



Asian Journal of Plant Sciences

ISSN 1682-3974

science
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Fruit Properties of Rose Hip Species Grown in Lake Van Basin (Eastern Anatolia Region)

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Abstract: In this study, some chemical and technological fruit attributes of rose hip species grown in the Lake Van Basin (Eastern Anatolia Region) were studied. Attributes such as fruit and stone length, width (mm) and weight (g), fruit flesh ratio (%), the water-soluble extracts (%), pH, titretable acidity (%) and dry matter content (%) were evaluated. Evaluated fruit attributes of the rose hip genotypes were significantly different from each others ($p < 0.05$). Fruit weights were between 1.50 and 3.74 g. *Rosa dumalis* (Rd) has the heaviest average fruit weight of 3.11 g. However, this genotype has the lightest flesh ratio (57.2%) because of the highest stone weight. Fruit shape index were between 1.06 and 2.12. The rose hip samples had a range of 11-25% for water-soluble extract, 3.95-4.57 for pH, 0.35-1.14 for titretable acidity and 34.34-66.70 for dry matter content. *Rosa foetida* and *Rosa pisiformis* has the highest water-soluble extract of 20.54 and 20.33, respectively. Variations in water-soluble extract are of great importance. Chemical and technological values of the investigated rose hip species showed a similarity to that studied from other native rose hip populations earlier.

Key words: Rose hip species, genotype, Van

INTRODUCTION

Rose hips belonging to the genus *Rosa* (*Rosaceae*) have approximately 70 species in the world^[1]. Anatolia is one of the main centers of rose hip and 27 species of rose hip are grown in the region^[2]. With large native populations of rose hips, Anatolia is rich in rose hip germplasm^[3].

Because the impressive nutrient levels of rose hip fruit it should be consumed for healthy diet. The rose hip has the highest levels of vitamin C. It is also good sources of carotenoids and procyanidin. Its popularity increases all the more and it has been widely used in formulation of some food products^[4]. The Vitamin C content of rose hips depends on its species, genotypes and cultivation ecology. On the other hand, rose hips also contain Vitamins A, B₁, B₂, E and K and minerals such as K, Ca, Na, Fe, Mg, P^[5,6].

In some countries, rose hip processed into many products such as marmalade, jelly, fruit juice, fruit jam and rose hips tea in the food industry. *Rosa canina* fruits also have antioxidative characteristics due to their high Vitamin C contents^[6-9].

The lake Van Basin situated on Eastern Anatolia Region has rich genetic resources of rose hips^[10-12]. The objective of this study was to identify some fruit characteristics of native rose hips germplasm (*Rosa canina*, *Rosa foetida*, *Rosa iberica*, *Rosa dumalis*,

Rosa pisiformis and *Rosa pimpinellifolia*) collected from Van provinces for future breeding efforts.

MATERIALS AND METHODS

This study was conducted in the Lake Van basin located in Eastern Anatolia of Turkey during years of 2002-2003. The altitude of the study was about 1750 m. Seedling bushes of native rose hip population were assessed with respect to characteristics such as fruit width (mm), length (mm) and weight (g), fruit shape index (length/width), fruit flesh ratio (%), fruit stone width (mm), length (mm) and total stone weight (g), the water-soluble extracts (%), pH, titretable acidity (%) and dry matter content (%). Mean values of two years of experiments were calculated to define fruit characteristics as assessed in the earlier studies^[5,13-15]. Rose hip species have been identified based on fruit, flower and leaf characteristics of the collected genotypes as described by Davis^[1]. Twenty rose hip bushes were randomly selected from hundreds of species holding diverse taxonomies based on the selection criteria. The twenty fruit samples from the each selected native rose hip species were randomly selected and those samples were utilized for some fruit analyses including chemical and technological attributes. Fruits from thorny and damaged rose hip bushes were not collected.

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RESULTS AND DISCUSSION

In this study, as native rose hips genotypes *Rosa canina*, *Rosa foetida*, *Rosa iberica*, *Rosa dumalis*, *Rosa pisiformis* and *Rosa pimpinellifolia* species were assessed for two years and evaluated with regard to some fruit characteristics. In selecting promising rose hip bushes, some selection criteria were applied such as genotypes with small and stony fruits and horny and damaged bushes were excluded as indicated earlier. Davis^[1] and Kutbay and Kılınç^[10] have indicated that *Rosa pisiformis*, *Rosa foetida*, *Rosa hemisphaerica*, *Rosa pimpinellifolia*, *Rosa iberica*, *Rosa montana*, *Rosa canina*, *Rosa dumalis*, *Rosa heckeliana* and *Rosa phoenica* species are grown in the Lake Van basin.

Technological attributes: In this study, many values of the investigated fruit traits belonging to different rose hip species showed a similarity to those determined from other native rose hip populations. Yamankaradeniz^[5] recorded that native rose hips have 0.60-4.95 g fruit weight, 56-80% fruit flesh ratio and 20.5-27.0% soluble solids.

Evaluated fruit attributes of the rose hip genotypes were significantly different ($p < 0.05$) from each others (Table 1). Fruit weight ranged from 1.50 to 3.74 g. Genotype having the heaviest average fruit weight was *Rosa dumalis* (Rd) with 3.11 g (Table 1). However, this genotype has the highest stone weight that yielded the lightest flesh ratio (57.2%). Fruit shape index were between 1.06 and 2.12. Stone weight ranged from 0.26 to 1.98. These technical attributes are in the similar ranges as indicated by Gunes and Sen^[13]. They found 16.56 mm fruit width, 23.94 mm fruit length, 1.45 fruit shape index,

3.57 g fruit weight in *Rosa dumalis*; 14.90 mm fruit width, 30.66 mm fruit length, 2.05 fruit shape index, 3.13 fruit weight in *Rosa pisiformis* and 19.32 mm fruit width, 25.01 mm fruit length, 1.29 fruit shape index. Only *Rosa canina* genotype had heavier fruit weight (4.97 g) than the rose hip samples used in the study.

Kazankaya *et al.*^[12] identified fruit attributes of indigenous genotypes, *Rosa canina*. It had a range of 1.02-5.82 g for fruit weight, 40.5-80% for fruit flesh ratio. In our study, fruit weight (1.60-3.45 g) was lighter than this result. However, fruit flesh ratio (59.0-80.9%) was similar to the range of that found in the mentioned study.

Gunes and Sen^[13], 25.58% soluble solid, pH 3.75, 1.72% acidity, 45.14% total dry matter in *Rosa dumalis*; 19.32 mm fruit width, 25.01 mm fruit length, 1.29 fruit shape index, 4.97 fruit weight, 25.38% soluble solid, pH 3.36, 2.83% acidity, 42.19% total dry matter in *Rosa canina* and 14.90 mm fruit width, 30.66 mm fruit length, 2.05 fruit shape index, 3.13 fruit weight in *Rosa pisiformis*, respectively.

Some chemical attributes: The highest soluble extracts and acidity level of rose hip fruits are of great importance to obtain a good quality jelly, marmelate and herbal tea. In terms of water-soluble extract and pH, there were significant differences among the samples ($p < 0.05$). However, titratable acidity and dry matter content were not significantly different from each other in this study (Table 2).

Two genotypes having the highest water-soluble extract were *Rosa foetida* and *Rosa pisiformis* with 20.54 and 20.33, respectively (Table 2). The rose hip samples had a range of 11-25% for water-soluble extract, 3.95-4.57 for pH, 0.35-1.14 for titratable acidity and 34.34-66.70 for dry matter content. Results showed

Table 1: Technological attributes of rose hip fruit samples

Attributes	Rose hips genotypes *					
	Rc	Rf	Ri	Rd	Rps	Rpm
Fruit width (mm)	13.20±0.3	13.20±0.4	13.10±0.3	14.40±0.6	13.80±0.1	13.60±0.2
Fruit length (mm)	20.70±1.2	22.70±0.4	22.10±0.3	18.40±1.3	21.20±0.9	27.40±0.1
Fruit weight (g)	2.35±0.16	2.03±0.12	2.48±0.27	3.11±0.34	2.87±0.39	1.95±0.14
Fruit shape index	1.63	1.72	1.66	1.11	1.53	2.05
Fruit flesh ratio (%)	73.88	72.64	64.02	57.20	85.27	66.30
Stone width (mm)	2.60±0.13	2.60±0.13	2.10±0.05	1.90±0.19	3.80±0.27	2.2±0.21
Stone length (mm)	5.10±0.19	5.70±0.20	4.00±0.08	4.30±0.29	6.20±0.09	6.1±0.20
Total stone weight (g)	0.60±0.04	0.55±0.04	0.89±0.11	1.40±0.31	0.40±0.08	0.64±0.02

Table 2: Some chemical attributes of rose hip fruit samples

Attributes	Rose hips genotypes *					
	Rc	Rf	Ri	Rd	Rps	Rpm
Water-soluble extracts (%)	18.19	20.54	18.00	18.00	20.33	12.00
pH	4.27	4.45	4.43	4.15	4.32	4.38
Titratable acidity (%)	0.73	0.77	0.75	0.66	0.82	0.85
Dry matter content (%)	49.72	47.86	46.75	50.00	46.22	50.27

* *Rosa canina* (Rc), *Rosa foetida* (Rf), *Rosa iberica* (Ri), *Rosa dumalis* (Rd), *Rosa pisiformis* (Rps) and *Rosa pimpinellifolia* (Rpm)

that variations in water-soluble extract are of great importance. Kazankaya *et al.*^[12] identified fruit attributes of *Rosa canina* had a range of 3.2-4.5 for pH, 14.5-37.2% for soluble solids and 39.8-55.4% for total dry matter. Kostic^[16] recorded 37.32% dry matter, pH 3.60 and 3.25% acidity in *Rosa canina* and 22.40% dry matter, pH 4.0 and 1.35% acidity in *Rosa rugosa*. Balta and Cam^[17] recorded 16-24% soluble solid content for fourteen native rose hips selected from Gevas and Ahlat districts. Similar findings were observed by other researchers^[14,18].

The results revealed that Lake Van Region has rich rose hip germplasm. Fruit attributes of the investigated genotypes grown in the Lake Van basin were generally in agreement with those of genotypes studied in different areas of Turkey^[11,15]. Genotypes with large fruit, high soluble contents and high fruit flesh ratio should be investigated in detail. These values can be influenced by different ecological conditions and cultural practices.

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