

# The influence of climate factors from sandy soils on starting the main phenophases at species apricot during the years 2015-2017

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**Abstract** Climate change in the area of sandy soil in the three experimental years has been manifested by the increase in the average air temperature that led to an earlier spring.

At the apricot, the crossing phenophases are very alert, first the flowers appear and then the leaves. The specialized literature indicates a 6-6.5°C biological threshold for entering in vegetation, and in the sandy soil conditions at Dăbuleni, between 2015-2017 this threshold was between 9,6-11,3°C.

Swelling buds in apricot in 2015 took place between 18-20. III in 2016 between 19-23. III, and 2017 between 20-24. III. It can be noticed that from year to year the swelling bud period increased by up to 4 days.

During the flowering period in year 2016 there were smattering and frosts (temperatures of -3,10°C), which affected a part of the open flowers and prevented the process of pollination and binding of the flowers. Blooming phenophase took place during April all the three years, the earliest year being 2015, and at the latest 2017. The witness variety 'Olimp' is the latest variety, the flowering period of this variety takes place between April 10 and April 30. Compared to this variety, the first varieties that flourished were: 'Fortuna', 'Goldrich', 'Cristal', 'Auras' (2-3-IV).

## Key words

Swelling buds, low temperature, phenology, varieties

Temperature affects the development of buds, roots, branches, the exiting buds of dormancy period and their following evolution. Each fruit species has a certain biological threshold, and its value is: 8.0 °C apple, 7,5-8,0°C to pear, 6-6,5°C to apricot, 6,5-7°C to peach, 5°C to almond, 8°C to cherry, 10°C to walnut, 1-2°C to goosberry and 5°C to strawberry (6, 11).

Starting in apricot vegetation is marked by swelling buds, a phenomenon observed after several days with average temperatures of 5-7°C. The optimum temperature for pollen germination in fruit trees is between 22°C and 27°C, which is very rare in nature during April, when most of the fruit species in our country practically flourish (2).

Frostbite the buds at certain species is the most commonly encountered damage in the winter conditions in our country. Vegetative buds rarely frost, being more resistant. Flowering buds are easier to frost, because they have a shorter rest period and come out of this state faster, which is affected both during winters, excessive frosts and early spring when the trees have lost their hardening condition (1).

Global warming has positive or negative effects on plant growth and fructification. Information on the effects of global warming was presented in the works written by to certain authors: (1, 3, 4, 5, 6). The

elevated temperature together with excess solar radiation influences the content of gluation in the skin of the fruit (7), also the pollination is affected, resulting in the qualitative degradation of the fruit (deformation) and the decrease in productivity (3, 9).

Fruit maturation is influenced by temperature and precipitation in the pre-floral and post-floral period, and a mathematical model can be created according to these (8). High temperature degrades the period it is viable, thus shortening the days at high risk of pollen allergies (10).

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) (13).

Plants feel extreme, positive or negative temperatures, through more disrupted biological processes that work like sensors, but it seems that not all sensors work at the same time, some react promptly, while others need more time to activate (12). Increasing the temperature of the environment causes some cultures to extend their vegetation period (5).

## Material and Method

The study was done at SCDCPN Dăbuleni between 2015 and 2017, on the species apricot, at varieties: Fortuna, Dacia Goldrich, Harcot, Amiral, Mamaia, Olimp, Augustin, Histria, Cristal, Auras, Euxin, Ceres, Orizont. The apricot plantation was established in 2009 at planting distances of 4/4 m, with a density of 1242 trees per hectare, being grafted on the apricot.

Observations and determinations were made on:

- the main phenophases of vegetation in the context of climate change on sandy soils; swelling buds, bursting,

flowering, and fruits maturation.

- recording climatic data at the SCDCPN Dăbuleni weather station.

## Results and Discussions

Swelling buds in apricot in 2015 took place between 18-20. III in 2016 between 19-23. III, and 2017 between 20-24. III. It can be noticed that from year to year the swelling bud period increased by up to 4 days. (Figure 1 a, b).



a



b

Fig. 1 (a, b) -Bursting and full flowering to apricot species

Between the calendar date of swelling buds in the three years of study in the fourteen varieties was fixed correlations given by polynomial equations, with

significant correlation factors ( $r=0.80^{**}$ ) in 2015 and insignificant for the years 2016 and 2017 (Figure 2).

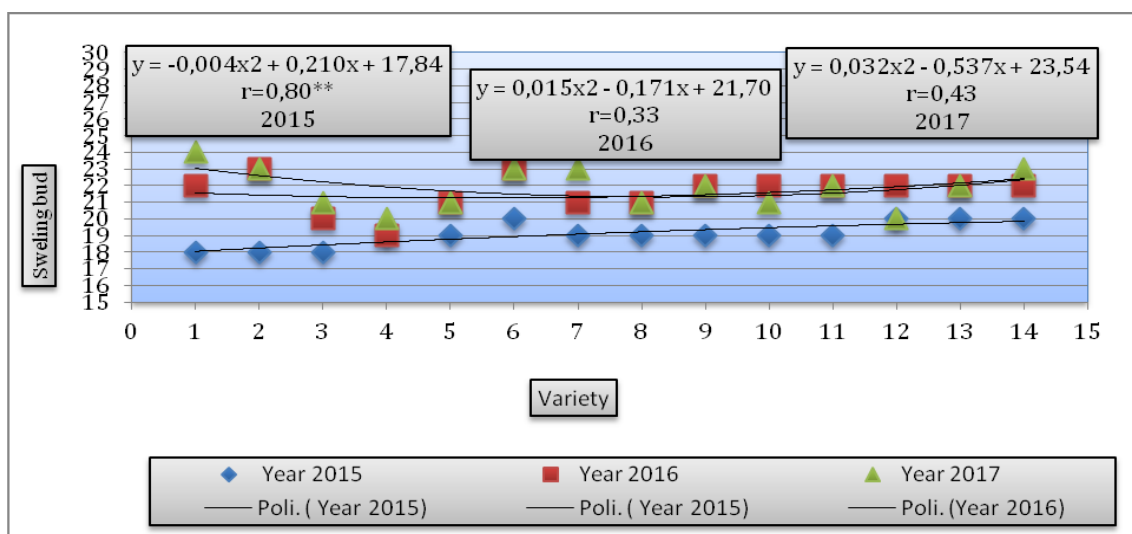


Fig. 2 Correlation between swelling buds date in period 2015-2017 to fourteen apricot varieties

If we analyze the monthly average temperatures of the rest period in the three years of study from the data presented in figure 3, it can be noticed that only in 2015 the average air temperature

showed a continuous increase from January to March. In 2016 and 2017, the average air temperature reported negative values in January, after which it showed accelerated increases in the coming months.

Table 1

*Phenological observations at apricot varieties in years 2015-2017*

Variety	Swelling buds			Begining bursting			Early flowering			End flowering			Maturity of harvest		
	2015	2016	2017	2015	2016	2017	2015	2016	2017	2015	2016	2017	2015	2016	2017
Fortuna	18-III	22-III	24-III	22-III	26-III	28-III	2-IV	6-IV	8-IV	12-IV	20-IV	22-IV	12-VI	-	13 VI
Dacia	18-III	23-III	23-III	24-III	29-III	29-III	5-IV	10-IV	10-IV	13-IV	20-IV	20-IV	1-VII	-	2 VII
Goldrich	18-III	20-III	21-III	22-III	24-III	25-III	2-IV	4-IV	5-IV	11-IV	15-IV	16-IV	2-VII	-	2VII
Harcot	19-III	19-III	20-III	24-III	25-III	26-III	3-IV	4-IV	5-IV	13-IV	15-IV	16-IV	24-VI	-	23VI
Amiral	19-III	21-III	21-III	23-III	25-III	25-III	9-IV	11-IV	11-IV	17-IV	21-IV	21-IV	20-VI	-	20 VI
Mamaia	20-III	23-III	23-III	23-III	27-III	27-III	5-IV	10-IV	10-IV	16-IV	23-IV	23-IV	13-VII	-	13 VII
Olimp(Witness)	19-III	21-III	23-III	23-III	25-III	27-III	10-IV	18-IV	20-IV	19-IV	28-IV	30-IV	25-VII	-	23 VII
Augustin	19-III	21-III	21-III	23-III	25-III	25-III	5-IV	8-IV	8-IV	16-IV	21-IV	21-IV	27-VII	-	26 VII
Histria	19-III	22-III	22-III	23-III	27-III	27-III	10-IV	15-IV	15-IV	19-IV	26-IV	26-IV	1-VIII	-	1 VIII
Cristal	19-III	22-III	21-III	22-III	26-III	25-III	2-IV	8-IV	7-IV	11-IV	18-IV	17-IV	19-VI	-	17 VI
Auraş	19-III	22-III	22-III	22-III	25-III	25-III	3-IV	7-IV	7-IV	11-IV	17-IV	17-IV	17-VI	-	17 VI
Euxin	20-III	22-III	20-III	23-III	26-III	24-III	9-IV	14-IV	12-IV	18-IV	25-IV	23-IV	29-VII	-	27 VII
Ceres	20-III	22-III	22-III	24-III	26-III	26-III	5-IV	9-IV	9-IV	15-IV	21-IV	21-IV	21-VI	-	21 VI
Orizont	20-III	22-III	23-III	24-III	26-III	27-III	7-IV	10-IV	11-IV	16-IV	21-IV	22-IV	10-VII	-	10 VII

The apricot has periods of short vegetation, early flowering, rapid crossing of spring phenophases and early maturation of fruits. Under the conditions of 2015 the first varieties that flourished were: 'Fortuna', 'Goldrich', 'Cristal', 'Auras' (2-3-IV), and the last

varieties were 'Histria' and 'Olimp' -IV). In 2016, the first varieties that flourished were: 'Goldrich' and 'Harcot' (4-IV), followed by Fortuna (6 IV), 'Cristal' (8 IV), 'Auras' and the last varieties were 'Olimp' (18 IV) and 'Histria' 15 (IV).

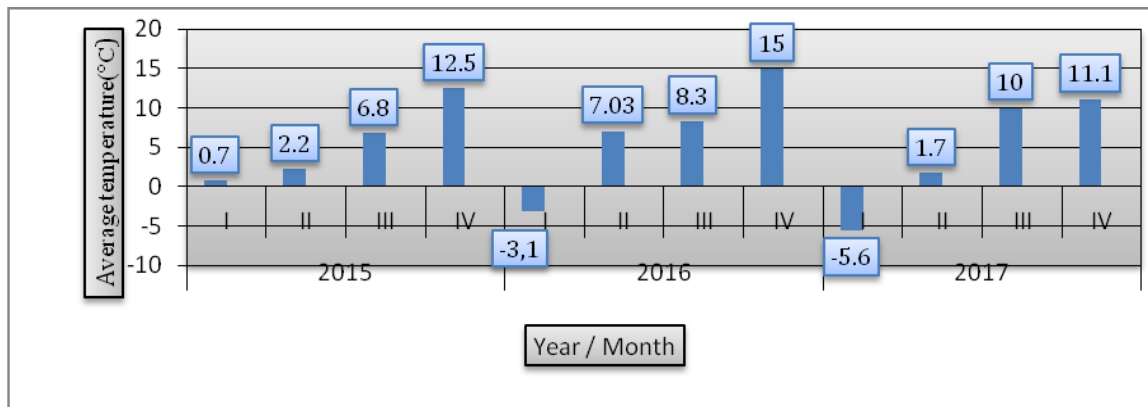


Fig. 3 Average air temperature between January and April during the period 2015-2017

Flowering is also directly dependent on temperature. If colder periods occur, flowering is extended, and if the time warms up, the succession rate

of the stages is accelerating. Blooming phenophase took place during april in all three years. The earliest year was 2015, and at the latest 2017 (Figure 3).

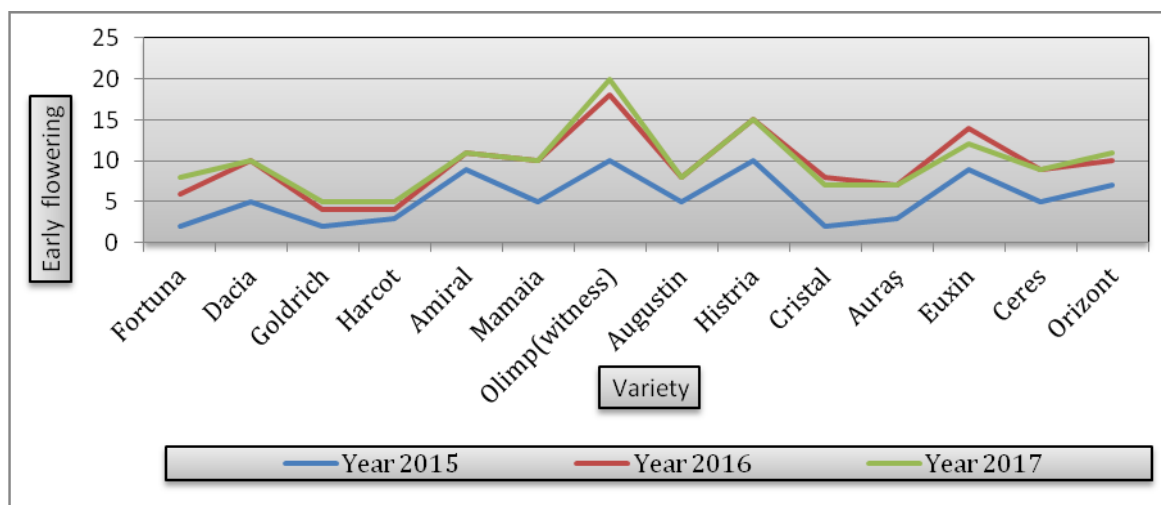
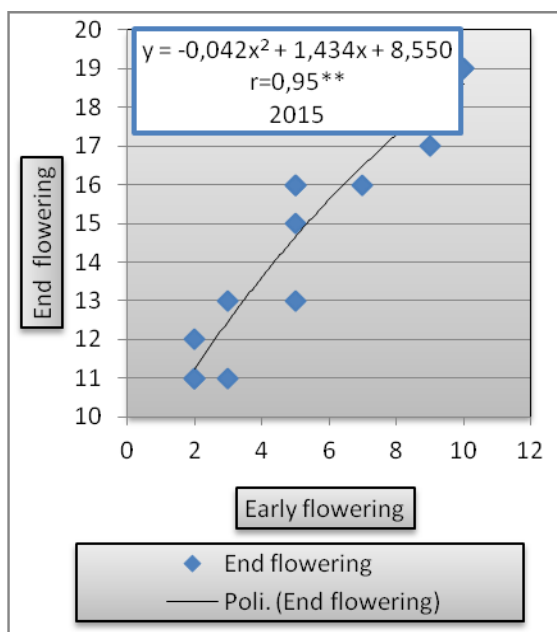


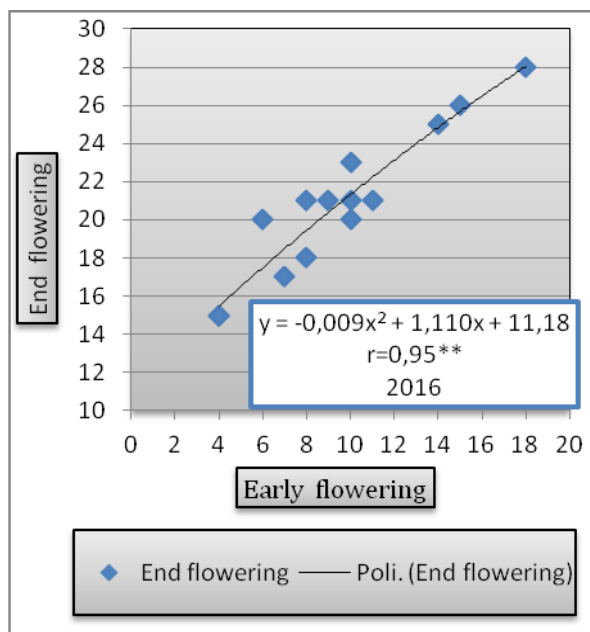
Fig. 4 Flowering phenophase to apricot species in tree years of study

Compared to the 'Olimp' witness, all other varieties flourished earlier. The 'Olimp' variety is the latest variety, both the beginning flowering and the end of flowering are very late. Between the two phenophases of flowering (beginning and the end of

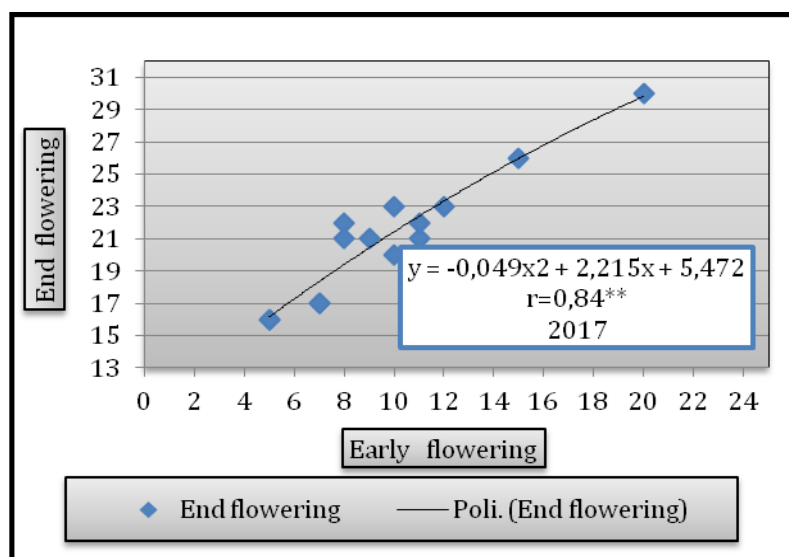
flowering), correlations of polynomial equations with significant correlation factors were found but which decrease from 0,95 in 2015 to 0,84 in 2017 (Figure 5 a, b, c).



a



b



c

Fig. 5 (a,b,c) Correlation between flowering phenophase to species apricot in period 2015-2017

At once with the starting fructification phenophases, apricot may be affected to a lesser or greater extent by negative temperatures, particularly in the flowering phenophase.

Due to the increase in air temperature, this species enter much faster in vegetation and can be

affected by the late smattering and frost spring. During the flowering period in 2016 there were smattering and frosts (temperatures of  $-3.1^{\circ}\text{C}$ ), which affected part of the open flowers and prevented the process of pollination and binding of flowers (Figure 6).



Fig. 6 Effect of smattering phenomenon to apricot species

## Conclusions

1. The swelling buds at apricot in 2015 took place between 18-20 in 2016 between 19-23. III, and 2017 between 20-24. III, and bursting in the last decade of March in all the varieties studied.
2. The average air temperature in 2015 showed a steady increase from January to March, and in 2016 and 2017 it showed negative values in January, followed by accelerated increases in next months.
3. In the three years of experimentation (2015-2017), climatic conditions in 2015 went a crossing of early phenophases of growth and fructification by about a week, compared to 2017.
4. In conditions year 2015 the first varieties that flourished were: 'Fortuna', 'Goldrich', 'Cristal', 'Auras' (2-3-IV), and the last varieties were 'Histria' and 'Olimp' –(IV).

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