Scientific Papers. Series B, Horticulture. Vol. LXIII, No. 2, 2019
Print ISSN 2285-5653, CD-ROM ISSN 2285-5661, Online ISSN 2286-1580, ISSN-L 2285-5653

STUDY OF MORPHOLOGIC CHARACTHERISTICS OF SOME FRUITS LESS KNOW IN ROMANIAN POMICULTURE

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Abstract

The researches were carried at the Frasinu Society in Buzău County, located on the outskirts of Buzău. The orchard was established in the spring of 2010, with the 'Caroa de Rei', 'Sharon', 'Ogosho' and 'Rojo Brillante' varieties, of nine years old. The trees were planted at a distance of 4 x 4 m. Four variants (represented by the variety), cultivated in 4 repetitions, were studied. Observations on the fruits were made from 2014 until 2018. Determinations were made on the average fruit weight, the height of the fruit and the diameter of the fruit and the shape index was calculated. From the chemical point of view, determinations have been made regarding the content in soluble solids determined by refractometry. The largest fruits were obtained in the 'Sharon' variety (190 g on average), followed by the 'Rojo Brillante' (180 g) and 'Ogosho' (174 g). The fruits of the 'Caroa de Rei' variety recorded a shape index of 1.14, and the 'Ogosho' variety had the lowest value of the shape index (0.64), the fruits being of the flattened form. The kaki fruit is sweet, due to its high content in soluble solids. The varieties studied had values higher than 10%, the sweetest variety being 'Caroa de Rei' (17.12%). Considering the quality of the fruits and the behavior of the trees during the experiments we consider that this species can be cultivated successfully in Romania.

Key words*: fruits, Japanese persimmon, shape index.*

INTRODUCTION

The kaki species (*Diospiros kaki*), experimentally cultivated in Romania, is a tree species that can be grown in warm areas. Known by its fruit present on the shelves of the big stores, it has been appealing to consumers in Romania in a short time, due to its special taste.

Diospiros kaki is known from the earliest times, fruits are considered to be the gods' food. It forms a globular crown and reaches heights of 6-8 m (Cepoiu N., 2001). The foliage is rich and leaves are is very large in size compared to other species. The relatively small greenish yellow flowers are solitary or clustered. They are formed from small buds and functional masks, females or hermaphrodites. The fruits are large, spherical, elongated, or may have a collar at the top (Păun C, 2017).

They have orange or red color, resemble mature tomatoes, are astringent when not ripened, they are consumed after a storage period (Cepoiu et al., 2005). They have a specific taste of ripe pumpkin or pumpkin pie. They have a very complex chemical composition (Table 1):

Table 1. Nutritional value per 100 g fruit pulp

Calories	70 Kcal	Total fats acid saturated	0.02 g
Protein	0.58 g	Total fats acid monosaturated	0.037 g
Lipid	0.19 g	Cholesterol	0 mg
Carbohidrates	18.59 g	Phytosterol	4 mg
Fiber	1.7 g		
AMINOACIDS (g)			
Tryptophan	0.01	Threonine	0.03
Alanine	0.029	Isoleucine	0.025
Leucine	0.042	Lysine	0.033
Fenil-alanine	0.05	Methionine	0.026
Cisteine	0.013	Thyrosine	0.016
Valeine	0.03	Arginine	0.025
Histidine	0.012	Serine	0.022
acid-aspartic	0.057	acid-glutamic	0.076
Glycine	0.025	Proline	0.022
VITAMINS (mg)			
Vitamin B_1	0.03	Vitamin C	7.5
Vitamin B_2	0.02	Vitamin A	217
Vitamin B_3	0.1	Vitamin E	0.59
Vitamin B_6	0.1		
MINERALS			
Ca	8 mg	Na	1 mg
P	17 mg	K	161 mg
Zn	0.11 mg	Cu	0.113 mg
Mn	0.335 mg	Se	0.6 µg

Source: Fichier canadien sur les éléments nutritifs, 2001b

MATERIALS AND METHODS

The observations were made during 5 years (2014-2018) at Frasinu S.A. from Buzău County. Four varieties with large fruit from Portugal were studied.

At first, the experience was aimed at studying the adaptability of this species to the conditions in our country, knowing that it preferred tropical and subtropical areas.

The 'Caroa de Rei', 'Sharon', 'Ogosho', 'Rojo Brillante' varieties have been studied under various aspects.

The trees were planted according to the scheme of a normal planting with a distance of 4 m between rows and 4 m between plants per row.

Observations have been made on the growth and development of varieties and the evolution of the foliar surface until the fructification has been established, and after that, the characteristics of the fruit have been studied.

The fructification was installed three years after planting, and production increased visibly from one year to the next.

During the 5 years of study, the temperatures during the winter were very low. In the winter of 2014, temperatures dropped to -25°C, and in 2016 to -30°C. As a result, in 2014 a large part of the fruit branches was affected and very few fruits were obtained.

The fruits were analyzed annually in the Horticultural Products Laboratory, determining their weight, fruit height, fruit diameter in the two-way median area, USS content and storage capacity.

On the crowns were not made the specific interventions, the plants being allowed to evolve freely, having the ability to adjust the size of the shoots.

Observations have been made regarding the evolution of the foliar surface of each variety. The large foliar surface can explain the high productive potential of this species.

Fruits were analyzed concerning the external appearance and chemical analyses were performed with respect to USS content.

The average weight was determined by weighing 30 fruits obtained as a result of the average analytical sample technique.

RESULTS AND DISCUSSIONS

The fruits of the kaki species (Japanese persimmon) developed very well every year of experimentation (Table 2). The data presented in Table 2 represents the average fruit weight of the 4 varieties of kaki.

Table 2. Average weight of fruits (g)

Variety	Year of experimentation					Average
	'14	'15	'16	'17	'18	
'Caroa de Rei'	140	110	135	115	125	125
'Sharon'	290	160	150	170	180	190
'Ogosho'	150	160	170	200	190	174
'Rojo Brillante'	220	180	170	180	150	180

It can be noticed that there are small differences between the fruit size from one year to the next. The largest fruits were obtained in the 'Sharon' variety (190 g on average), followed by the 'Rojo Brillante' and 'Ogosho' varieties (Figure 1).

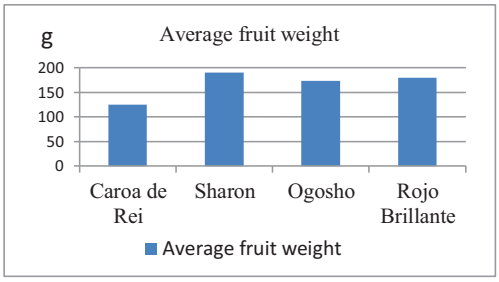

Figure 1. Average fruit weight of kaki varieties

All the studied varieties produced large fruit.

The fruit of the kaki species reaches a height of 40 to 71 mm (Table 3). The highest fruits formed 'Caroa de Rei' variety, in the 4 years of experimentation, the height of the fruit was between 62 and 71 mm.

Table 3. The height of the kaki fruit (mm)

Variety	Year of experimentation					Average
	'14	'15	'16	'17	'18	
'Caroa de Rei'	70	60	71	62	63	65.2
'Sharon'	65	51	53	52	52	54.6
'Ogosho'	46	45	47	53	51	48.4
'Rojo Brillante'	50	50	50	50	40	48.0

Because the fruits are not round, two measurements were made perpendicular on the middle of the fruit. Thus, the differences between the two measurements show the degree of asymmetry of the fruit.
The analysis of the data presented in Table 4 shows that the fruits are slightly asymmetrical in the four varieties.

Table 4. Determination of kaki fruit diameter (mm)

Variety	Year of experimentation					Ave rage
	’14	’15	’16	’17	’18	
‘Caroa de Rei’	60.0	55.6	58,4	54.2	58.4	57.3
‘Sharon’	86.0	73.0	68.0	71.0	74.3	74.4
‘Ogosho’	72.8	76.1	74.4	76.9	76.5	75.4
‘Rojo Brillante’	70.4	70.0	65.4	70.2	60.7	67.4

In order to determine the shape index, the relationship between the fruit height and the average of the two diameters was made (Figure 2).

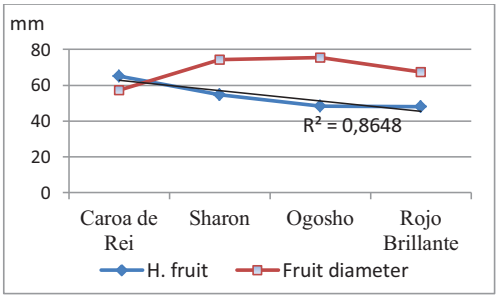

Figure 2. The correlation between high fruit and fruit diameter

The data presented in Table 5 shows that the fruits of the ‘Caroa de Rei’ variety had the value of a form greater than 1 each year of experience, the fruits being elongated. The other varieties had lower values of the shape index, the fruits being spherical.

Table 5. Shape index determination

Variety	Year of experimentation					Ave-rage
	’14	’15	’16	’17	’18	
‘Caroa de Rei’	1.16	1.07	1.21	1.19	1.08	1.14
‘Sharon’	0.75	0.69	0.77	0.73	0.70	0.72
‘Ogosho’	0.63	0.60	0.64	0.69	0.66	0.64
‘Rojo Brillante’	0.71	0.72	0.66	0.71	0.66	0.69

The kaki fruits are astringent and cannot be eaten immediately after harvesting. Content in USS grows as the fruit matures in the warehouse to a maximum, at which point the fruit pulp becomes soft. The soluble dry matter content is between 14.0 and 17.5%, depending on the variety and the year of experimentation (Table 6, Figure 3).

Table 6. Determination the fruit content in U.S.S (%)

Variety	Year of experimentation					Ave-rage
	’14	’15	’16	’17	’18	
‘Caroa de Rei’	17.4	17.0	16.8	17.4	17.0	17.12
‘Sharon’	14.0	15.4	16.0	14.8	15.0	15.04
‘Ogosho’	14.5	15.0	14.8	14.4	14.7	14.68
‘Rojo Brillante’	17.5	17.3	17.5	17.2	17.5	17.4

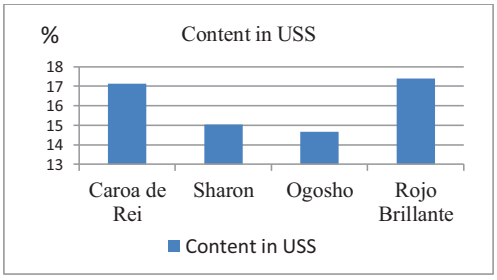

Figure 3. The content of pulp in USS

CONCLUSIONS

The ‘Sharon’ variety has formed the biggest fruit - 190 g. The highest height of the fruit was observed in the ‘Caroa de Rei’ variety - 65.2 mm. The ‘Sharon’ and ‘Ogosho’ varieties had fruit with similar diameter - 74.4 mm, respective 75.4 mm. Only the ‘Caroa de Rei’ variety had elongated fruit (1.14 shape index), the other varieties having spherical shaped fruit. The ‘Caroa de Rei’ and ‘Rojo Brillante’ varieties had fruit with the highest content in USS - 17.12%, respective 17.4%.
The four varieties can be grown successfully, because the fruits are tasteful and attractive (shape and color) being appreciated by consumers. The trees have resisted the most difficult environmental conditions in the winter and summer.

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