

Determination of Pomological Characteristics of Niksar District Pomegranates (*Punica granatum* L.) of the Tokat Province

Y. Özkan
Gaziosmanpaşa Univ., Fac. of Agric.
Department of Horticulture
60240-Tokat/Turkey

Keywords: Pomegranate, plant characteristics, biodiversity

Abstract

This research was carried out at the University of Gaziosmanpaşa of the Agricultural Faculty and the Inspection Laboratory of the Ministry of Agriculture in Tokat Province between the years 1997 and 1998. Five pomegranates were taken from each genotype under investigation, to conduct physical and chemical analyses. According to two years average, fruit weight was between 140.9-281.1 g, the weight of 100 kernels varied between 24.1-41.4 g, percentage of kernels changed from 43.4 % up to 61.3 %, skin thickness varied between 2.82-3.59 mm. Skin bottom colour was yellow, skin upper colour was pink-red, and fruit let colour changed from clear pink to dark red. In addition to this total soluble solid content was found between 13.5 %-16.7 % and total acidity between 2.66 %-3.58 %.

INTRODUCTION

The range of production and consumption of pomegranate grown in the tropic and subtropics zones are less comparable to other fruits, but pomegranates are an important part of the industry where it is used to produce fruit juice, vinegar, citric acid, dye and medicine (Cemeroğlu, 1977; Dokuzoğuz and Mendilcioğlu, 1978; Onur, 1982; Onur, 1988). Anatolia, Caucasus and Iran are known as the motherland of pomegranate (Onur, 1988).

In recent years, pomegranate has been grown in fruit orchards in Turkey while it was growing as a hedge in the past. This has considerably increased the profit of the farmers growing pomegranate (Yılmaz et al., 1995). Pomegranate growing has important advantages such as easy multiplication, adaptable to different soils and climatic conditions, and high yield per area. It is estimated that the production of pomegranate has reached 60.000 tons in Turkey in the last few years (Tibet and Onur, 1999). Increases in domestic consumption and in export have gained the interest of producers to this fruit. Studies have been conducted to determine different genotypes of pomegranate grown almost in all regions of Turkey. Variety standardisation of various characteristics and have significantly contributed to this development. Up to now, many researches aimed to determine the characteristics of pomegranate varieties and types grown in different parts of Turkey. Breeding work on this crop has also been intensively done in the past in Turkey (Dokuzoğuz and Mendilcioğlu, 1978; Onur and Kaşka, 1985; Boz, 1988; Yılmaz et al., 1992; Ercan et al., 1991; Ercan et al., 1992; Yılmaz et al., 1995; Polat et al., 1999).

Turkey ranks as the first in pomegranate production in the Mediterranean region with up to 20.000 tonnes, which constitutes 35 % of the total pomegranate production (Anonymous, 1998). Although the central part of the Tokat province is not suitable to grow pomegranate economically, the cultivation can be advised in the counties of Niksar and Erbaa of Tokat. Both counties have certain microclimate characteristics for temperate-zone pomology. The number of pomegranate trees is about 1100 in Tokat and the annual production reaches approx. 9 tons (Anonymous, 1996).

Especially in Niksar farmers have grown pomegranate for a long time. The main aim of this study is to contribute to the conservation of Turkey's plant genetic resources and to determinate the fruit characteristics of the present pomegranate genotypes.

MATERIAL AND METHOD

This research was carried out at the University of Gaziosmanpaşa, Faculty of Agriculture, Department of Horticulture and the Inspection Laboratory of the Ministry of Agriculture and Rural Affairs in Tokat in 1997 and 1998. In the research, eleven pomegranate genotypes of the Niksar district were used as material. Five pomegranate fruits were taken from each genotype to be used for analysis. In fruit samples, physical and chemical characteristics such as fruit weight (g), skin bottom colour, skin upper colour and ratio, skin thickness (mm), fruit let colour, weight of 100 kernel number (g), percentage of kernels, fruit let hardness, cracking of fruit skin, the total soluble solid content (%) and total acidity (%) were investigated.

RESULTS AND DISCUSSION

Some pomological characteristics of the investigated genotypes are given in table 1 as the average of two years. Average fruit weight in the trials varied between 140.9 g for Acar 4 and 281.1 g for Leblebicioğlu. These results are lower in value when compared to those of other researchers. For example, fruit weights was found between 250.84 g and 461.77 g by Polat et al. (1999), between 223.5 g and 493.1 g by Tibet and Onur (1999), between 253.6 g and 308.3 g by Yılmaz et al. (1995). All types had yellow skin bottom colour, while the upper skin colour varied between pink and red. The skin thickness of genotypes varied between 2.82 mm and 3.59 mm. Skin thickness was found between 2.41 mm and 4.33 mm by Polat et al. (1999), while Yılmaz et al. (1995) reported it to be between 1.50 mm and 5.43 mm. These results are similar of those of other researchers.

Fruit let colour varied between clear pink and dark red. The percentage of kernel was determined between 43.4 % (Acar 4) and 61.3 % (Taş 1), while the weight of 100 kernel number varied between 24.1 g and 41.4 g. The percentage of kernel seems low when compared to the results of other researchers. This percentage was reported between 54.0 % and 61.5 % by Polat et al. (1999), or between 41.0 % and 64.0 % by Tibet and Onur (1999), or between 50.6 % and 60.9 % by Yılmaz et al. (1995). Seed hardness varied from hard to soft in the genotypes. The fruit skin of Acar 3, Hekimoğlu 1, Hekimoğlu 2 and Hekimoğlu 3 cracked, but it did not crack in other types (Table 1). All pomegranate genotypes were categorised under the sour group since total acid content exceeded 2 %. As it can be seen from table 1, total soluble solid content varied between 13.5 % and 16.7 %. This value was found between 12.6 % and 15.5 % by Yılmaz et al. (1995), between 12.8 % and 16.1 % by Tibet and Onur (1999), and between 13.87 % and 15.80 % by Polat et al. (1999). Our results can be ranked as high when compared to those of other researchers. Total acidity values were determined between 2.66 % (in the case of Acar 1) and 3.58 % (in the case of Leblebicioğlu). It can be said that the pomegranate types we investigated are more suitable for industrial proposes instead of fresh consumption, since pomegranate genotypes need to have total acid content less than 1 % when intended for fresh consumption. Red kernel colour is also preferred for the same propose (Onur, 1988; Tibet and Onur, 1999).

In recent years, especially in West Europe, studies on conservation of natural genetic resources are intensified and it investments are more and more canalised to projects related to this subject (Kahn, 1985; Tan and Tan, 1999; Tan, 1999; Göschl, 1999; Hawtin, 1999).

As a consequence, this study aimed to determine the situation of pomegranate population in the region by investigating the general characteristics of the present genotypes. It is expected that this study will show a way for further studies on plant biodiversity and the conservation of pomegranate genotypes.

Literature Cited

- Anonymous 1998. Tarımsal Yapı ve Üretim. DİE, Ankara.
Boz, Y., 1988. Şanlıurfa'da Yetiştirilen Bazı Önemli Nar (*Punica granatum* L.) Çeşitlerinin Morfolojik ve Pomolojik Özellikleri Üzerinde Araştırmalar (MSc Thesis). Ondokuz Mayıs Univ. Graduate School of Natural and Applied Sciences Inst.,

- Samsun.
- Cemeroğlu, B. 1977. Nar Suyu Üretim Teknolojisi Üzerinde Araştırmalar. Ankara Univ. Agric. Fac. Publications No: 664.
- Dokuzoğuz, M. ve Mendilcioğlu, K., Ege Bölgesi Nar Çeşitleri Üzerinde Pomolojik Çalışmalar. Journal of Ege Univ Fac. Of Agric., 15(2): 133-159.
- Ercan, N., Özvardar, S., Gönülşen, N., Baldıran, E., Önal, K. and Karabıyık, N. 1992. Ege Bölgesine Uygun Nar Çeşitlerinin Saptanması. 1st National Horticultural Congress. Vol. 1: 553-556.
- Ercan, N., Özvardar, S. and Baldıran, E. 1991. Nar Çeşit Araştırma Projesi (Ara sonuç raporu). Ege Agric. Res. Inst. Menemen-İzmir.
- Göschl, T. 1999. The Value of Biodiversity: the Economic Perspective. Course on Conservation and Sustainable Use of Plant Biodiversity. 27 September-9 October. Ege University, Faculty of Agriculture, İzmir- Turkey.
- Hawtin, G. 1999. Management of Plant genetic resources in the CGIAR: Problems, Prospects and the Quest for Equity. World Trade Forum, Berne, Switzerland, Aug. 27/28.
- Kahn, R.P. 1985. Technologies to Maintain Biological Diversity: Assessment of Plant Quarantine Practices. OTA commissioned paper, Congress of The United States, Office of Technology Assessment, Washington, DC 20510- 8025.
- Onur, C. 1982. Akdeniz Bölgesi Narlarının Seleksiyonu (PhD thesis). Çukurova Univ. Fac. Of Agriculture, Adana.
- Onur, C. and Kaşka, N. 1985. Akdeniz Bölgesi Narlarının (*Punica granatum* L.) Seleksiyonu. Doğa Bilim Dergisi, D 2, 9, 1:25-33.
- Onur, C. 1988. Nar (Özel Sayı). Derim 8(4), Antalya.
- Polat, A.A., Durgaç, C., Kamiloğlu, Ö., Mansuroğlu, M. and Öztürk, G. 1999. Hatay'ın Kırıkhan İlçesinde Yetiştirilmekte Olan Bazı Nar Tiplerinin Pomolojik Özelliklerinin Belirlenmesi Üzerinde Çalışmalar, 3rd National Horticultural Congress, p. 746-750, Ankara.
- Tan, A. 1999. Current Status of Plant Genetic Resources Conservation in Turkey. Course on Conservation and Sustainable Use of Plant Biodiversity. 27 September-9 October. Ege University, Faculty of Agriculture, İzmir- Turkey.
- Tan, A. and Tan, A.Ş. 1999. Database management systems for conservation of genetic diversity in Turkey. Course on Conservation and Sustainable Use of Plant Biodiversity. 27 September-9 October. Ege University, Faculty of Agriculture, İzmir-Turkey.
- Tibet, H. and Onur, C. 1999. Antalya'da Nar (*Punica granatum* L.) Çeşit Adaptasyonu (III). 3rd National Horticultural Congress, p. 31-35, Ankara.
- Yılmaz, H., Şen, B. and Yıldız, A. 1992. Akdeniz bölgesinde Seçilen Narların Bölgesel Adaptasyonu. 1st National Horticultural Congress. Vol. 1:549-552.
- Yılmaz, H., Ayanoğlu, H. and Yıldız, A. 1995. Ege Bölgesinde Selekte Edilen Bazı Nar Tiplerinin Erdemli Koşullarında Adaptasyonu Üzerinde Araştırmalar. 2nd National Horticultural Congress. Vol. 1:691-695.

Tables

Table 1. Some pomological characteristics of pomegranate genotypes investigated (1997-1998).

Types* →	Acar 1	Acar 2	Acar 3	Acar 4	Hek. 1	Hek. 2	Hek. 3
characteristics ↓							
Fruit weight (g)	173.3	169.0	176.7	140.9	150.6	163.0	156.6
Skin bottom colour	yellow	yellow	yellow	yellow	yellow	yellow	Yellow
Skin upper colour and ratio (%)	Pink 70	Red 85	Pink 30	Pink 75	Pink 35	Red 65	Pink 50
Skin thickness (mm)	3.23	3.19	2.82	3.24	3.37	3.46	3.38
Kernel colour	Clear pink	Dark red	Pink	Red	Pink	Dark pink	Clear pink
The weight of 100 kernel (g)	24.1	28.4	32.6	29.7	27.3	32.8	26.4
The percentage of kernel	56.2	59.7	54.6	43.4	50.8	60.6	48.5
Fruit let hardness	Middle hard	Soft	Soft	Middle hard	Middle hard	Middle hard	Hard
Cracking	-	-	+	-	+	+	+
Taste	Sour	Sour	Sour	Sour	Sour	Sour	Sour
TSSC (%)	15.2	16.6	15.9	13.5	14.7	16.7	15.6
Total acid (%)	2.66	2.72	2.85	2.80	2.83	3.06	2.82

*: Hek.; Hekimoğlu,

Table 1 continued.

Some pomological characteristics of pomegranate genotypes investigated (1997-1998).

Types* →	Taş 1	Taş 2	Leb.	Deniz
Characteristics ↓				
Fruit weight (g)	187.8	229.7	281.1	158.8
Skin bottom colour	yellow	yellow	yellow	Yellow
Skin upper colour and ratio (%)	Red 90	Red 60	Red 40	Pink 55
Skin thickness (mm)	3.59	3.22	2.64	3.56
Kernel colour	Red	Dark pink	Dark red	Dark pink
The weight of 100 kernel (g)	27.8	41.4	32.5	27.8
The percentage of kernel (%)	61.3	60.9	51.8	52.6
Fruit let hardness	Hard	Hard	Soft	Middle Hard
Cracking	-	-	-	-
Taste	Sour	Sour	Sour	Sour
TSSC (%)	14.9	14.6	13.9	13.6
Total acid (%)	3.34	3.16	3.58	3.46

*: Leb.; Leblebicioğlu