

## FLOWERING OF *HEUCHERA* L. CULTIVATED IN FULL SUNLIGHT AND IN SEMI-SHADE

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### Abstract

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Observation of flowering four taxa of *Heuchera micrantha* 'Palace Purple', *Heuchera* × *brizoides* 'Cappucino', *Heuchera* × *brizoides* 'Plum Pudding' and *Heuchera sanguinea* 'Leuchtkäfer' cultivated in the ground in spacing 40x40cm either in the full sunlight or in the semi-shadow was conducted. Observations of flowering were conducted by two years. To assess the flowering dates were recorded to various stages of development: early flowering, full flowering and late flowering. Flowering of *Heucheras* was dependent upon the species, the place of cultivation and the year of cultivation. In the second year of cultivation all plants cultivated in the full sunlight formed more inflorescences while in the third year of cultivation more inflorescences were observed in two taxons: *Heuchera* × *brizoides* 'Plum Pudding' and in *Heuchera sanguinea* 'Leuchtkäfer'. *Heucheras* cultivated in the semi-shadow formed longer inflorescence peduncles except for *Heuchera* × *brizoides* 'Cappucino' whose peduncles did not differ significantly regardless of the place of cultivation.

**Key words:** perennials, *Heuchera*, position of cultivation, flowering, semi-shade, full-sunlight

### Introduction

Detailed observations of garden perennials and especially their classification according to the length and abundance of flowering make it possible to select the species that would provide ornamental value of the composition during the whole season (Berkan and Bernaciak, 1970; Hellwig, 1978; Pogroszewska and Nazarewicz, 1998). Flowering of plants is a dynamic process and a vast majority of perennials form inflorescences characterised by a relatively short longevity of a single flower. However, one must bear in mind that with the large number of flowers the blooming period lasts for a relatively long time (Marcinkowski and Raducka-Mynett, 1976/77; Marcinkowski, 1978).

### Materials and Methods

The following plants were selected for the study: *Heuchera micrantha* 'Palace Purple', *Heuchera* × *brizoides* 'Cappucino' and 'Plum Pudding', and *Heuchera sanguinea* 'Leuchtkäfer'. Young plants were planted in the ground in either the full sunlight or in the semi-shadow. The semi-

shadow site was created by putting up screens made from nursery net at the height of 200 cm, limiting the sunlight by about 40%. Plants were grown at the spacing of 40x40 cm, in 3 replications formed out of 4 plants. In the first year of cultivation the plants did not bloom. Observation of flowering was conducted in the second (2005) and the third (2006) year after planting *Heucheras* into the ground. In order to assess flowering the times of particular stages: the beginning of the flowering period - the emergence of first fully developed flowers on the inflorescence, the full blooming period - fully developed flowers up to the half of the inflorescence, and finally, the end of the blooming period - withered flowers on all inflorescences were recorded. The beginning date of the mentioned above stages was assumed the day on which most plants under examination exhibited the features described for the particular stage. The length of the blooming period expressed as the number of days from the beginning up to the end of flowering was calculated. Also the number of inflorescences on each plant was assessed during the whole blooming period. During the full blooming period the length of peduncles (cm) from their base to the top of the inflorescence in five inflorescences was measured.

Statistical analysis was conducted separately for each taxon. When statistically significant differences were observed the means were grouped with the use of Duncan test at the significance level of  $\alpha=0.05$ .

## Results and Discussion

The blooming period of *Heuchera* (depending on the species) according to Łukasiewicz (1967) begins either in May or in June. Examined *Heuchera* × *brizoides* cultivars began to bloom in the second year of cultivation towards the end of May - similarly as in the experiment conducted by Krzymińska and Lisiecka (2004). In the conducted experiment the blooming of *Heucheras* was dependent upon the taxon, the site and the year of cultivation. *Heuchera sanguinea* 'Leuchtkäfer' started blooming at the earliest, in the first half of May while *Heuchera micrantha* 'Palace Purple' began its blooming period at the latest - at the beginning of July (Table 1). In the second year of cultivation the beginning of the blooming period depended upon the cultivation site. In all the taxons under examination the blooming period started 4-5 days earlier on sunny sites in comparison with semi-shadow sites. In the third year of cultivation in 2006 *Heucheras* on the two examined sites began blooming at the same time. While comparing the time of blooming during the two years under examination it was observed that *Heuchera micrantha* 'Palace Purple' started blooming 5-10 days earlier while *Heuchera* × *brizoides* 'Cappucino' started blooming 10-15 days later and *Heuchera* × *brizoides* 'Plum Pudding' 6-13 days later when compared with the second year of cultivation. As far as *Heuchera sanguinea* 'Leuchtkäfer' is concerned, the

beginning of the blooming period did not depend on the year of cultivation - when it was cultivated on the sunny site - and when it was cultivated on the semi-shadow site the blooming began 5 days earlier when compared with the second year of cultivation. As pointed out by Łukasiewicz (1967) it is the age of plants, the competition between the individual plants and climatic factors that influence perennials development. Aniśko (2008) claims that the blooming of *Heucheras* is particularly dependent upon the site and the year of cultivation, which is also stressed by Czuchaj and Szczepaniak (2008). In the own experiment in 2005 *Heuchera micrantha* 'Palace Purple' on the semi-shadow site reached full blooming at the earliest after 9 days while *Heuchera* × *brizoides* 'Plum Pudding' reached the peak of the blooming period after 10 days. Similarly, *Heuchera* × *brizoides* 'Cappucino' after 9 days reached the full blooming on both sites under examination. Łukasiewicz (1967) proved that depending on the year in which *Heucheras* were observed they achieved the peak of the blooming period after 3 to 10 days since the time when the first flowers were formed. Marcinkowski and Raducka-Mynett (1976/77), on the other hand, in the observations they conducted noticed that *Heuchera* × *brizoides* 'Gracilima' reached the peak blooming period after 35 days, while *Heuchera* × *brizoides* 'Pluie de Fue' after 25 days. Such a long period of flower development to reach the peak of the blooming period in the own study was observed in the case of *Heuchera sanguinea* 'Leuchtkäfer' and *Heuchera micrantha* 'Palace Purple' in 2006 (23 days).

*Heucheras*, as stated by Szczepaniak and Lisiecka (2012) are characterized by a long blooming period. It is also Aniśko (2008) who emphasises that *Heucheras* can bloom

**Table 1**  
Dates of beginning and end of flowering fully of *Heuchera*

Taxon	Site	Onset flowering		Begining of flowering		End of flowering	
		Year cultivation		Year cultivation		Year cultivation	
		II - 2005	III - 2006	II - 2005	III - 2006	II - 2005	III - 2006
<i>Heuchera micrantha</i> 'Palace Purple'	Full sunlight	6.VII	1.VII	19.VII	24.VII	15.VIII	19.VIII
	Semi-shades	11.VII	1.VII	20.VII	24.VII	20.VIII	25.VIII
<i>Heuchera</i> × <i>brizoides</i> 'Cappucino'	Full sunlight	26.V	10.VI	17.VI	19.VI	20.VII	22.VII
	Semi-shades	30.V	10.VI	18.VI	19.VI	19.VII	24.VII
<i>Heuchera</i> × <i>brizoides</i> 'Plum Pudding'	Full sunlight	20.V	2.VI	2.VI	19.VI	11.VII	14.VII
	Semi-shades	25.V	2.VI	4.VI	19.VI	11.VII	10.VII
<i>Heuchera sanguinea</i> 'Leuchtkäfer'	Full sunlight	10.V	10.V	30.V	2.VI	12.VII	20.VII
	Semi-shades	15.V	10.V	30.V	2.VI	15.VII	24.VII

for 3 up to 8 weeks depending on the place of cultivation. In the own study, regardless of the year of cultivation, the blooming period of the plants lasted for 38 days in *Heuchera* × *brizoides* ‘Plum Pudding’ cultivated in the semi-shadow, up to 75 days in *Heuchera sanguinea* ‘Leuchtkäfer’ cultivated on the same site (Table 2). The significant influence of the site of cultivation onto the length of the blooming period was observed only for *Heuchera* × *brizoides* ‘Plum Pudding’, whose blooming period on the sunny site was longer for 4 days. Regardless of the cultivation site, *Heuchera* × *brizoides* ‘Cappucino’ and ‘Plum Pudding’ in 2005 bloomed for a longer time than in 2006. *Heuchera sanguinea* ‘Leuchtkäfer’ and *Heuchera micrantha* ‘Palace Purple’, on the other hand, bloomed longer in 2006. Pogroszewska and Nazarewicz (1998) in their research into perennials stated that *Heuchera* × *brizoides* was characterised by the medium length of the blooming period (51 days), which was similar to the observations made in the own study in 2005. Also Masirowska (2002) while doing research into the blooming biology of the species from Saxifragaceae family stated that the blooming period for *Heuchera* × *brizoides* lasts from 30 up to 65 days, and a single flower on a plant retains its longevity for 5.5 days. In the experiment conducted by Marcinkowski and Raducka-Mynett (1976/77) in *Heuchera* × *brizoides* ‘Gracillima’, on the other hand, the blooming period was longer and lasted for 71 days. Marcinkowski and Raducka-Mynett (1976/77) claim also that the length of the bloom-

ing period is dependent on how widely the inflorescences branch as side branches of the inflorescence usually prolong the blooming period.

The number and the length of the inflorescences in *Heucheras* was dependent upon the year and the cultivation site. In 2005 in two-year-old *Heucheras* a larger number of inflorescences and of more length were observed when compared with 2006, when the plants had been cultivated for the third year (Tables 3 and 4). Among the cultivated taxa it was *Heuchera sanguinea* ‘Leuchtkäfer’ that flowered most abundantly. It also exhibited the biggest differences in the number of inflorescences in different years of cultivation (19.2). In the second year of cultivation all *Heucheras* grown on the sunny sites formed more inflorescences in comparison to those grown in the semi-shadow. However, in the third year of cultivation and the second year of blooming on the sunny site it was only *Heuchera* × *brizoides* ‘Plum Pudding’ and *Heuchera sanguinea* ‘Leuchtkäfer’ that formed a larger number of inflorescences. Regardless of the year of cultivation the smallest number of inflorescences was observed in *Heuchera micrantha* ‘Palace Purple’ cultivated in the semi-shadow. The longest inflorescences (67.3 cm) were observed in 2005 in *Heuchera* × *brizoides* ‘Plum Pudding’, while the shortest ones in *Heuchera* × *brizoides* ‘Cappucino’ in two years of cultivation (51.4 and 44.1 cm). *Heuchera micrantha* ‘Palace Purple’, *Heuchera* × *brizoides* ‘Plum Pudding’ and *Heuchera sanguinea* ‘Leuchtkäfer’ cultivated in the semi-

**Table 2**  
Length of flowering period of *Heuchera* (days)

Taxon	Site	Year of cultivation		Means for the position
		II - 2005	III - 2006	
<i>Heuchera micrantha</i> ‘Palace Purple’	Full sunlight	40.0 a*	50.0 b	45.0 a
	Semi-shades	40.0 a	56.0 b	48.0 a
	Mean	<b>40.0 a</b>	<b>52.8 b</b>	
<i>Heuchera</i> × <i>brizoides</i> ‘Cappucino’	Full sunlight	55.0 c	42.0 a	48.5 a
	Semi-shades	50.0 bc	44.0 ab	47.0 a
	Mean	<b>52.5 b</b>	<b>43.0 a</b>	
<i>Heuchera</i> × <i>brizoides</i> ‘Plum Pudding’	Full sunlight	52.0 c	42.0 ab	47.0 b
	Semi-shades	47.0 bc	38.0 a	42.5 a
	Mean	<b>49.5 b</b>	<b>40.0 a</b>	
<i>Heuchera sanguinea</i> ‘Leuchtkäfer’	Full sunlight	63.0 a	71.0 b	67.0 a
	Semi-shades	61.0 a	75.0 b	68.0 a
	Mean	<b>62.0 a</b>	<b>73.0 b</b>	

\*Means followed by the same letters do not differ at  $\alpha = 0.05$

shadow formed significantly longer inflorescences when compared to those formed by the plants cultivated in the sun. The only exception was *Heuchera* × *brizoides* ‘Cappucino’ in which, regardless of the year of cultivation, no influence of the site of cultivation upon the length of the inflorescences

was observed. Czuchaj and Szczepaniak (2008) proved that in several cultivars of *Heuchera* × *brizoides* more inflorescences were formed when the plants were cultivated in mulched soil. The favourable effect of mulch onto the number of inflorescences was also observed by Krzymińska and

**Table 3**  
**Number of inflorescences of *Heuchera***

Taxon	Site	Year of cultivation		Means for the position
		II - 2005	III - 2006	
<i>Heuchera micrantha</i> ‘Palace Purple’	Full sunlight	18.4 d*	5.5 a	11.9 b
	Semi-shades	8.6 c	6.6 b	7.6 a
	Mean	<b>13.5 b</b>	<b>6.1 a</b>	
<i>Heuchera</i> × <i>brizoides</i> ‘Cappucino’	Full sunlight	36.4 d	7.2 a	21.8 b
	Semi-shades	22.7 c	14.1 b	18.4 a
	Mean	<b>29.6 b</b>	<b>10.7 a</b>	
<i>Heuchera</i> × <i>brizoides</i> ‘Plum Pudding’	Full sunlight	22.4 d	14.0 c	18.2 b
	Semi-shades	8.7 a	10.7 b	9.7 a
	Mean	<b>15.6 b</b>	<b>9.7 a</b>	
<i>Heuchera sanguinea</i> ‘Leuchtkäfer’	Full sunlight	45.3 d	18.9 b	32.1 b
	Semi-shades	20.8 c	9.0 a	14.9 a
	Mean	<b>33.1 b</b>	<b>13.9 a</b>	

\*Means followed by the same letters do not differ at  $\alpha = 0.05$

**Table 4**  
**Length of inflorescence stalks of *Heuchera* (cm)**

Taxon	Site	Year of cultivation		Means for the position
		II - 2005	III - 2006	
<i>Heuchera micrantha</i> ‘Palace Purple’	Full sunlight	58.2 c*	44.5 a	51.4 a
	Semi-shades	70.2 d	56.9 b	63.5 b
	Mean	<b>64.2 b</b>	<b>50.7 a</b>	
<i>Heuchera</i> × <i>brizoides</i> ‘Cappucino’	Full sunlight	50.0 c	48.8 b	49.4 a
	Semi-shades	52.8 d	46.5 a	48.5 a
	Mean	<b>51.4 b</b>	<b>44.1 a</b>	
<i>Heuchera</i> × <i>brizoides</i> ‘Plum Pudding’	Full sunlight	66.2 b	62.9 a	64.6 a
	Semi-shades	68.4 c	65.7 b	67.1 b
	Mean	<b>67.3 b</b>	<b>64.3 a</b>	
<i>Heuchera sanguinea</i> ‘Leuchtkäfer’	Full sunlight	54.6 b	53.6 a	54.1 a
	Semi-shades	60.0 d	57.0 c	58.5 b
	Mean	<b>57.3 b</b>	<b>55.3 a</b>	

\*Means followed by the same letters do not differ at  $\alpha = 0.05$

Lisiecka (2004). The length of inflorescences exhibited by the *Heucheras* in question were comparable with the length described in cultivar characteristics given by Jelitto et al. (2002), Heims and Ware (2005), Hertle (2004, 2007) and Oliver and Oliver (2006).

## Conclusions

Flowering of *Heucheras* was dependent on the species, site and the year of cultivation. In the first year of flowering all *Heucheras* cultivated on the sunny sites formed more inflorescences, while in the second year of flowering a higher number of inflorescences was exhibited only by *Heuchera* × *brizoides* ‘Plum Pudding’ and *Heuchera sanguinea* ‘Leuchtkäfer’. *Heucheras* cultivated in the semi-shadow formed longer inflorescences than those cultivated in the sun with the exception of *Heuchera* × *brizoides* ‘Cappucino’, in which the site selection did not influence the length of the inflorescence.

## References

- Aniśko, T., 2008. When Perennials Bloom. *Timber Press*, Portland, London, pp. 252 – 258.
- Berkan, W. and M. Bernaciak, 1970. Perennials in garden. PWRiL. Warszawa: p. 19 (PI).
- Czuchaj, P. and S. Szczepaniak, 2008. The influence of mulching on growth and flowering of some *Heuchera* × *brizoides* hort. ex Lemoine cultivars (*Heuchera* × *brizoides* hort. Ex Lemoine). *Zeszyty Problemowe Postępów Nauk Rolniczych*, **525**: 63-71 (PI).
- Heims, D. and G. Ware, 2005. *Heucheras* and *Heucherellas*. Coral Bells and Foamy Bells. *Timber Press, Inc*: pp. 65 – 70, 112 – 115.
- Hellwig, Z., 1978. Perennials in the Park and Garden. PWRiL. Warszawa, pp. 16 – 17, 20 – 25, 125 – 127 (PI).
- Hertle, B., 2004. The best *Heuchera* for permanent garden use. *Gartenpraxis*, **12**: 23 – 32.
- Hertle, B., 2007. Coral Bells: Only the best for your garden. *Deutscher Gartenbau*, **34**: 26-28.
- Jelitto, L., W. Schacht and H. Simon, 2002. The Field - Jewelry Perennials. *Verlag Eugen Ulmer & Co.* Stuttgart, I: 464 – 467.
- Krzywińska, A. and A. Lisiecka, 2004. The influence of mulching on growth and flowering of some species of perennials. *Folia Universitatis. Stetinensis Agricultura*, **236** (94): 93-96 (PI).
- Lukasiewicz, A., 1967. Rhythmic development perennials especially with regard to phenology aboveground organs. *Poznańskie Towarzystwo Przyjaciół Nauk*, **31** (6): 72 (PI).
- Marcinkowski, J. and M. Raducka-Mynett, 1976/77. Investigations on the suitability of some ornamental perennials for garden growth. Part I. Classification of garden perennials according to the length and abundance of flowering. *Prace Instytutu Sadownictwa i Kwiaciarstwa Seria B*, **2**: 215-227 (PI).
- Marcinkowski, J., 1978. Studies on the evaluation of the ornamental garden perennials. Part II. Classification of the garden perennials according to their date of flowering. *Prace Instytutu Sadownictwa i Kwiaciarstwa Seria B*, **3**: 103-118 (PI).
- Masierowska, M., 2002. Flowering biology, nectar and pollen production of three perennial species from the *Saxifragaceae* family. *Annales Unniversitatis Mariae Curie-Skłodowska Sectio EEE*, **X**: 35-43 (PI).
- Oliver, C. and M. Oliver, 2006. *Heuchera*, *Tiarella* and *Heucherella*. *A Gardener's Guide*, Badsford, 160 pp.
- Pogroszewska, E. and B. Nazarewicz, 1998. The valuation of selected species of decorative garden perennials. *Zeszyty Naukowe Akademii Rolniczej im. H. Kollątaja w Krakowie* nr 333. Sesja Naukowa, **57**: 749-753 (PI).
- Szczepaniak, S. and A. Lisiecka, 2012. Ornamental perennials. *Wydawnictwo Uniwersytetu Przyrodniczego*, Poznan: pp. 30-32 (PI).

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