

THE NEGATIVE EFFECTS OF FROST IN THE WINTER OF 2007 ON THE FRUIT GROWING SPECIES CULTIVATED IN THE N-E MOLDAVIA

EFECTELE NEGATIVE ALE GERULUI DIN IARNA ANULUI 2007 ASUPRA SPECIILOR POMICOLE CULTIVATE ÎN N-E MOLDOVEI

PETRE L., SÎRBU SORINA, IUREA ELENA

Research and Development Station for Fruit Tree Growing Iasi

Abstract. *The N-E part of Moldavia sprads good conditions for the growth of the pome fruits (apple, pear, quince) and the stone fruits (plum, cherry, apple, apricot and peach trees) which marks the north limit of growing. The 2006-2007 winter was an abnormal one, with high temperatures during December-January and first decade of February, following by of suddenly lower of temperature (20,5 degrees centigrades bellow). In the experimental plantation of Fruit Growing Research Development Station Iasi after that frost, the blossom buds have been affected such as apricot, peach, cherry, plum trees, or even drying of nut trees. The most affected were supported by the apricot and peach species, in fact the fruit crop was destroyed. The same, the plum crop was 90%-100% affected. Damages of the floriferous buds were also registered for the cherry breeds especially for the breeds with an early maturity in proportion of 10-20% and for the walnuts where some trees partially dried off in the inferior third of the canopy and whose floriferous buds (especially male) were affected, a fact that led to the reduction of fruit production by 10-30%.*

Rezumat. *Zona de N-E a Moldovei oferă condiții favorabile culturii speciilor pomicele semințoase (măr, păr, gutui) și sămburoase (prun, cireș, vișin, măr, puțin cais și piersic) care se găsesc la limita nordică de cultură. Iarna anului 2006/2007 a fost una anormală, cu temperaturi ridicate în lunile decembrie, ianuarie și primele decade ale lunii februarie, urmată de o scădere bruscă a temperaturii în ultima decadă a lunii (-20,5°C), când s-au înregistrat afecțiuni ale mugurilor floriferi la speciile cais, piersic, prun, cireș și nuc și chiar uscarea parțială sau totală a unor pomi la nuc. Speciile măr, păr, gutui și vișin nu au fost afectate de aceste calamități. Cele mai grave afecțiuni s-au înregistrat la speciile cais și piersic a căror producție a fost calamitată în totalitate. Surprinzător a fost faptul că specia prun a fost puternic afectată ca urmare a distrugerii mugurilor floriferi în proporție de 90-100%. Afecțiuni ale mugurilor floriferi s-au înregistrat și la specia cireș, în special la soiurile cu maturare timpurie în proporție de 10-20% și la nuc la care unii pomi s-au uscat parțial în treimea inferioară a coroanei și a căror muguri floriferi (mai ales masculi) au fost afectați, fapt ce a produs diminuarea producției de fructe cu 10-30%.*

Key words : frost, cherry tree, plum tree, walnut tree, affections

INTRODUCTION

There have been published many papers with valuable scientific contents on the climate of Iasi and its surrounding area. Thus in the paper "Descriptio Moldaviae" (1716), Dimitrie Cantemir (1673-1723) speaks in the second chapter about the Moldavian climate and he mentioned for the first time the non-uniform character of this climate as a consequence of the influence from the mountainous region "of Transylvania".

Observations on the climate of Iasi we may also find in the paper of Andreas Wolf (1805). Speaking about the Moldavian climate, he remembers that winters are very harsh, the springs windy and the most common winds come from east and north. In our area of influence, the low temperatures of a frosty winter provoke damages in nurseries and orchards manifesting by the nipping of the vegetative and floriferous buds, the damaging of the inner bark - ligneous tissues from branches and trunk and sometimes the total destruction of trees. Consequently the trees grow weak, become sensitive to diseases and pests and the fruit production is partially or totally destroyed in the respective year and even in the next 2-3 years.

MATERIAL AND METHODS

The pronounced continental climate is specific to the NE area of Moldavia. The average annual temperature is 9,5° C, the lowest temperatures being registered in January with an average of – 17,3°C. The minimal temperatures reach sometimes -32°C, when they may affect the floriferous buds especially for apricot trees, peach trees and cherry trees.

The winter of 2006-2007 was an abnormal one. After a period poor in precipitations (53,7 mm in the months September-December), with temperatures exceeding 30°C (32,1°C on October 4th), there occurred the first frosts registered in October (-3°C on October 17th and -1°C October 31st). The beginning of the year 2007 was a warm one with positive temperatures in January (3,8°C on average) and February up to 22nd of February when they registered the first snow of winter followed by the abrupt decrease of temperature (-20,5°C) (table 1).

Table 1

Thermic and pluviometric conditions at Iasi between 1.10.2006-1.05.2007

Month	Monthly sum of rainfalls (mm)		Average temperature °C		Absolute minim temperature °C
	2006-2007	Normal	2006-2007	Normal	
October 2006	27,9	32,0	11,4	10,1	-4,7
November 2006	8,6	36,2	6,5	4,0	-4,5
December 2006	1,4	30,3	2,3	-0,9	-8,3
January 2007	26,5	29,4	3,8	-3,3	-9,9
February 2007	33,9	28,1	0,9	-1,5	-20,5
March 2007	33,4	29,2	7,5	3,1	-2,4
April 2007	23,0	44,8	10,6	10,3	1,2

As research material we used the trees from the experimental contest plantations for the breeds of apple trees, pear trees, quince trees, plum trees, apricot trees, cherry trees, sour cherry trees and walnuts. We analysed the unfavourable meteorological factors, the degree of damage for the trees that were during their fruit-bearing period as well as the manner in which the trees recovered in the period of vegetation from 2007.

RESULTS AND DISCUSSIONS

The fruit-growing breeds under study behave differently this year in terms of frost resistance.

The seedy breeds (apple trees, pear trees, quince trees) that can bear temperatures between -26-35°C, were not affected. Surprisingly, the plum trees that can resist in normal conditions to minimum temperatures of -32 -38°C, were the ones that suffered a lot this

year. Otherwise, A. Negrilă, 1980 warns that the plum trees are more sensitive than apple trees at low temperatures during winter and that some breeds, having a short winter rest, are very sensitive to low temperatures from January-February.

In the winter of 2007, with positive oscillating temperatures and high amplitudes when frost occurred abruptly after a warm interval, it affected the reproductive organs of buds for some breeds in proportion of 90-100%. For the plum trees, all the hybrids B.N.68, B.N. 5-125-5 and B.N 61-4 and the breeds Joris plum, Prezident, Valor and Carpatin. Soiurile Centenar, Blue free, Stanley, Superb, Dâmbovița, Tuleu gras, Silvia and the hybrid B.N 7-237-7 were affected in proportion of 91-99%. The breed Minerva registered a damage percentage of 90% being the only breed where they harvested fruits but the production was still low (3,5 kg/tree). In the production plantations, they registered damages of 100% of the reproductive organs of buds from the breeds Agen, Vinete românești and Renclod Althan.

The breeds of apricot and peach trees, whose the floriferous buds were the most sensitive to temperatures of -12-14°C were destroyed during their pheno-phase of bud swelling and the temperature of -20°C caused the total destruction of the fruit production.

The specialized literature shows that the cherry trees resist to low temperatures depending on the breed, the stage of development, the vegetation phase, the level of nutrition and health of trees. Large oscillations are registered within the breed depending on the geographical origin of the breed (Breon 1980).

In a decreasing order in terms of need for warmth the fruit-growing breeds may be classified as follows: peach trees, apricot trees and almond trees, cherry trees and walnut trees, nut trees, plum trees, sour cherry trees and apple trees. The cherry trees are more sensitive than apple trees, pear trees, plum trees and quince trees. The most sensitive part of the floriferous buds in the period of rest is the pistil, at -20°C in the rest period the floriferous buds suffer registering losses of 65-75% for the early breeds and Boambe de Cotnari, Germersdorf and B. Napoleon and less for Hedelflinger, B. Donissen (1-6%).

In the conditions specific to this year, after registering a temperature of -20,5°C in the last decade of February, we sectioned the floriferous buds to determine their degree of damage. Most of the cherry breeds were not affected (Precoce dela Marca 21%, M. Fruhe 19%, Cetățuia 13%, Cătălina 11%). Exception made the breed Rivan (of Swedish origin) that was not at all affected. The fruit production registered in this year were lower than in the previous years but the determining factor was not the effect of the February frost but the excessive drought registered in April-June that caused an accentuated physiological fall of fruit, reduced quantities and an inferior quality of these.

The sour cherry trees, with modest claims for temperature resisted well to the February frost and did not register damages of the floriferous buds and still the fruit productions were small as compared to the previous years due to the severe drought from that year. In deep rest, the walnut trees resist to temperatures of -25-30°C. The conditions specific to the winter of 2007 caused severe damages to walnut trees. In some localities of the counties Iași, Botoșani and Vaslui, especially in the lower areas very many walnut trees dried off completely, but most often the lower third of the canopy was affected in proportion of 50-90%.

On the experimental plantation of walnut trees from SCDP Iași most of the walnut breeds registered damages consisting in the drying of the branches from the lower third of the canopy. Some breeds (Velnița, Bucium, Ciurea) had their aments totally affected whereas the breeds Germisara, Miroslava, Geoagiu 65 were affected in proportion of 35-50%. The female flowers were also affected, especially their stigma in proportion of 10-30%, a fact that led to the serious diminishing of the fruit production.

CONCLUSIONS

1. The winter of 2006/2007, with very low temperatures in the last decade of February, after a warm interval in December 2006, January and February 2007 was a good occasion to find out the behaviour of the fruit-growing breeds cultivated in the NE area of Moldavia in these unusual conditions.

2. In the fruit-growing plantations, as a consequence of the frosts from the last decade of February, we registered damages of the floriferous buds for the breeds of apricot, peach, plum, cherry and walnut, and even the total or partial drying of the walnut trees.

3. The breeds of apple, pear, quince and sour cherry trees were not affected by the frost from the winter of 2007.

4. The most serious damages were registered for apricot and peach trees whose production was completely destroyed.

5. The plum trees were strongly affected by the frost in proportion of 90-100%.

6. Damages were also registered for the cherry breeds especially for the breeds with early maturity of the floriferous buds (10-20%) and for the walnut trees by the total or partial drying and destruction of the male and female flowers, a fact that led to the diminishing of the fruit production (10-30%).

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