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THE INFLUENCE OF CLIMATE FACTORS FROM SANDY SOILS ON STARTING THE MAIN PHENOPHASES AT SPECIES PLUM CHERRY AND SOUR CHERRY DURING THE YEARS 2015-2017

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Abstract
Climate change in the sandy soil area in the three experimental years has been manifested by increasing the average air temperature that led to early spring installation. On the sandy soils of Dăbuleni were recorded maximum temperatures of 29.4°C in the second decade of April 2015 and 30.1-31.4^{0}C in the second decade of April in 2016, periods followed by days of rain that negatively affected the binding of fruits to plum, cherry and sour cherry. In these species phenophase of swelling buds and beginning bursting, starting in the last decade of March, in the sandy soil area of Dăbuleni, and the early phenophase starts in the second and third decades of April. Under the condition 2015, at species plum, the first variety that flourished was 'Stanley' (11 IV), followed by 'Carpatin' and 'Tuleu Gras', (12 IV) and the last variety 'Minerva' 14- IV). In 2016, 'Stanley' was the first variety to flourish. Swelling buds at cherry in year 2015, took place between 27-29- III, in 2016 between 29-30 IV and in 2017 between 29-31, the bursting being in the first decade of April in all the studied varieties. At sour cherry species in year 2015 swelling buds took place between 21-23- III, in 2016 between 24-26, and in 2017 between 25-27, the bursting being in the last decade of March in all the studied varieties.

Keywords: bursting, flowering, temperatures, varieties.

1. INTRODUCTION

In the conditions of Romania the most frequent abiotic stress factors are the low temperatures during the winter / spring period, but also the summer heat, hail, poor soil fertility and poor structure (bad aero-hydric regime), and the biocenotic attack diseases, pests and competing plants.
To browse characteristic phenophases, tree species need a certain amount of active temperature (active thermal balance). For example, for swelling of apple buds, depending on the variety, the sum of temperature ranges is 160-230 °C; for maturation of summer fruits 1200-1400 ^{0}C and 2800-3000^{0}C respectively for winter maturation (Ghena et al., 2004; Istrati, 2007, Roman and Ropan, 2008).
Global thermal balance of the air temperature is an important indicator both as an absolute value and as partial values at which triggering of the main phenophases occurs.
Plants feel the extreme, positive or negative temperatures, through several disrupted biologic processes that act as sensors (Ruelland and Zachowski, 2010), and the increase in the ambient temperature causes some cultures to expand their vegetation period (Falloon and Betts, 2009).

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The period of fruit growth differs from one species to another and even from one varieties to another. In June, witness a more intense fall in young fruit because of the trees' tendencies to self-adjust the size of the crop to their growing potential. When the number of fruit bound on the tree is lower, the fall in June can be prevented by suppressing the apical branches (the peak) that compete with them (for food and water) (Vătămanu, 2013).

When the temperature during blossoming is higher than 35^0C and the humidity is below 30 per cent, then, according to the studies done by Rasul in 2008, there is a correlation between the flowering period, the duration of the flowering and the fruit production.

2. MATERIAL AND METHOD

The study was carried out at SCDPN Dăbuleni during 2015-2017, on cherry species with four varieties: Kordia, Rivan, Roşii de Bistriţa, Boambe de Cotnari; sour cherry - four varieties: Tarina, Ilva, Meteor, Nana and plum with four varieties: Carpatin, Stanley, Minerva, Tuleu Gras, aiming to develop the main phenophases in the context of climatic changes on the sandy soils, and recording climatic data at the SCDCPN Dăbuleni weather station.

3. RESULTS AND DISCUSION

The fruit grows from the moment of their binding and last until maturation. The period of fruit growth differs from one species to another and even from one varieties to another. So, for the growth of cherries, only 45 days are necessary for some varieties, while for winter apple varieties, the growing period of fruits is extended to 150-160 days.

Fruits grow first in diameter and then in height. In June, we witness a more intense fall in young fruit due to the trees' tendencies to self-adjust the size of the harvest in relation to their growing potential.(Anconelli, et al, 2004)

When the number of fruit bound on the tree is lower, the fall in June can be prevented by suppressing the apical branches (the peak) that compete with them (for food and water). In drought conditions, some apple varieties crack and collapse, and the pear form many sclereides (petrified cells) in the pulp of the fruit.

By applying cuttings and renewal of productive wood, fewer fruits are retained on the fruit tree, which grow more and reach larger sizes (Vătămanu, 2013). Fruit maturation starts with the ripening phase and continues with the actual baking, realizing the taste qualities and the color specific to the variety. Table 1 presents the evolution of the main phenophases during the vegetation period, the plum, sour cherry and cherry species studied during 2015-2017.

The bursting and the beginning of shoots growth in these species begin in the last decade of March and are influenced by the temperature level and supply status of the trees with reserve substances. Generally, this phase is slow and ends when the first true leaf appears.

In 2015, swelling buds in the plum species took place between 17-23 III, 2016 between 21-27 III and 2017 between 22-26 III, bursting taking place in the last decade of March for all the varieties studied the three years. Under the conditions of 2015 the first variety that flourished was: 'Stanley' (11 IV), followed by 'Carpatin' and 'Tuleu Gras' (12 IV), and the last variety which blossoming was 'Minerva' (14- IV). In 2016, 'Stanley' was the first variety to flourish

In the sour cherry species, swelling buds in 2015 took place between 21-23- III, in 2016 between 24-26, and in 2017 between 25-27, the bursting being in the last decade of March for all the studied varieties. In the year 2015, the first variety that flourished was 'Țarina' (16 IV), followed by 'Nana' (19 IV) and the last varieties that flourished were 'Ilva' (20th-IV) Meteor '(21-IV). In 2016, the first variety that flourished was still 'Țarina' 21 IV (Table 1).

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In the evolution of growth and fructification phenophases, the observations made during the three years of study highlighted the fact that besides the genetic determinant of the variety, climatic conditions had a different influence. So, in the three years of experimentation (2015-2017), climatic conditions in 2015 contributed to a crossing of early phenophases of growth and fructification by about a week, compared to 2017.

In the cherry species in the year 2015 swelling buds took place between 27-29- III, 2016 between 29-30 and 2017 between 29-31, in the first decade of April in all the studied varieties. In 2015 the first varieties that flourished were: 'Kordia' (17 IV) and 'Rosi de Bistrita' (18 IV), and the last varieties that flourished were 'Boambe de Cotnari' (20th-4th) and 'Rivan' (20-IV). In 2016 the first variety that flourished was 'Kordia' 19 - IV (Table 1).

In these species, the phenophases of sweling buds and beginning bursting begin in the last decade of March, in the sandy soil area of Dăbuleni, and the phenophase of flowering begin in the second and third of April.

Table 1. Phenological observations to plum, sweet cherry and sour cherry species in period 2015-2017

Plum					
Variety	Sweling bud	Begining bursting	Early flowering	End flowering	Maturity of harvest
Carpatin	17 III-23 III	19 III-31III	12 IV-20 IV	19 IV-29 IV	9 VIII
Stanley(Witness)	19 III-22 III	25 III-29III	11 IV- 15 IV	18 IV- 23 IV	29VII
Minerva	21 III-25 III	25 III-30III	14 IV-20 IV	20 IV- 27 IV	30VII
Tuleu Gras	23 III-27III	28 III-2 IV	12 IV-20 IV	19 IV- 28IV	28VII
Cherry					
Variety	Sweling bud	Begining bursting	Early flowering	End flowering	Maturity of harvest
Kordia	27 III- 30 III	2 IV- 5 IV	17 IV- 20 IV	1V – 4 V	-
Boambe de Cotnari	29 III- 31 III	6 IV- 8 IV	20 IV- 22 IV	3 V – 5 V	25VI -26 VI
Roşii de Bistrița	28 III-29III	5 IV- 6 IV	18 IV- 20 IV	3 V – 5 V	-
Rivan (Witness)	28 III- 31 III	4 IV- 7 IV	20 IV -22 IV	2 V – 5 V	14 VI- 16 VI
Sour cherry					
Variety	Sweling bud	Begining bursting	Early flowering	End flowering	Maturity of harvest
Țarina	21 III- 25 III	26 III- 31III	16 IV – 22 IV	20 IV – 27 IV	12 VII
Ilva	23 III- 26 III	25 III- 29 III	20 IV -25 IV	25 IV – 30 IV	4VII
Meteor (Witness)	23 III- 27 III	25 III -30 III	21 IV – 28 IV	25 IV – 4 V	11 VII
Nana	23 III – 26 III	26 III – 29 III	19 IV- 25 IV	24 IV- 30 IV	3 VII

These species are less affected by late spring smattering (as happened in 2016), but can be greatly influenced by the steadily rising temperatures.

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The optimal temperature for pollen germination in fruit trees is between 22^0C and 27^0C, a temperature that is very rare in nature during April, when most of the fruit species in our country practically bloom after its statements (Baciu, 2005)

On the sandy soils of Dăbuleni were recorded maximum temperatures of 29.4^0C in the second decade of April 2015 and 30.1-31.4^0C in the second decade of April in 2016, of days with rain that negatively affected the binding of fruits to these species. Pollination is affected by these climatic conditions, resulting the abortion of flowers, the qualitative deterioration of the fruits (deformation) and the decrease productivity.

Tudor, 1989 following research on a collection of fifteen sour cherry varieties also showed that low temperatures with smattering and frosts of -2.2^0C and -3.6^0C, with rainy and cold days, affected a part of the flowers open and prevented the process of pollination and binding of flowers. In such conditions they suffer especially self steril varieties which bind a smaller number of flowers.

4. CONCLUSION

1. In year 2015, at plum species, begining flowering and the end of flowering took place at the earliest, and in the three experimental years the "Stanley" witness was the earliest.
2. The maximum temperatures of 29.4°C in the second decade of April 2015 and 30.1-31.4°C all in the second half of April in 2016, negatively affected the binding of fruits to plum, cherry, and sour cherry.
3. Plum, cherry and sour cherry species are less affected by late spring smattering but can be greatly influenced by steadily rising temperatures, so the climatic conditions of 2015, contributed to a crossing of early growth and fructification phenophases by about a week compared to 2017.
4. At fruit trees, plum, cherry and sour cherry on the sandy soils, phenophases of swelling buds and begining bursting begin in the last decade of March, and the flowering phenophase starts in the second and third decades of April.

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