±0.03	M
65-37	5.70	527	185.5	3.35	1.52±0.12	1.68±0.10	0.27	0.85±0.05	0.79±0.04	E
65-38	4.65	462	210.5	3.25	1.55±0.05	1.63±0.03	0.25	0.82±0.03	0.77±0.03	D
65-39	5.85	510	315.0	2.82	1.38±0.07	1.55±0.06	0.31	0.84±0.03	0.83±0.04	E
65-40	3.57	247	307.5	2.26	1.27±0.10	1.45±0.10	0.24	0.83±0.03	0.80±0.03	D
65-41	3.77	320	223.0	2.99	1.54±0.10	1.56±0.15	0.25	0.88±0.05	0.79±0.04	D
65-42	9.30	435	291.0	2.13	1.28±0.08	1.42±0.09	0.20	0.78±0.05	0.75±0.03	E
65-43	3.27	463	255.0	2.15	1.27±0.04	1.44±0.03	0.23	0.79±0.04	0.79±0.08	E
65-44	8.74	418	258.5	2.73	1.42±0.08	1.63±0.10	0.29	0.89±0.04	0.86±0.06	E
65-45	3.15	324	290.5	3.28	1.54±0.08	1.57±0.11	0.29	0.91±0.05	0.80±0.03	D
65-46	3.85	365	250.0	2.47	1.50±0.08	1.55±0.12	0.22	0.88±0.04	0.82±0.03	E
65-47	12.93	575	446.0	2.55	1.41±0.07	1.58±0.06	0.22	0.83±0.04	0.80±0.03	E
65-48	5.45	492	273.0	2.70	1.50±0.08	1.60±0.06	0.22	0.91±0.06	0.81±0.06	D
65-49	4.37	550	309.5	2.38	1.42±0.07	1.60±0.08	0.21	0.85±0.05	0.80±0.04	E
65-50	5.17	532	332.0	1.93	1.34±0.06	1.48±0.06	0.17	0.84±0.04	0.78±0.06	D

TSD: Tree stem diameter (cm), TCL: Tree crown length (cm), TCD: Tree crown diameter (cm), FW: Fruit weight (g), FL: Fruit length (cm), FD: Fruit diameter (cm), SW: Seed weight, SL: Seed length, SD: Seed diameter, SS: Seed Separation, E: Easy, M: Moderate, D: Difficult.

Table 2. Some technological, chemical and physical characteristics of promising sour cherry genotypes selected in Van region

Tree No	FSL (cm)	FSD (mm)	FSC	FFSC	FFC	TSS (%)	pH	Taste	F/S
65-1	5.65±0.48	0.80±0.08	R	LR	LR	11.6	3.79	MS	11.17/1
65-2	5.04±0.52	0.82±0.11	R	LR	LR	12.4	3.83	MS	7.66/1
65-3	6.12±0.31	1.10±0.19	R	R	LR	13.8	3.78	MS	7.6/1
65-4	5.20±0.50	1.02±0.14	R	LR	LR	11.6	3.72	MS	8.58/1
65-5	5.56±0.45	0.99±0.11	R	LR	LR	10.6	3.99	MS	9.07/1
65-6	5.42±0.32	1.01±0.09	R	DR	LR	11.7	3.65	MS	10.68/1
65-7	5.31±0.70	0.94±0.05	DR	R	LR	13.3	3.67	MS	9.35/1
65-8	5.70±0.62	0.76±0.13	DR	DR	LR	13.6	3.62	MS	9.90/1
65-9	5.24±0.58	0.74±0.14	DR	R	LR	12.4	3.74	S	11.38/1
65-10	6.60±0.73	0.68±0.08	DR	DR	LR	14.8	3.65	S	9.52/1
65-11	6.14±0.52	0.68±0.06	DR	DR	LR	13.9	3.60	S	11.73/1
65-12	5.40±0.47	0.73±0.06	DR	DR	LR	12.6	3.58	MS	9.79/1
65-13	4.81±0.51	0.67±0.09	DR	DR	LR	12.2	3.67	MS	10.81/1
65-14	5.42±0.66	0.87±0.10	DR	DR	LR	12.9	3.66	MS	11.00/1
65-15	5.61±0.50	0.81±0.10	R	R	LR	11.6	3.56	MS	8.77/1
65-16	5.15±0.58	0.80±0.09	LR	R	LR	11.6	3.68	MS	9.08/1
65-17	4.73±0.76	0.72±0.17	DR	DR	LR	12.6	3.57	MS	9.53/1
65-18	4.66±0.46	0.74±0.17	DR	DR	LR	12.2	3.53	MS	8.35/1
65-19	4.74±0.34	0.55±0.11	R	DR	LR	12.2	3.56	MS	9.59/1
65-20	4.84±0.50	0.62±0.13	R	LR	LR	10.8	3.53	MS	9.03/1
65-21	4.68±0.30	0.77±0.11	DR	DR	LR	15.6	3.55	MS	8.55/1
65-22	4.67±0.28	0.75±0.11	DR	DR	LR	16.8	3.60	MS	7.94/1
65-23	4.51±0.49	0.64±0.08	DR	DR	LR	13.2	3.50	MS	8.56/1
65-24	4.71±0.53	0.64±0.11	DR	DR	LR	11.8	3.64	S	9.20/1
65-25	5.10±0.88	0.64±0.10	R	LR	LR	12.2	3.53	S	16.14/1
65-26	6.11±0.46	0.81±0.07	DR	DR	LR	15.6	3.40	MS	12.15/1
65-27	5.51±0.36	0.79±0.11	DR	DR	LR	12.8	3.59	MS	9.97/1
65-28	4.52±0.34	0.70±0.09	DR	DR	LR	12.6	3.59	MS	12.50/1
65-29	6.10±0.33	0.78±0.04	R	R	LR	12.0	3.45	MS	13.17/1
65-30	5.62±0.24	0.71±0.05	DR	DR	LR	12.6	3.41	MS	12.86/1
65-31	5.71±0.47	0.68±0.12	DR	DR	LR	12.8	3.42	MS	12.38/1
65-32	4.48±0.46	0.62±0.08	DR	DR	LR	13.4	3.44	MS	11.58/1
65-33	5.99±0.43	0.68±0.11	DR	DR	LR	12.5	3.47	MS	12.50/1
65-34	5.88±0.46	0.55±0.12	DR	DR	LR	13.4	3.43	MS	11.14/1
65-35	6.15±0.66	0.67±0.11	DR	DR	LR	11.8	3.49	MS	12.16/1
65-36	6.15±0.27	0.75±0.12	DR	DR	LR	12.8	3.44	MS	12.41/1
65-37	6.12±0.59	0.82±0.09	DR	DR	LR	12.2	3.49	MS	13.00/1
65-38	5.50±0.42	0.80±0.10	DR	DR	LR	14.2	3.44	MS	9.10/1
65-39	5.33±0.56	0.74±0.08	DR	DR	LR	10.6	3.60	MS	9.42/1
65-40	4.71±0.65	0.95±0.05	R	R	LR	9.8	3.55	S	11.96/1
65-41	5.91±0.24	0.79±0.05	R	R	LR	11.8	3.66	MS	10.65/1
65-42	4.10±0.45	0.77±0.05	DR	DR	LR	12.6	3.52	MS	9.35/1
65-43	4.45±0.28	0.82±0.05	DR	DR	LR	14.2	3.46	MS	9.41/1
65-44	5.55±0.51	0.84±0.06	R	R	LR	12.6	3.57	MS	11.31/1
65-45	5.32±0.54	0.84±0.08	DR	DR	LR	14.6	3.55	MS	11.23/1
65-46	6.00±0.38	0.80±0.07	DR	DR	LR	12.0	3.55	S	11.59/1
65-47	4.97±0.55	0.78±0.05	DR	DR	LR	10.6	3.54	MS	12.27/1
65-48	5.63±0.43	0.75±0.08	DR	DR	LR	12.6	3.52	MS	11.33/1
65-49	4.91±0.32	0.73±0.05	DR	DR	LR	13.8	3.59	MS	11.35/1
65-50	4.07±0.33	0.75±0.06	DR	DR	LR	14.0	3.54	MS	11.00/1

FSL: Fruit stalk length (cm), FSD: Fruit stalk diameter (cm), FSC: Fruit skin colour, FFSC: Fruit flesh skin colour, FFC: Fruit flesh colour, TSS: Total Soluble solid (%), F/S: Fruit/Seed, R: Red, DR: Dark red, LR: Light red, MS: Middle sour, S: Sour.

Chemical composition of sour cherries expressed as percentage of fresh weight: Mean value of TSS and pH of the fruits was obtained as 12.72 % and 3.58, respectively. These values are in the range (soluble solid content between 12 and 17 %, pH between 3.1 and 3.3, total acid between 1.5 and 1.8 %) of values given by Cemeroğlu (1982) and Kaack et al. (1996). Thus, TSS of 37 % of types were found over 12 %. On the other hand, TSS of the fruits was lower than those reported by Tekintaş et al. (1991).

Conclusion

The results showed that some sour cherry genotypes grown in Van province had promising characteristics for local breeding efforts in the region when the other varieties grown in the some part of the world are compared. It should be pointed out that the climate of the province with 1725 m altitude is very cold and winter duration takes about 5 or 6 months and the temperature sometimes goes as low as -29°C (Anonymous, 1999).

As germplasm is incorporated to the breeding programmes from the parts of world where sour cherries are indigenous, great progress is expected as regards to extend this fruit to more severe climates than before possible (Fogle, 1975). Moreover, all cherry trees investigated during this study were in the family orchards; and except irrigation no another cultural practices were observed. Therefore, it is certain that in case of more appropriate cultural conditions, it will be possible to get more productive trees and good quality sour cherry fruits. As a suggestion; all types, having fruit weights more than 3 g and with high quality of fruits investigated in this study, should be propagated by vegetative propagation methods. Also these natural forms should be studied in more detail to put forward their good fruit properties yield and resistance to cold climate conditions.

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