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Selections of Natural Growing Rose hips (Rosa spp.) from Yozgat Province, Turkey

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Abstract

The Eastern and Central Anatolia Region have the largest native rose hip population. This study was carried out on wildly grown rose hip genotypes in Yozgat province of the Central Anatolia Region during 2015-2016. Fruit samples from 142 bushes were collected in the first year and their locations marked by Global Positioning System. Depending on the primary selection criteria (fruit weight, fruit flesh rate, total soluble solid, vitamin C, aroma, total dry matter, and degree of thornless), 49 genotypes were selected at the end of the first year. 11 genotypes which were in the group of "very well" (755-677 scores) and 38 genotypes in the group of "good" (676-598 scores) were amplified with the wood cuttings and root cuttings during the rest period. Morphological and physiological characterization studies continue on these genotypes.

Keywords: Biodiversity, Rose hip, selection, Yozgat

INTRODUCTION

Turkey is one of the most important rose germplasm centers.

The genus Rosa includes more than 100 species in the temperate and subtropical zones of the Northern hemisphere while Anatolia has 27 species of them that are native in the region [1, 2]. Roses are deciduous, rarely evergreen, and upright or climbing shrubs, with more or less prickly branches [2]. The fruit, the rose hip, is a pseudocarp or false fruit, consisting of fleshy walls surrounding a cavity containing the single seed [3]. Fruits of some other species also have economic value and are used for medicinal purposes. Most of the rose shrubs have harvested for hips are derived from seed and show tremendous variability in terms of plant and fruit properties like growth habit, fruit shape, weight, length, color and diameter. At present, Turkey holds a rich gene pool of rose plants in different agro-climatic regions but these resources are threatened by genetic erosion due to the drastic increase in human population [4]. Thanks to the fascinating nutrient levels of rose hip fruit, it can be consumed for healthy diet. The rose hip has the highest level of vitamin C and content of the vitamin C in rose hips depends on its species, genotypes and cultivation ecology. In addition, rose hips contain other vitamins and minerals, carotenoids, tocopherols, flavonoids, fruit acids, tannins, pectin, sugars, organic acids, amino acids and essential oils [5,6]. The fruits are commonly used to make jam, marmalade, fruit juice etc. [7], while the dried fruits and roots are excellent for making tea [8]. Production of rosehip is mainly in the hands of the traditional and sparse private sector in Turkey.

The eastern and central Anatolia region have the largest native rose hip population [4]. Yozgat is located in the Central Kızılırmak Division of the Central Anatolia Region on Bozok Plateau in Turkey. Semi-arid climate dominates in Yozgat however, Çekerek Valley incomes in Yeşilırmak basin, has mild climate and effects of Blacksea Region are seen in it. Generally, summers are hot and dry and winters are cold and rainy, and the temperature difference between at day and night are high. 213 genus and 399 species that belong to 56 family, 70 of 399 species are determined as endemics exist in Yozgat. With these endemic types; apples, pears, plums, cherries, peaches, apricots, almonds, walnuts, quinces, native grapes, Viburnum opulus are also grown; there are also wild ones of some fruits such as nuts, cranberries, limes, hawthorn, rosehip, saleps, wild pears, apples [1,9].

The aim of this research was to select the most promising rose hip genotypes for use in breeding and to identify their desirable fruits and shrub characters. To utilize this variability, efforts must be made to investigate different rose hips and select desirable clones to establish gene banks. Moreover, these selected shrubs can be used for vegetative propagation of plantings of uniform cultivars.

MATERIALS and METHODS

This study was carried out on wildly grown rose hip genotypes in Yozgat province of the Central Anatolia Region during 2015-2016. After pre-examining a large number of rose hip genotypes in the region, fruit samples from 142 bushes were collected in the first year and their locations marked by GPS (Global Positioning System). Depending on the primary selection criteria (fruit weight, fruit flesh rate, total soluble solid, vitamin C, aroma, total dry matter, and degree of thornless), 49 genotypes were selected at the end of the first year. Modified weighted grading used in selection was determined in the following manner (Table 1).

Table 1. Weighted grading which was modified scale

Selection Criteria	Grade (%)	Grade (Scores)
Fruit weight (g)	15	10 – 7 - 3
Fruit flesh rate (%)	15	10 – 5 - 2
Yield (kg/plant)	15	10 – 8 – 2
Vitamin C (mg/100g)	15	10 – 5 – 2
Total soluble solid (%)	10	10 – 7 – 3
Total dry matter (%)	10	10 – 8 – 2
Degree of thornless	10	10 – 7 – 3
Aroma	10	10 – 7 – 2

RESULTS

In our study, genotypes were determined in the rose hips during their flowering period (31.05-01.07.2015) in the central province of Yozgat and districts. During fruit period (14-20.09.2015), these genotypes were revisited and fruit samples were taken. Selected genotypes were subjected to physical and chemical properties of the rating scales. Weighted grading which was modified was taken cognizance of yield, fruit weight, fruit flesh ratio, vitamin C content, aroma, total dry matter, total soluble solid and degree of thornless properties. 11 genotypes which were in the group of "very well" (755-677 scores) and 38 genotypes in the group of "good" (676-598 scores) were amplified with the wood cuttings and root cuttings during the rest period. The number of types selected from the districts, based on weighted grading results, were given in the following Table 2. Geographical location data of the selected types from the area were marked by GPS (Table 3).

Table 2. The number of types selected from the districts based on weighted grading results

No	Districts	Survey	Selected
1	Akdağmadeni	9	2
2	Aydıncık	7	4
3	Boğazlayan	11	5
4	Çandır	2	0
5	Çayıralan	5	2
6	Çekerek	9	3
7	Kadışehri	7	3
8	Saraykent	2	1
9	Sarıkaya	31	6
10	Sorgun	19	7
11	Şefaatli	3	1
12	Yenifakılı	2	1
13	Yerköy	5	1
14	Yozgat city center	30	13
Total		142	49

The first selection studies on rose hip germplasm in Turkey were initiated at the beginning of the 1990s in middle and north-east Anatolia. From those studies, promising selections have been described with regard to several fruit characteristics. The selection of valuable individuals within seedling populations with great diversity in different areas or districts of Anatolia might contribute to breeding progress. Although gathering of rosehip is still going on, plant breeding programs for rosehip production have been initiated in different parts of Turkey and some selections have been released [10, 11]. In most parts of Anatolia, fruits (rose hips) of roses have been gathered from scattered sites by peasants since ancient times, as a food [4].

Several studies on the pomological diversity of rose hip genotypes of Turkey have been conducted. Native rose hips genotypes Rosa species were collected to explore wild populations and to select the most promising rose hip genotypes for use in breeding and to identify their desirable fruit and shrub characteristics [10, 31]. Similar studies in Czech Republic, Sweden, Lithuanian, Scandinavia, Transylvania have also been conducted [7, 32, 36]. Important fruit traits were screened in a plant breeding program concerning a newly domesticated crop in Sweden of rose hips. The taxa Rosa dumalis subsp. coriifolia, R. dumalis subsp. dumalis, R. rubiginosa and R. villosa subsp. mollis, collected from 23 localities in Scandinavia, were investigated for fruit weight, percentage of fruit flesh, percentage of dry matter and vitamin C content [7]. Other study presents the methodology to achieve a plantation of wild rose, using four varieties of Rosa canina from wild flora of Transylvania [35]. In Sweden, rose hips are used mainly for commercial production of rose hip soup, which is a popular national dish. In 1985, a project was initiated at the Department of Horticultural Plant Breeding, to domesticate rose hips in order to provide raw material for the rose hip manufacturing food industry. In the Swedish rose hip breeding programme, fruit size, percentage of fruit flesh, percentage of dry matter and vitamin C content are important quality traits. Large differences in these traits have been reported from fruits of ornamental roses, species and hybrids of Rosa [36].

Consequently, there is now a strong need for conserving the existing rose germplasm in Turkey. Our study continues on morphological and physiological characterization of selected genotypes.

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Table 3. Geographical location data of the selected types from Yozgat Province in Turkey.

No	District	Selection Cod	Latitude	Longitude	Altitude (m)
1	**Akdağmadeni**	AKD 02	39°66'92.9"	35°77'91.2"	1397
2		AKD 10	39°65'51.8"	35°82'05.9"	1412
3	**Aydıncık**	AYD 01	40°07'22.3"	35°24'62.5"	1440
4		AYD 05	40°10'61.1"	35°29'76.0"	1299
5		AYD 07	40°10'71.5"	35°29'94.6"	1303
6		AYD 09	40°20'33.3"	35°32'06.6"	647
7	**Boğazlayan**	BGZ 03	39°32'49.7"	35°14'44.0"	1202
8		BGZ 04	39°30'95.2"	35°17'12.3"	1266
9		BGZ 07	39°23'27.7"	35°31'01.6"	1086
10		BGZ 10	39°25'55.5"	35°43'32.9"	1171
11		BGZ 11	39°31'70.6"	35°15'79.5"	1231
12	**Çayıralan**	ÇYR 02	39°30'28.8"	35°67'71.4"	1365
13		ÇYR 03	39°30'15.5"	35°64'88.4"	1335
14	**Çekerek**	ÇKR 06	39°96'35.3"	35°36'86.1"	1251
15		ÇKR 08	39°93'55.4"	35°31'74.1"	1344
16		ÇKR 09	39°98'98.0"	35°39'95.8"	1103
17	**Kadışehri**	KDŞ 02	39°99'03.2"	35°75'43.4"	1035
18		KDŞ 05	40°02'45.6"	35°78'81.2"	1086
19		KDŞ 07	39°99'39.5"	35°77'77.4"	1045
20	**Saraykent**	SRY 02	39°71'72.3"	35°51'85.7"	1085
21	**Sarıkaya**	SRK 12	39°32'67.9"	35°30'57.5"	1136
22		SRK 13	39°54'00.4"	35°25'21.2"	1067
23		SRK 17	39°48'02.8"	35°25'10.6"	1154
24		SRK 26	39°42'72.0"	35°32'33.3"	1280
25		SRK 27	39°40'02.8"	35°31'80.9"	1301
26		SRK 33	39°32'68.0"	35°30'57.7"	1137
27	**Sorgun**	SRG 03	39°95'97.2"	35°16'64.4"	1407
28		SRG 05	40°02'68.3"	35°22'17.5"	1257
29		SRG 08	39°74'87.1"	35°07'48.8"	1351
30		SRG 13	39°77'76.0"	35°19'60.5"	1220
31		SRG 14	39°82'07.0"	35°49'58.6"	984
32		SRG 16	39°77'76.2"	35°19'60.5"	1217
33		SRG 17	39°55'49.9"	35°15'23.7"	1034
34	**Şefaatli**	ŞFT 03	39°50'66.7"	34°74'34.5"	916
35	**Yenifakılı**	YFK 02	39°20'88.1"	35°09'35.7"	1031
36	**Yerköy**	YRK 06	39°60'07.5"	34°52'80.4"	797
37	**Yozgat city center**	MRK 05	39°71'43.5"	34°74'26.9"	1142
38		MRK 06	39°66'77.0"	34°74'18.6"	1245
39		MRK 08	39°98'58.0"	34°97'61.9"	1135
40		MRK 10	39°86'03.1"	34°92'65.3"	1183
41		MRK 13	39°82'49.2"	34°78'74.8"	1299
42		MRK 15	39°83'43.3"	34°77'43.8"	1385
43		MRK 19	39°86'09.0"	34°70'04.7"	1260
44		MRK 20	39°90'20.5"	34°69'24.6"	1374
45		MRK 21	39°88'91.6"	34°74'29.5"	1299
46		MRK 27	39°82'40.5"	34°74'54.1"	1304
47		MRK 28	39°88'94.5"	34°74'35.9"	1317
48		MRK 29	39°77'22.6"	34°80'20.8"	1358
49		MRK 30	39°68'59.4"	34°86'99.9"	1113

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