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INFLUENCE OF WINTER FROSTS ON SOME PEACH CULTIVARS OF DOBROGEA

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Abstract

This heat-loving species always found good conditions for growth and fructification in the south-eastern part of Romania, and especially in Dobrogea. Climate accidents are increasingly studied in fruit trees in recent years under global climate change. The limitative factor of the peach production in this area is represented by temperature oscillations during winter, i.e. relatively high values followed by low temperatures, which may compromise the fruit yield in certain years (2010; 2011; 2012). At the Research Station for Fruit Growing Constanta, a total of 6 cultivars of peach (Springcrest, Springold, Collins, Cardinal, Redhaven, Southland) with different maturation periods were studied. This paper presents the manner in which the peach tree species replied to winter frosts in the climatic conditions recorded in the winters of 2010, 2011 and 2012. The obtained results demonstrate the importance of choosing the proper assortment of peach cultivars for the region.

Key words: *Prunus persica, late frosts, Cardinal, Redhaven, Southland, loses.*

INTRODUCTION

Peach fruit tree is the third species after apple and plum trees in our country and is grown in warmer areas with average annual temperature of 10 to 11.5°C, with deep porous soil, pH between 5.7 and 7.5 and active limestone content not exceeding 7% g/g when using franc rootstock, and 15% when the rootstock is almond (Stanica F. and Braniste N., 2011).

Due to climate change in recent years it has been found that the resistance of peach cultivars is very different from one year to another.

The Black Sea Coast is situated in the area with the largest annual average sums of day length on the country′s territory, sums which exdeeds 2250-2300 hours (Paltineanu Cr. et al., 2000). Previous research papers hay revealed that the impact of climatic changes upon fruit-growing species can already be felt. For instance, by the end of the 1990s, the flowering of the trees in Germany was occurring several days earlier (Chmielewschi F.M. et al., 2004 and 2005). The vegetative season in Europe became longer by 10 days in the past 10 years (Chmielewschi F.M. and Rotzer T., 2002). Due to the early flowering of the trees, in certain regions of Europe there was an increase in the risk of damage caused by late frosts (Anconelli et al., 2004; Sunley et al., 2006; Legave J.M. and Clauzel G., 2006; Legave J.M. et al., 2008; Chitu E. et al., 2004 and 2008) or by the disorders in the pollination and fruit setting processes (Zavalloni C. et al., 2006).The purpose of this paper is to highlight the influence of winter frosts on some cultivars of peach production of Dobrogea in the lest three years.

MATERIALS AND METHODS

The observations and determinations were carried out in the plots cultivated with some of the nectarine tree cultivars 3 to 5 days after the climatic accidents recorded in the years 2010, 2011 and 2012. The plots are situated in the experimental base within the Research Station for Fruit Growing (R.S.F.G. Constanta), Valu lui Traian. The degree of differentiation of the flowering buds was relatively good. Samples of branches were collected and analysed, these belonging to 6 peach tree cultivars: Springold, Springcrest, Cardinal, Collins, Redhaven and Southland, which were planted in 1986. The stock parent that was used was the franc peach tree with a density of 625 trees/ha (4m x 4m

planting scheme). The chosen shape of the canopy was the free palmette.
The soil is a calcareous chernozem, with a loamy texture and a low alkaline pH (8.2) on its entire profile. On average, the climatic conditions were also favourable to the growth and fructification of the trees, with the exception of the years 2010, 2011 and 2012, when a strong frost occurred in January and February, causing the loss of several flowering buds. The climatic data were recorded with the aid of an automatic meteorological station, type WatchDog, and were processed as diurnal averages.
It was found that the resistance is very different peach cultivars from year to year due to climate change in recent years and the magnitude of climatic accidents. Determinations were carried out in order to assess the losses of flowering buds due to temperature variations during winter and the low diurnal temperatures.

RESULTS AND DISCUSSIONS

Although the south-eastern part of Romania has been considered to be favourable to the culture of peach tree, this suffered because of the climatic variations, mainly the aggressiveness of the low temperatures in alternation with the maximum positive values. The peach tree recorded losses because of these variations which occurred during the dormancy period in the climatic conditions of 2010, 2011 and 2012.It was noticed that the resistance of peach tree cultivars differs from one year to another because of the climatic changes occurred in the past years. Other factors are: the alternation between minimum and maximum temperatures during winter, which reduces the trees' resistance and last but not least, the severity of the climatic accidents (Figure 1).
Figure 2 reveals the fact that the coldest month in the period October 2009 – March 2010 was January 2010, when, for 10 consecutive days, the values recorded ranged between-10.1°C (January 29th) and-17.7°C (January 24th and 25th). Moreover, in the same period, the temperatures in the valleys dropped bellow-18°C, up to-20°C (local observations). These values, together with the big diurnal differences in temperature in the month of February caused the loss of some flowering bud, in early cultivars such as Springold (61%), Springcrest (59%) and Cardinal (39%).

Figure 1. Aspects of the winters of 2010, 2011 and 2012 with the frost on the branches

In the October 2010-March 2011 period, the lowest temperature was recorded in January:-12°C. The lowest temperature recorded during this period affected Springold cultivars in 40% and Spingcrest with 38%.
As can be observed in Figure 2c, January was the coldest month, with 9 days displaying average diurnal values ranging between-10.2°C and-17.6°C. These values, together with the extreme amplitudes in February (7 days with average diurnal values ranging from-10.4°C to-16.4°C) and 8 consecutive days of glazed frost and ice on branches caused the loss of 31%-63% of the flowering buds of all the studied cultivars.

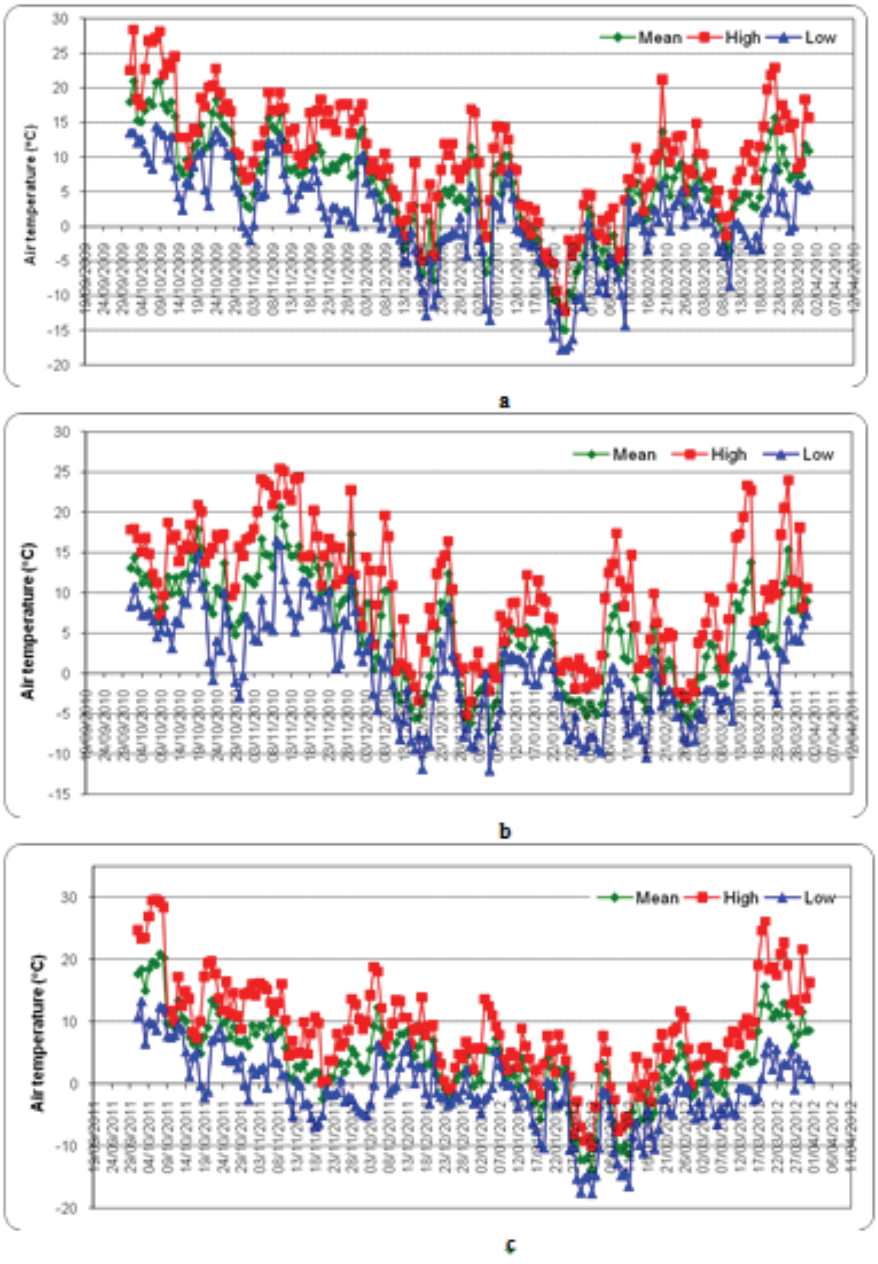

Figure 2. Air temperature (°C) in the cold periods: October 2009 – March 2010 (a), October 2010 – March 2011 (b), October 2011 – March 20120 (c) at Valu lui Traian, Constanta

Thus, the losses for the Springold cultivar were of approximately 61% in 2010, 39% in 2011 and 89% in 2012, there being differences between cultivars. The losses caused by frost for the Springcrest cultivar were of 59% in 2010, 37% in 2011 and 84% in 2012. For the Cardinal cultivar the losses were of 39% in 2010, 29% in 2011 and 66% in 2012, whereas for the Collins cultivar, the values were 37% in 2010, 21% in 2011 and 54% in 2012. For the Redhaven cultivar the values were the following: 32% in 2010, 23% in 2011 and 62% in 2012. Finally, for the Southland cultivar, the

losses represented 29% in 2010, 16% in 2011 and 48% in 2012 (Figure 3).

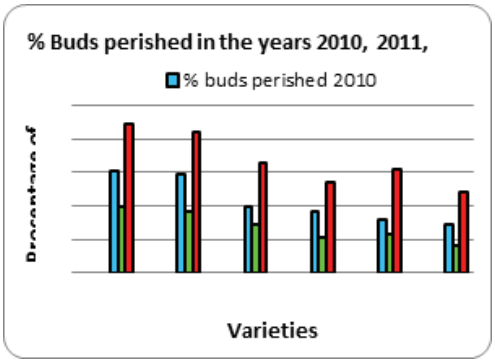

Figure 3. Procentage of peach tree flowering buds perished due to frosts during the winter of 2010, 2011 and 2012 at Valu lui Traian, Constanţa

Under these conditions, the Springold and Springcrest cultivars were destroyed at a level of magnitude over 60%, the Cardinal cultivar – 45%, the Redhaven cultivar, which was less afftected, was destroyed at a level of 39%, while the Collins and Southland cultivars were affected with 37% and 31%, respectively (Figure 3). The climatic accidents recorded in the months of January and February 2010 and 2012, when the temperature suddenly dropped to-17°C (minimum diurnal temperature in 2010) and-16.4°C + 8 days of hoarfrost in 2012 affected the peach production for the early cultivars Springold, Springcrest and Cardinal and partially for the Redhaven, Collins and Southland cultivars (Figure 4 and 5).

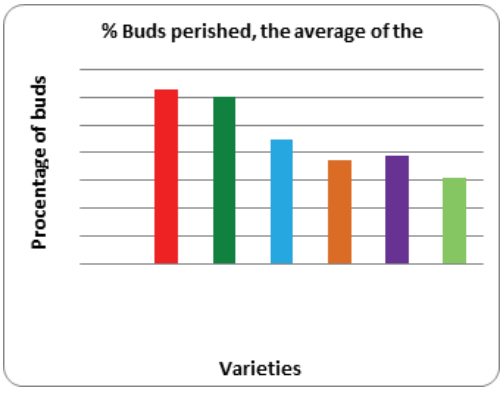

Figure 4. Procentage of peach tree flowering buds erished because of frosts (average over the three years), Valu lui Traian

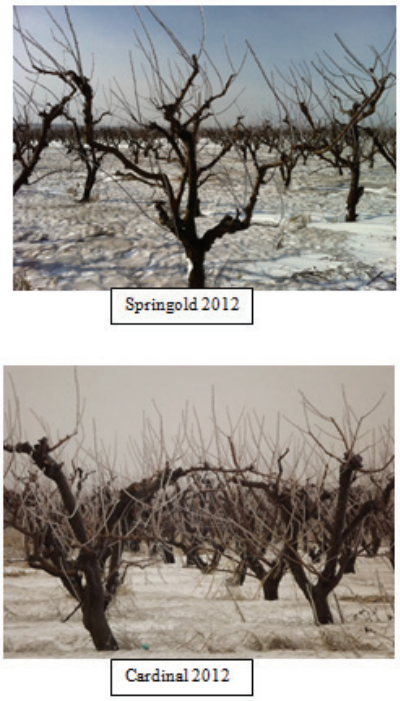

Figure 5. Aspects of the winter of 2012 with glazed frost on the branches

CONCLUSIONS

The fruit production of the peach tree species was affected in variable percentages according to the cultivar, following the climatic accidents recorded in the winters of 2010, 2011 and 2012.

The novelty of the results is the fact that the frosts in the winters of 2010, 2011 and 2012 affected the peach tree species according to the cultivar (approximately 31-63%).

The flowering buds losses were over 60% in Springold and Springcrest cultivars: however these cultivars were also planted in the lowest altitude locations.

The smallest losses in the three studied years (2010, 2011 and 2012) were recorded the Southland cultivar.

There was an increasing trend in frost damages for the last three years.

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