BEHAVIOR STUDY OF PEACH VARIETIES TO LATE SPRING FROSTS AND EARLY AUTUMN FROSTS WITHIN S.C.D.P. BIHOR

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RESEARCH ARTICLE

Abstract

In the present study, the behavior of peach varieties grown in the Fruit Research and Development Station – Oradea (Bihor County), during late spring frosts and early autumn frosts was highlighted. To carry out the study, the varieties Redhaven and Autumn gorgeous were chosen, and a sample of 15 tree of each variety was chosen to determine the percentage of buds affected by the negative temperatures in April and November. For each peach specimen taken in the study from the two varieties, 10 branches were chosen every year, where the fruit buds were counted before and after entering the vegetation. The study highlights the negative influence of late spring frosts on peach production in S.C.D.P. Oradea, in 2022, 31.23% of the fruit buds of the Redhaven variety and 12.01% of the Autumn gorgeous variety were affected, with a decrease in fruit production between 32-58%.

Keywords: peach, variety, fruit buds, frosts, fruit production

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INTRODUCTION

For a long time it was believed that the place of origin of the peach would be in Persia from where its culture would have spread to other countries, which explains the scientific name *Prunus persica* L. Current research shows that China would be the country of origin, with fossil evidence also being discovered in Chinese writings from the 10th century BC, where the fruit is said to have been a favorite of Chinese emperors (Zheng, 2014).

In 1753, Linne made the first classification of the peach, placing it in the Genus *Amygdalus* (*Amygdalus persica* L.). Mille in 1768 introduced a new genus *Persica*, where the species was included under the name *Persica vulgaris*. Batsch in 1807 included the peach in the genus *Prunus* under the name *Prunus persica* (L.) Batsch.

Peaches is a valuable fruit tree species considering the biological and technological particularities of the fruit. Peaches contain 82-91% water, 17-18 g dry matter, 2-5 g total sugar, 0.3-1.4 g titratable acidity expressed as malic acid, 0.4-1.3 g protein, 0.02-0.4 g tannins and 0.3-0.7 g ash and mineral salts (Radu, 1957). Among carbohydrates, peach fruits contain an amount of 1.47% glucose, 1% fructose and 6.6% sucrose, and vitamins are represented by ascorbic acid in a proportion of 5-8 mg/100 g (Popescu, 1993).

In 1963, the first collection of peach varieties was established at the Fruit Research and Development Station (S.C.D.P.) Oradea. The assortment of peaches consisted of varieties with different maturities of fruit ripening.

The Fruit Research and Development Station (S.C.D.P.), is located in the town of Oradea (N:47.06696 E:21.96124), at an altitude of 150 m, on a surface with S exposure, slope of 5-10°.

In the present study, 2 varieties of peach cultivated within the S.C.D.P., namely Redhaven and Autumn gorgeous, were taken into account. The main purpose of the work was to study the behavior of some peach varieties in late spring frosts and early autumn frosts.

In order to prepare this study, a series of specialized works on the culture of peach varieties developed by Constantinescu (1971); Draganescu (2005); Cociu (1993); Cociu et al., (1981); Hoza (2000); Spiță (2002); Mihailescu (1981); Engindemiz (2003); Chalmers (1989); Nyeki & Szabu (1989), were also consulted.

MATERIAL AND METHOD

Two peach varieties Redhaven and Autumn gorgeous from S.C.D.P. were taken into study. For the determinations made, a number of 15 peach specimens from the 2 studied varieties, aged 10 years on Oradea – 2 and De Balc (Mt.) rootstocks, were selected.

The planting distance of the peach varieties studied is 4x4 m, with a density of 625 trees/ha. To determine the effect of negative temperatures in autumn and spring on the studied specimens, the buds on 10 branches of

each specimen corresponding to the 2 studied varieties were counted, every year, during the period 2022-2024.

The percentage of buds affected by the effect of negative temperatures recorded during this time interval and the production of the 2 peach varieties were determined.

RESULTS AND DISCUSSIONS

The peach of the Redhaven variety is a self-fertile variety, with medium to high productivity, which bears fruit from the 2nd year after planting and can ensure constant production over a period of 10-15 years. Peach culture in S.C.D.P. Oradea was realized on sunny (southern) exposures. The peach of the Redhaven variety fructify on mixed branches, which are carriers many fruit buds placed in groups, usually three, of which one is vegetative, which implies the thinning of the fruits after the physiological fall in June. The flowering is spectacular and takes place in April, lasts 10-14 days, the flowers being pink. The fruits are spherical, slightly asymmetrical, non-adherent to the seed, with an average weight of 150 grams, very resistant to transport. The soils on which the peach culture is located are preluvosol type with loamy, loamy-sandy texture, deep and permeable.

Autumn gorgeous variety peach is a tree of great vigor, with an inverted pyramidal crown, fruiting branches, predominantly mixed. It is a late variety, with large fruit (150-170 grams), of regular spherical shape, the base color is yellowish-white, covered with red on the sunny side, over which stripes, splashes and spots of cherry-red color overlap, the pulp yellowish-white, with slight infiltration around the kernel, consistency, pleasant taste and contains 15-16% dry matter, medium-sized kernel, non-adherent to the core. It has a relatively good resistance to frost and drought, tolerant to the main diseases. It blooms late, and the floral anthesis lasts 5-7 days, the variety is self-fertile. Fruit harvest maturity August 25 - September 15.

To carry out the measurements, 15 specimens of the two varieties were chosen, determining the height (Figure 1) and diameter at the parcel (Figure 2), for each tree. In order to determine the number of fruit buds affected by frost, a number of 10 branches were chosen each year for each specimen of the studied varieties (Table 1).

Table 1

Dimensional characteristics of the peach varieties studied

Variety	No. of specimens studied	Diameter at the parcel (cm)		Height (m)		No. of branches studied/trees
		Diameter category	No. of trees	Height category	No. of trees	
Redhaven	15	12	3	2	3	10
		14	6	3	11	
		16	5	4	2	
		18	1	5	-	
Autumn gorgeous	15	12	4	2	2	10
		14	6	3	12	
		16	4	4	1	
		18	1	5	-	

Figure 1 **Determining the height of trees**

Figure 2 **Determining the diameter of the trees**

For a better correlation, the average length of the 10 branches bearing fruit buds was determined for the Redhaven and Autumn gorgeous varieties in the period 2022-2024. The total number of fruit buds was determined for the 15 specimens studied (floriferous and mixed buds), as well as the number of buds affected by frost in the established interval (Table 2).

Table 2

Parcentage of affected buds in the period 2022-2024

Variety	Period	Branch length range (cm)	Fruits buds/15 trees	Affected fruit buds by negative temperatures		Production (t/ha)
				No.	%	
Redhaven	2022	28-64	461	144	31.23	8.4
	2023	20-72	386	104	26.94	10.3
	2024	22-68	392	-	-	12.4
Autumn gorgeous	2022	18-42	283	34	12.01	6.3
	2023	16-40	226	27	11.95	10.1
	2024	14-38	203	-	-	10.8

We can see that the temperatures during the floral anthesis period (April) had a negative influence on the fruit buds (Table 3). It was determined that in the year 2022 31.23% of the fruit buds were affected in the Redhaven variety and 12.01 in the Autumn gorgeous variety, mainly due to the negative temperatures from April 03-08 period, which also influenced fruit production, 8.4 t/ha at Redhaven and 6.3 t/ha at Autumn gorgeous (Figure 1).

In 2024, a higher fruit production is observed mainly due to the lack of negative temperatures during the period of flowering and fruit setting.

Table 3

Variation of negative temperature in April and November, in the period 2022-2024 (Oradea weather station)

Year	Month	Negative temperatures, (period of the month) (°C)
2022	April	-2.3...-0.8 (interval: 03-08)
	November	-1.7 °C (date: 30)
2023	April	-1.3...-0.7 °C (interval: 04-07)
	November	-1.1...-4.0 °C (interval: 26-30)
2024	April	-

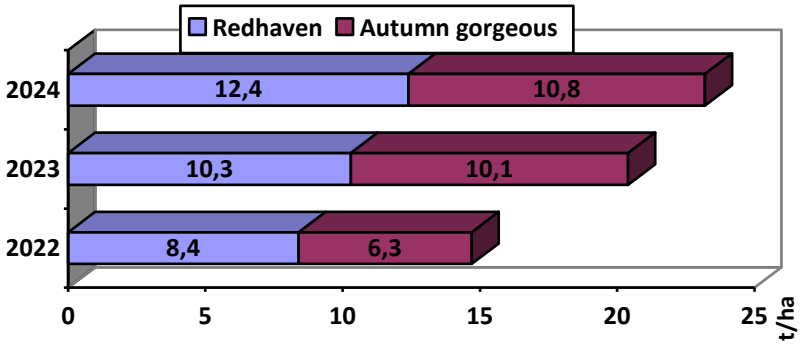

Figure 1 **The variation in fruit production of the studies peach varieties in the period 2022-2024 (S.C.D.P.-Oradea)**

CONCLUSIONS

It was found that the resistance of the peach to the late spring frosts differs within fairly close limits from one variety to another, but differently depending on the phenophase in which it is located. The frost resistance of the varieties studied is different, thus the Redhaven variety recorded a percentage of 31.23% buds affected in 2022 following temperatures of -0.8...-2.3 in a range of 03-08 April, compared to the Autumn gorgeous cultivar with 26.94% affected buds at the same temperatures and time interval.

Flower buds in the pink bud stage withstand peach down to -3.9°C, open flowers can withstand -2.8°C, and recently set fruit -1.1°C. For this reason we believe that the effect of spring frosts is more harmful during the period of fruit setting, causing production losses.

To avoid damage caused by frost, it is recommended to create and use varieties resistant to low temperatures, varieties with long-lasting deep dormancy and reduced vegetation period. Phosphorus and potassium fertilizers increase frost resistance, and excess nitrogen weakens it. Phytosanitary treatments with oil or sulfo-calcium solution delay the entry into the vegetation by 8-10 days.

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