

RESISTANCE OF THE NEPTUNE APRICOT VARIETY TO LATE FROSTS

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Keywords: *Prunus armeniaca*, thermal shock, temperatures, flower buds.

ABSTRACT

The Dobrogea region is a favorable area for apricot culture, this species ensuring relatively uniform production over the years. However, the temperature variations in the long and cold springs influence the production of certain apricot varieties in operation. The Neptun apricot variety studied in recent years showed and proved a uniformity in the given productions even though the late frosts were more and more frequent. Low temperatures affect apricot plantations, causing irregularities in the regularity of fruit production and their quality, gummy leaks and awareness of trees to the attack of apricot-specific pathogens. The research was conducted in a orchard of apricot aged 9 years, located at 18 km away from Constanta. Trees planted at a distance of 4x4m were studied during the vegetation season paying particular attention to resistance to low temperature. In the winter of 2019, temperatures in winter decreased to -14 degree C and produced losses of flower buds. In the spring of 2020, the 'Neptun' variety bloomed well, 80% of flower buds being resistant to negative temperatures from winter. In 2021 was a warm winter but the temperature decreased in January to -14 degree C and the trees suffered a thermal shock. Following, resistance to frost decreased and the percentage of flower buds affected was 84,8%. In 2022 'Neptun' variety was not affected. In February of 2023 were, recorded temperatures of -10 degrees C associated with very cold wind, the flower buds were affected in 80,6%.

INTRODUCTION

The apricot is a species appreciated for fruit quality and is grown successfully in areas with high temperatures (Cociu V. et al. 2000; Sestraș R. et al. 2004). In Romania, grows in the S - E part of the Dobrogea area. In this part, the apricot, do not make the fruits every year because of the low temperatures that affect the flowers (Braniște N. et al. 2007). The 'Neptun' is a old variety reintroduced in crop and after these studies this variety proves to us that it has a genetic resistance to low winter temperatures and temperatures during the flowering period. We made a trial with 'Neptun' variety to study resistance to winter cold, fructification and fruit quality. As a result of the researches, we were able to establish the resistance limit at low temperatures and I observed that the 'Neptun' variety behaves differently from one year to another depending on the evolution of the temperatures. In cold winters associated with wind, the productions are kept in relation to the warm winters. Researchers are concerned about obtaining apricot varieties that start late in vegetative and resist winter frost. The transition period from the cold to the warm

season (called the “spring release” period) is of particular importance for apricot production in the area of favorability of this species. The evolution of the agro-meteorological conditions from this period, in the South-East area of Romania, especially of the air and soil temperatures and humidity, presents special fluctuations, which reflect on the soil condition, apricot vegetation and finally on fruit production.

MATERIALS AND METHOD

The study was carried out in apricot demonstrative lots at Research Station for Fruit Growing Constanta, located in south-eastern Romania, near the Black Sea.

The site is located at 44°10' Northern latitude and 28°29' Eastern longitude, and 70 m above sea level. Climate is continental with warm and droughty summers, frequent dry winds all the year round and temperate winter generally without snow. The mean annual temperature is 12.0°C and the total active temperature is 3988°C, out of which 3170°C during the growing season; the annual precipitation amount is 400 mm, out of which during the growing season (April 1 to September 30), 240.7 mm.

The lowest winter temperatures below -20°C are not very often: 1 out of 10-15 years and so are the spring frosts susceptible to cause apricot yield damage.

The climatic water deficit reaches as much as 400 mm/year, so irrigation application is needed for apricot.

The selection are planted in demonstrative lots (4 m x 4 m scheme) in 2011 with north-south row orientation and the crown shape is improved vase. The apricot trees are grafted on Constanta 14 described by PhD. Indreias Alexandra (2010).

The blooming intensity was noted from 0 (absent) to 5 (abundant), according to the research methodology of fruit tree breeding (Cociu 1989).

The trees and fruit characteristics were evaluated according to the Methodology for trying new varieties of fruit trees, shrubs and rootstock in order to approve the homologation and International Union for the Protection of New Varieties of Plants (UPOV) guidelines.

During 2020-2023 the fruit yield was recorded, when fruit production was considered stable. The average yield was evaluated by weighing the fruit of three apricot trees of each variety (kg/tree) and then as kg/ha.

RESULTS AND DISCUSSIONS

In 2019 the winter temperatures varied a lot in very short periods of time, so if in January we recorded temperatures of - 17°C, in February we recorded days with temperatures above + 14°C, followed by temperatures of - 5°C in March. For this reason, the Neptun apricot variety suffered, the flower buds were affected in a proportion of 88%. According to table 2 in 2020, the "Neptun" apricot variety was not affected by winter frosts, the variety having a good tolerance to thermal shocks (table 2). In 2021, from the analysis of the flower buds analyzed between January and February, we notice that the apricot variety "Neptun" was 84,8% affected by the winter frosts and very little by the return frosts or late frosts.

Observations regarding the genetic resistance of flowers at low temperatures during bloom showed that the “Neptun” variety very well tolerates low temperatures (photo 1 and photo 2). In years with high production, when winter frost did not destroy fruit buds, and the temperature drop gradual the flowers were not affected by low temperatures during the flowering period.

In 2018 and 2020 during the bloom when the flowers were opened, during the night when temperatures was $-1^{\circ} \dots -4^{\circ}\text{C}$, the apricot flowers were not affected (Table 1). The results regarding the influence of low temperatures on the percentage of fruits formed are presented in table 5. The fruits were analyzed morphologically and was determined the production on the tree (Table 5). From the analyzed data we observe an average production during the four years of study of 20kg / tree, which places this variety above the average production.

Table 1.

Behavior of the 'Neptun' variety in the winter 2019				
Variety	Rehearsal	Nr. buds analyzed	% viable fruit buds	% affected buds
"Neptun"	R1P1	250	90	10
	R1P2	220	91	9
	R1P3	180	88	12
	R1P4	230	86	14
	R1P5	230	84	16
Average	x	222	88	12

Table 2.

Behavior of the 'Neptun' variety in the winter 2020				
Variety	Rehearsal	Nr. buds analyzed	% viable fruit buds	% affected buds
"Neptun"	R1P1	180	88	12
	R1P2	200	85	15
	R1P3	210	75	25
	R1P4	240	80	20
	R1P5	260	85	15
Average	x	218	82,6	17,4

Table 3.

Behavior of the 'Neptun' variety in the winter 2021				
Variety	Rehearsal	Nr. buds analyzed	% viable fruit buds	% affected buds
"Neptun"	R1P1	260	90	10
	R1P2	220	88	12
	R1P3	200	76	14
	R1P4	180	83	17
	R1P5	210	87	13
Average	x	214	84,8	13,2

Table 4.

Behavior of the 'Neptun' variety in the winter 2022				
Variety	Rehearsal	Nr. buds analyzed	% viable fruit buds	% affected buds
"Neptun"	R1P1	200	75	25
	R1P2	220	70	30
	R1P3	200	87	13
	R1P4	185	84	16
	R1P5	235	87	13
Average	x	208	80,6	19,4

Table 5.

Observations on characteristics fruits and productivity

Variety	Year	Average fruit weight (g)	Weight of pulp (g)	Weight of kernel (g)	Fruit production (kg/tree)
"Neptun"	2020	58	54	4	16
	2021	66	61	5	22
	2022	70	64	4	23
	2023	72	67	5	20
Average	-	66,5	61,5	4.5	20,25



Photo 1. Neptun



Photo 2. Neptun

CONCLUSIONS

"Neptun" is constant in terms of fruiting, having good results even in unfavorable years for apricot cultivation. 'Neptun' variety is a relatively resistant variety to low winter temperatures and resistance depends on how low the temperature is. Under thermal shock, fruit buds can be affected to 80% to 88%, and warm winters causes fruit bud losses. If the fruit buds are not affected during the winter, the 'Neptun' variety fructify normally, being resistant to low temperatures during the flowering period. Shows good plasticity to the accentuated climatic changes of the last years.

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