

## PRELIMINARY RESEARCH ON THE INFLUENCE OF THE PLANTING TIME ON THE GROWING AND BLOOMING OF VARIETY OF HERBACEOUS PEONY IN THE FIELD

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### Abstract

The present paper refers to the results of the research on the influence of the different planting times of some varieties of herbaceous peony in the field on the blooming and growing. The research was performed in the experimental field of USAMV Bucharest and in the town of Singureni, Giurgiu County. The studies made are based on the data obtained both by visual observation and by biometric measurements on the varieties of herbaceous peony. The biologic material was represented by a variety of herbaceous peony with white flowers, with pink flowers and with red flowers. The data was processed in the following indicators: growth stages (emergence, springing, percentage of shoots starting vegetation, percentage of springs, vegetation rest) and blooming stages (percentage of flower springs, appearance of buds, stages of blooming, percentage of blooming) as well as the dynamics of growth and blooming. There were results related both to the growth and blooming stages and to the dynamics of the growth and blooming.

**Key words:** blooming, growth, herbaceous peony, planning times.

### INTRODUCTION

The peony is native of Europe, Asia and America. The peony grows spontaneously in numerous countries with temperate climate in the Northern hemisphere. Peonies are perennial ornamental plants of the genus *Paeonia*, pertaining to the family of *Paeoniaceae* and it consists of 33 species (Rogers, 1996).

The herbaceous peonies are grown mainly for the use in horticultural industry like a home garden plant and also, the peonies are commercially grown as cut flowers. Peonies are, also cultivated for their medicinal properties (Dong-Yi et al., 2011) and even for their use as ornamental plants (Nehrlingand, 1978).

The research made by Cucu et al.(2009) on the study of the behaviour in crop of some species and the growing of the peony in the southern part of Romania, under the influence of local climate factors.

The study started with the plants coming at rest in the autumn of 2005. It was observed that the first signs of senescence are given away by the species *Paeonia officinalis* L. and its growing (late August), followed closely by the species

*Paeonia peregrina* Miller and *Paeonia mollis* Hort., as well as the herbaceous hybrids. The species *Paeonia lactiflora* Pallas and its growing are the last to come at rest on the ecologic conditions of the area, as well as the *Itoh* hybrids.

At the same time, the crops of the species *Paeonia lactiflora* Pallas became remarkable by the decorative colour of the foliar apparatus, especially 'Rosy Down' and 'Auguste Dessert'. In a research study published in 2002 by Barzilay et al., with the topic *The annual life cycle and flower development of 'Sarah Bernhardt' under the conditions of Israel*, they present the life cycle and the morphogenesis of the floral sprouts of *Paeonia lactiflora* Pallas. The cultivar 'Sarah Bernhardt' was studied on the conditions of Israeli climate.

The formation of the buds starts at the beginning of spring. The stems grow rapidly and they reach heights of 50-70 cm in 60-70 days. The flowering starts in April and it continues until the end of May. After the flowering, the stem remains green until September-October, when the leaves age and the plant comes at vegetation rest for 3-4 months.

Toma (2009) mentions that the herbaceous species of peony reproduce by the division of the bush, operation made by the mature plants, at the age of 4-5 years. After part of the soil is removed from the roots, the mother plants are cut by hand or with a very sharp knife in 3-6 parts, depending on the size of the mother plant.

After the division, the very large leaves are shortened to 2-3 foils in order to assure a good reproduction of the plants. The plant divisions will be put in planting holes, after mudding the roots, so that the area of the collar is covered with 2-3 cm of soil (Cantor, 2016). Deeper planting results in the delay and the diminishing of the flower or even its compromise for the next 2-3 years from the planting (Toma, 2009).

Peonies need a long period of cold of at least 900 hours around or under the freezing point (Jacob et al., 2006), in order to pass through the rest period and start the vegetation in the next season. In case the temperature does not drop enough, the peonies will fail to make flowers.

## MATERIALS AND METHODS

The planting material used in the research was constituted of herbaceous peony with white flowers, with red flowers and with pink flowers. The varieties of peonies were planted both at USAMV Bucharest and in Singureni in 3 planting times, this resulting 9 variants.

The planting was made with plants coming from 3-4 years old bushes and 7 years old bushes as divided and undivided bushes (Figures 1-4). The planting occurred in the autumn of 2016 at USAMV Bucharest and at Singureni. The data was processed using the biometric measurements and the visual observations made during 2017.

The indicators used in the study of the research were: start of vegetation, the appearance of shoots, the senescence, the appearance of the sprouts, the percentage of shoots, the percentage of flowering shoots, the phenophases of growth and flowering, the dynamics of growth and flowering, the earliness of the flowers and the flowering percentage.

The experimental variants, the cultivar the plating dates and the features of the planting materials are given in Table 1.

Table 1. Experimental variants

Variant	Cultivar	Date of planting	Type of material	Number of sprouts min/ max	Diameter of the ballot of the roots min/ max (cm)
V1	Cultivar with pink flowers in the collection USAMVB	05.11.2016	Divided bushes	1 - 7	2 - 16
V2	Cultivar with pink flowers in the collection USAMVB	14.11.2016	Divided bushes	2 - 16	5 - 21
V3	Cultivar with pink flowers in SINGURENI	05.11.2016	Divided bushes	4 - 9	8 - 15
V4	Cultivar with pink flowers SINGURENI	14.11.2016	Undivided bushes	8 - 24	20 - 27
V5	Cultivar with pink flowers in SINGURENI	25.11.2016	Divided bushes	2 - 14	6 - 17
V6	Cultivar with pink flowers in SINGURENI	25.11.2016	Undivided bushes	9 - 16	22 - 27
V7	Cultivar with white flowers in SINGURENI	05.11.2016	Divided bushes	4 - 9	9 - 15
V8	Cultivar with white flowers SINGURENI	14.11.2016	Divided bushes	3 - 12	5 - 14
V9	Cultivar with red flowers in the collection USAMVB	05.11.2016	Divided bushes	5 - 13	5 - 16



Figure 1. Undivided bushes, pink cultivar in Singureni



Figure 2. Divided bushes, white cultivar in Singureni



Figure 3. Divided bushes, pink cultivar in Singureni



Figure 4. Divided bushes, red and pink cultivar in USAMV Bucharest

## RESULTS AND DISCUSSIONS

The obtained results as far as the phenophases of growth of the varieties of herbaceous peony studied were made by the measurement of the following indicators: date of appearance of the sprouts, end or appearance of the sprouts', appearance of the shoots and the end of the growth of the shoots.

When starting the vegetation, the following results were obtained: early start in the variants V6, V7 and V8 and late starts in the variants V2, V4, V5 and V9 according to figure 5. In the early appearance of the shoots, the variants V6, V7 and V8 stood out, and in the late appearance, the variants V2, V4, V5 and V9.

In her research Barzilay et al. (2002) at the 'Sarah Bernhardt' peony cultivar, she shows that on the conditions of Israeli climate the formation of the buds starts at the beginning of spring.

In Figures 6 and 7 it is observed the appearance of the sprouts in the two locations of the research on 2017, and in Figures 8 and 9 it is

presented the growth of the shoots with the late start of sprouts.

The growth of shoots in the two research locations of the varieties of herbaceous peony studies is presented in Figures 10-13.

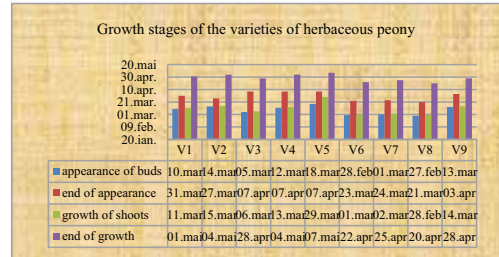


Figure 5. Stages of growth of the varieties of herbaceous peony planted in the field in 2017



Figure 6. Appearance of sprouts in the herbaceous peony, 2017



Figure 7. Start of vegetation in the varieties of herbaceous peony at USAMV Bucharest, 2017



Figure 8. Start of vegetation and the growth of shoots, pink cultivar of Singureni, 2017



Figure 11. Growth of shoots, white and pink cultivar of Singureni, 2017



Figure 9. Appearance of the sprouts and of the shoots in white cultivar of Singureni, 2017



Figure 12. Aspect of the bush and shoots, pink cultivar of Singureni, undivided bushes, 2017



Figure 10. Growth of shoots in the varieties of herbaceous peony planted in USAMV Bucharest, 2017



Figure 13. Aspect of the shoots towards the end of growth, pink cultivar of Singureni, 2017

Researching the stages of growth and flowering, the following indicators were analysed: percentage of vegetation start, percentage of shoots, percentage of flower shoots, percentage of plants with floral shoots, percentage of plants with blooming floral shoots and the blooming percentage.

The percentage of vegetation start in all the variants is 50%, the same with the percentage of shoots. The percentage of flower shoots was in two variants under 50%, and the rest above 50%. As far as the percentage of plants with floral shoots, the obtained results being under 100% in two variants and 100% in the others.

The blooming percentage was under 50% in variants V1, V2, V4, V5, V6, V7, and above 50% in variants V3, V8 and V9. The results are given in Figure 14.

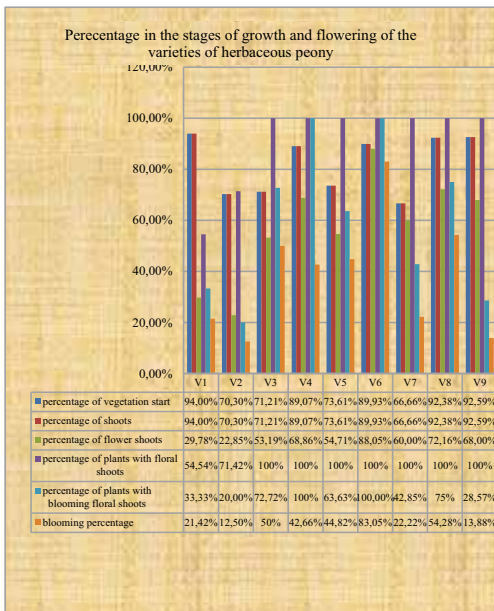


Figure 14. Percentage of growth and flowering in the varieties of herbaceous peony planted in the field, 2017

The aspect of the mass flowering of the varieties of herbaceous peony is presented in Figures 15 and 16. In Figures 17 and 18 are given the plants of herbaceous peony with floral shoots. Figure 19 presents the aspect of the flower in the cultivar of peony with pink flowers in USAMV Bucharest.



Figure 15. Aspect of flowering in pink cultivar at USAMV Bucharest, May 24, 2017



Figure 16. Aspect of flowering in white cultivar Singureni, May 24, 2017



Figure 17. Floral shoots in pink cultivar in Singureni, May 28, 2017



Figure 18. Floral shoots in pink cultivar at USAMV Bucharest, May 15, 2017



Figure 19. Aspect of flowering in pink cultivar USAMV Bucharest, May 24, 2017

We went on to analyse also the number of shoots in the varieties of herbaceous peony studied in the indicators: total shoots, total floral shoots and total flowering floral shoots. The number of shoots in the variants of divided bushes was a minimum of 35 in V2 and a maximum 97 in V8, and in the variants with undivided bushes they were 67 in V6 and 106 in V4.

The minimum number of floral shoots was in V2 and the maximum in V8 and V4. The minimum number of flowering floral shoots was in V2, and the maximum in V6. The obtained results are given in figure 20.

Figures 21 and 22 present shoots of peony before the flowering with semi-open buds in the two research locations.

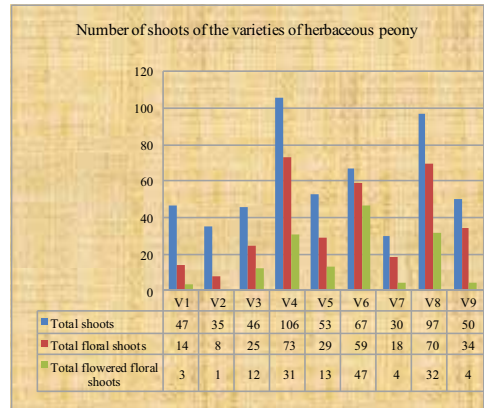


Figure 20. Number and types of shoots of the varieties of herbaceous peony planted in the field, 2017



Figure 21. Start of flowering in the white cultivar in Singureni, 16.05.2017



Figure 22. Floral shoots in the red cultivar USAMV Bucharest, May 10, 2017

The early emergence of the bud appeared in variants V6, V7 and V8 and the late emergence in variants V2, V3, V5, and V9.

The closed bud phase May 4 in V6, May 10 in V8, May 12 in V3, May 13 in V5, V7 and V9, May 15 in V1, V2, V4.

The opening of the flower emerged in May 10 in V6, May 15 in V8, May 17 in V3, V5; May

18 in V7 and V9; May 19 in V1 and May 20 in V2.

The end of blooming occurred on May 25 in V8; May 27 in V6; May 30 in V5; June 2 in V3 and V7; June 4 in V2; June 5 in V4 and V9; June 6 in V1.

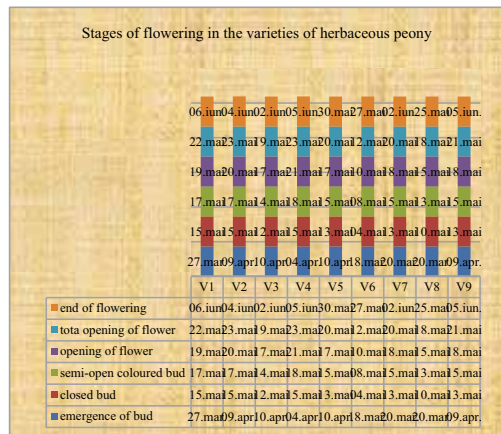


Figure 23. Stages of flowering in the varieties of herbaceous peony planted in the field, 2017

Figures 24-28 present the aspects of flowering and flowers of varieties of herbaceous peony in 2017.



Figure 24. Aspect of flowering in the red cultivar USAMV Bucharest, May 24, 2017



Figure 25. Red cultivar flowered in USAMV Bucharest, May 2017



Figure 26. Pink cultivar flowered in USAMV Bucharest, May 2017



Figure 27. Aspect of flowering in the red cultivar USAMV Bucharest, May 24, 2017

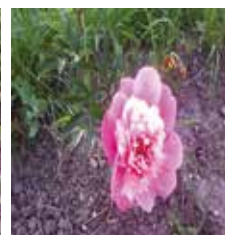


Figure 28. Aspect of flowering in the pink cultivar USAMV Bucharest, May 24, 2017

Analysing the duration of the stages of growth and flowering of the varieties of herbaceous peony, it was observed that the shortest duration of budding was in variants V2, V5 and V9, and the longest in variant V3. The duration of flowering was of 13 days in V5 and V8, 14 days in V4 and V7, 15 days in V2, V3, V6, and 17 days in V1 and V9 (Figure 29).

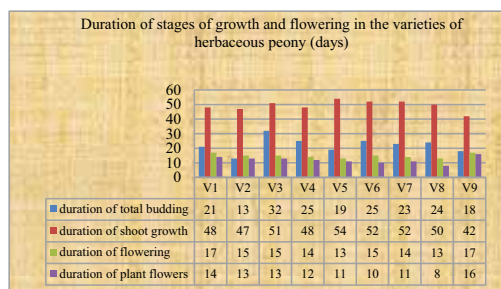


Figure 29. The duration of stages of growth and flowering in the varieties of herbaceous peony planted in the field, 2017

Figures 30-38 present the aspect of flowering and the aspect of the flower in the cultivars of herbaceous peony with pink flowers in

USAMV Bucharest, with pink flowers in Singureni and with white flowers in Singureni.



Figure 30. Aspect of flower, pink cultivar USAMV Bucharest, May 24, 2017



Figure 31. Aspect of flower, pink cultivar USAMV Bucharest, May 24, 2017



Figure 32. Aspect of flower, pink cultivar Singureni, May 24, 2017



Figure 33. Aspect of flower, pink cultivar Singureni, May 18, 2017



Figure 34. Aspect of flower, white cultivar Singureni, May 20, 2017



Figure 35. Aspect of flower, white cultivar Singureni, May 20, 2017





Figure 36. Aspect of flower, white cultivar Singureni, May 22, 2017



Figure 37. Aspect of flower, pink cultivar Singureni, May 20, 2017

As far as the dynamics of the growth and of the inflorescence of the types of studies herbaceous peony, the indicators in Table 2 were analysed. The short vegetation was observed for the variants V1, V6, V7 and V9, and a longer vegetation period was observed in variants V2, V3, V4, V5 and V8.

Table 2. The dynamics of growth and flowering in the varieties of herbaceous peony planted in the field, 2017

Variant	Sprouting	Shooting	Budding	Blooming	End of blooming	End of vegetation
V1	10.03	13.03	27.03	19.05	06.06	III October
V2	01.03	03.03	20.03	18.05	02.06	I November
V3	05.03	07.03	10.04	17.05	02.06	I November
V4	12.03	16.03	04.04	21.05	05.06	I November
V5	18.03	21.03	10.04	17.05	30.05	I November
V6	14.03	17.03	09.04	20.05	04.06	III October
V7	13.03	16.03	09.04	18.05	05.06	III October
V8	27.02	01.03	20.03	15.05	25.05	I November
V9	28.02	01.03	18.03	10.05	27.05	III October



Figure 38. Total opening of the flowers and the aspect of the flowering in the pink cultivar in Singureni, May 24, 2017

## CONCLUSIONS

The research made shows that some varieties of herbaceous peony may be planted in a period different from August or September, increasing thus the planting period in autumn of the herbaceous peony. This research came to the following conclusions:

The percentage of the start of vegetation in all the variants was over 50%, respectively 66.66% in the cultivar with white flowers in Singureni by 94% in the cultivar with pink flowers in the collection USAMV Bucharest.

The percentage of shoots is the same with the percentage of start of vegetation.

The percentage of floral shoots in two variants was under 50% respectively in the cultivar with pink flowers in the collection of USAMV Bucharest cu 29.78% and 22.85%, and the rest of the variants is over 50%, starting with the variety with pink flowers in Singureni with 53.19% by 88.05% in the cultivar with red flowers in the collection of UASVM Bucharest.

The percentage of plants with floral shoots is over 50% in all the variants, of which two variants with 54.54% and 71.42% in the cultivar with pink flowers in the collection of USAMV Bucharest and the rest of 7 variants of 100% respectively in the cultivars with white flowers in Singureni, with red flowers in the collection of USAMV Bucharest and with pink flowers in Singureni.

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