

Wild plants' phenology in the Czech republic during 1991 - 2010

Lenka Hajkova ¹⁾, Vit Vozenilek ²⁾, Radim Tolasz ³⁾, Jiri Nekovar ³⁾,
Alena Vondrakova ²⁾, Ales Vavra ²⁾

¹⁾ Czech Hydrometeorological Institute - Usti nad Labem

²⁾ Palacky University in Olomouc – Dept. of Geoinformatics

³⁾ Czech Hydrometeorological Institute - Prague





Introduction

Main tasks:

- 1) Temporal and spatial variability of CHMI phenology data
- 2) Calculation of basic meteorological characteristics to phenophase entrance and interval duration (pentade air temperature, sums of air temperature, sums of sunshine duration, sums of number of days with precipitation above 1 mm), altitudinal zones - 200 m step

Kind of species:

Caltha palustris L., *Anemone nemorosa* L., *Hepatica nobilis* Mill., *Ranunculus acris* L., *Fragaria vesca* L., *Hypericum perforatum* L., *Chamerion angustifolium* (L.) Holub, *Vaccinium myrtillus* L., *Lamium album* L., *Chrysanthemum leucanthemum* L., *Tussilago farfara* L., *Convallaria majalis* L., *Galanthus nivalis* L., *Dactylis glomerata* L., *Alopecurus pratensis* L.

Area: Czech republic – CHMI phenological network (wild plants)



MATERIAL AND METHODS



Phenophases: flowers' button visible (BBCH 51), **beginning (BBCH 61)** and **end of flowering (BBCH 69)**, first leaves (BBCH 07)

Period: 1991 – 2010

Phenological stations (CHMI):

Doksany 155 m asl 50° 27' N, 14° 10' E

Modrava, Filipova Hut 1102 m asl 49° 02' N, 13° 31' E

Technical series for phenological stations coordinates – meteo data (Štěpánek et al.)



Phenology: volunteer observers, methodology
instruction number 10, database Oracle - Phenodata

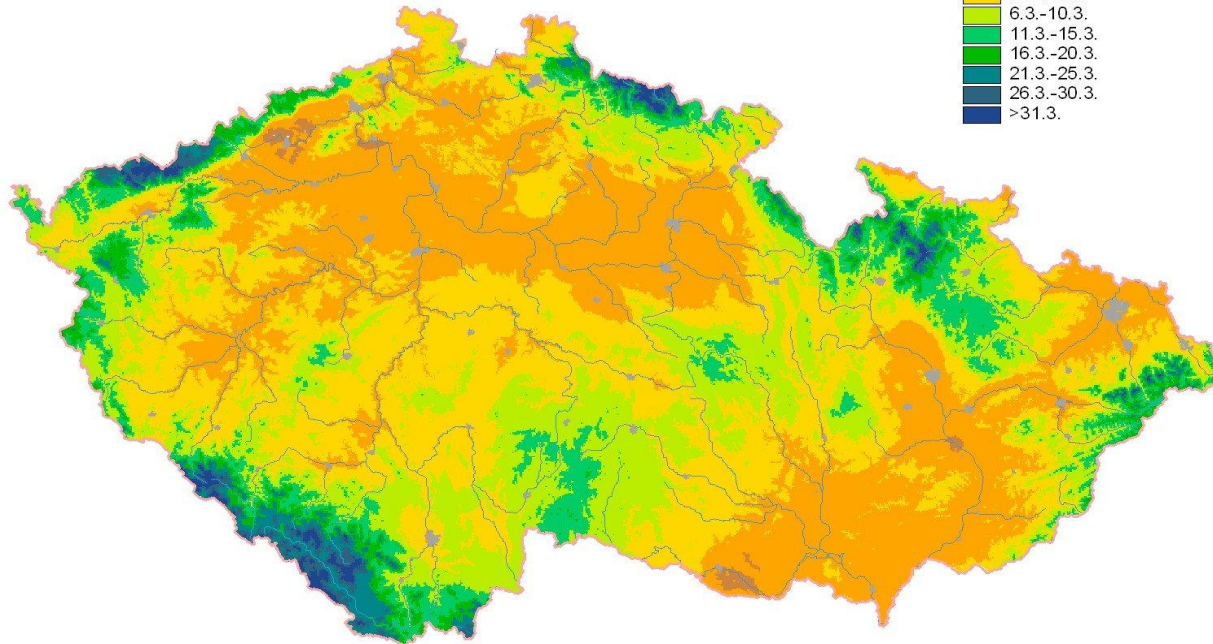
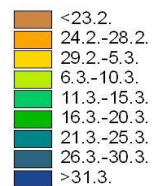
GIS – application Clidata-GIS(ArcView 3.2)
method: Clidata-DEM, 500 m horizontal resolution,
40 km distance, 10 stations



Galanthus nivalis L.

Beginning of flowering (10%)

Average phenophase onset



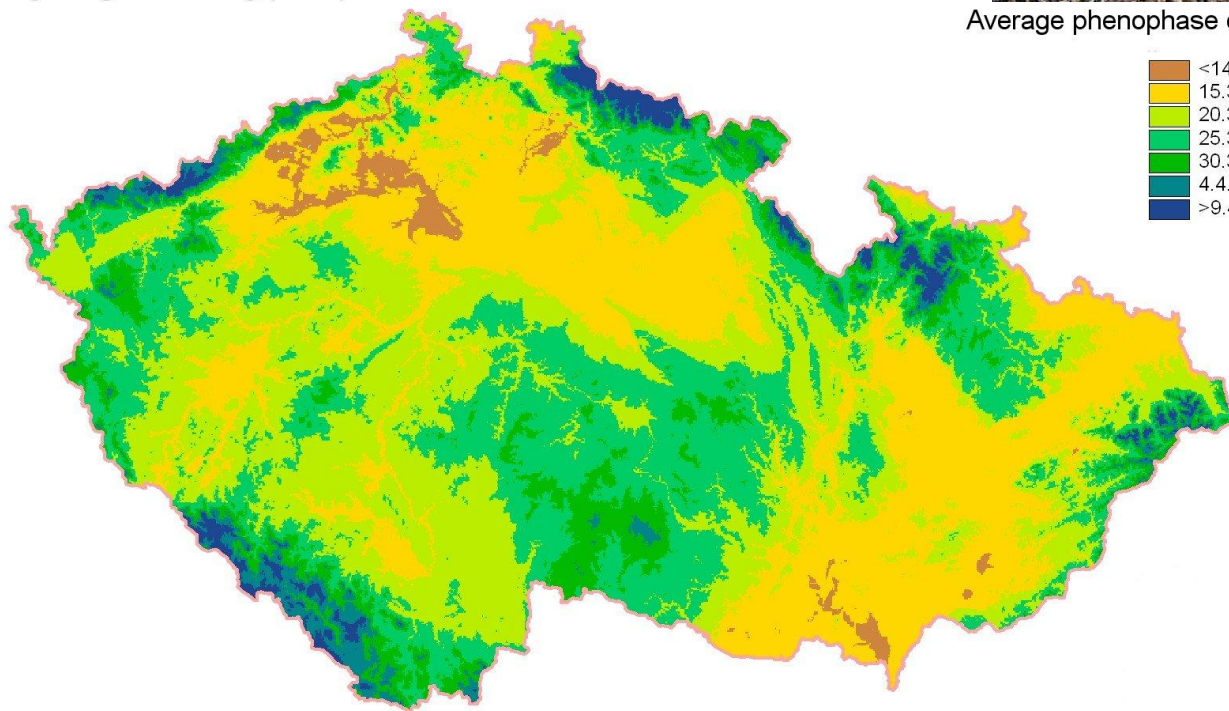
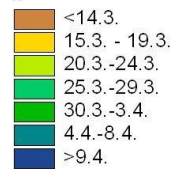


Tussilago farfara L.

Beginning of flowering (10 %)



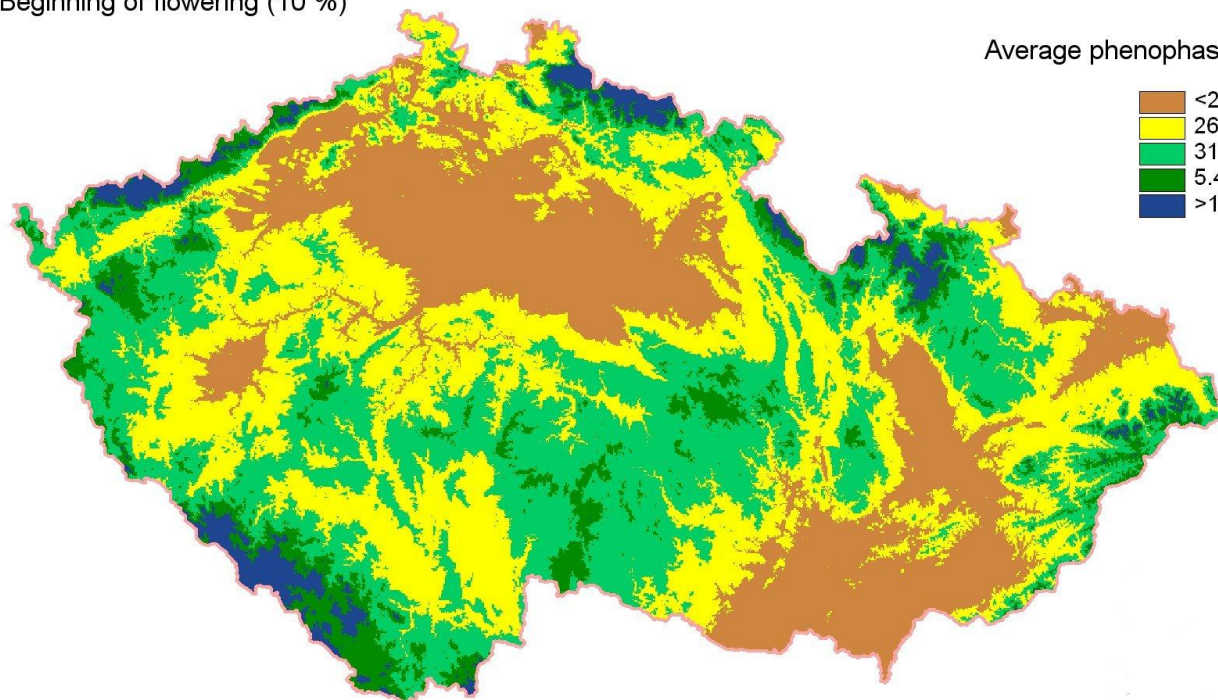
Average phenophase onset










Hepatica nobilis Mill.

Beginning of flowering (10 %)



Average phenophase onset

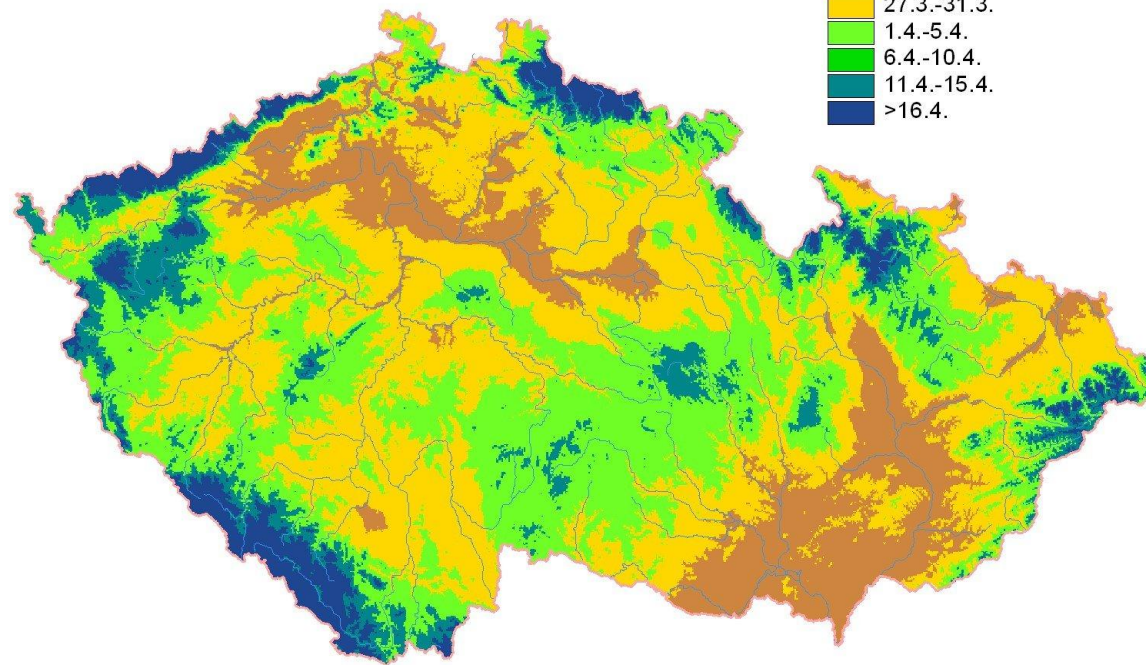
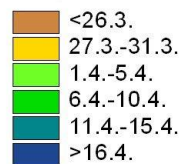
-  <25.3.
-  26.3.-30.3
-  31.3.-4.4.
-  5.4.-9.4.
-  >10.4.



Anemone nemorosa L.

Beginning of flowering (10%)

Average phenophase onset

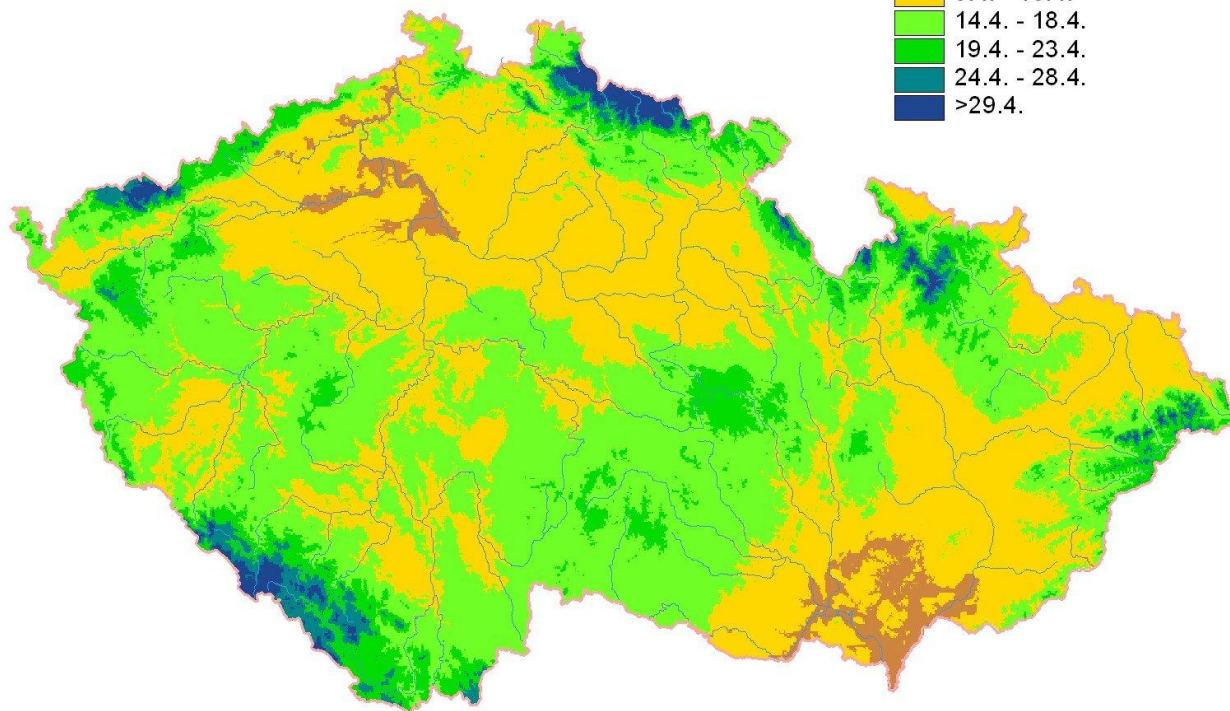
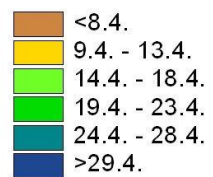




Caltha palustris L

Beginning of flowering (10 %)

Average phenophase onset

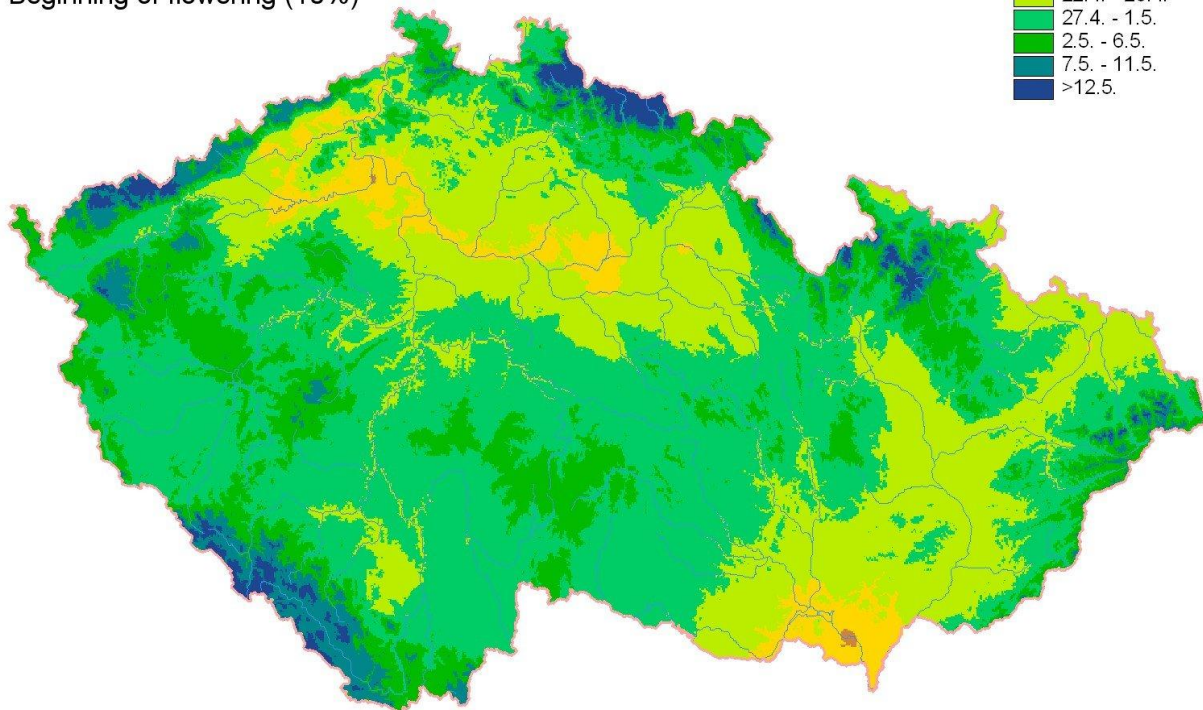
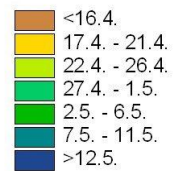




Vaccinium myrtillus L.

Beginning of flowering (10%)

Average phenophase onset

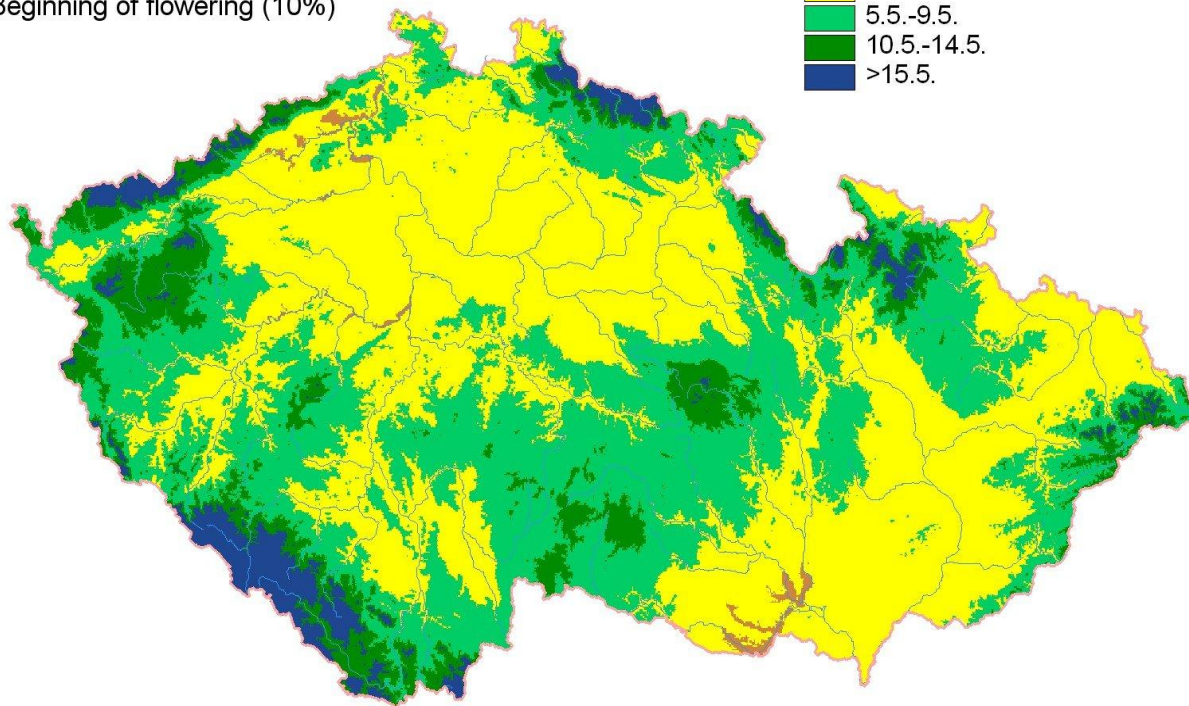
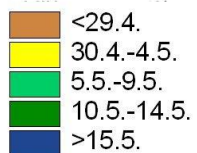




Fragaria vesca L.

Beginning of flowering (10%)

Average phenophase onset

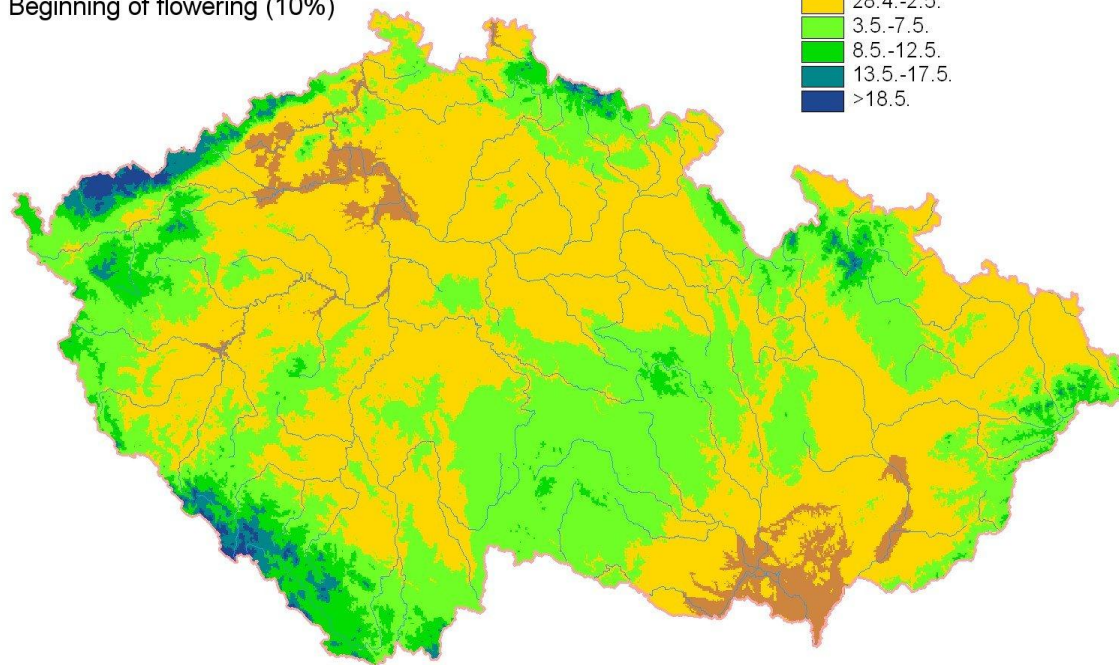
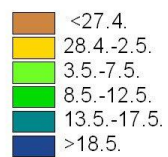




Lamium album L.

Beginning of flowering (10%)

Average phenophase onset

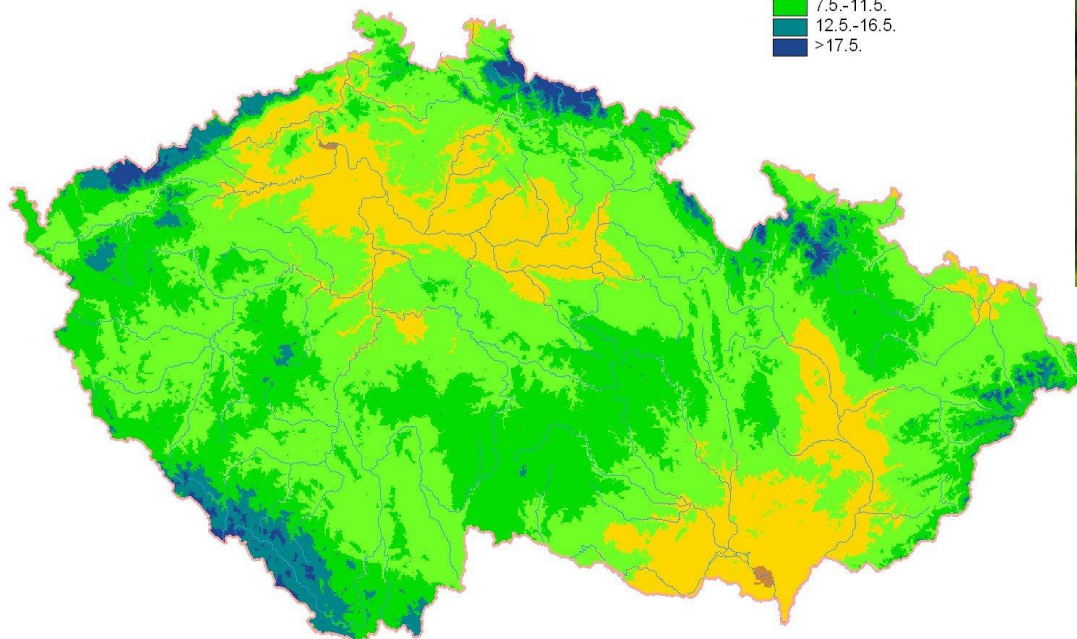
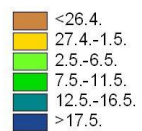




Ranunculus acris L.

Beginning of flowering (10%)

Average phenophase onset

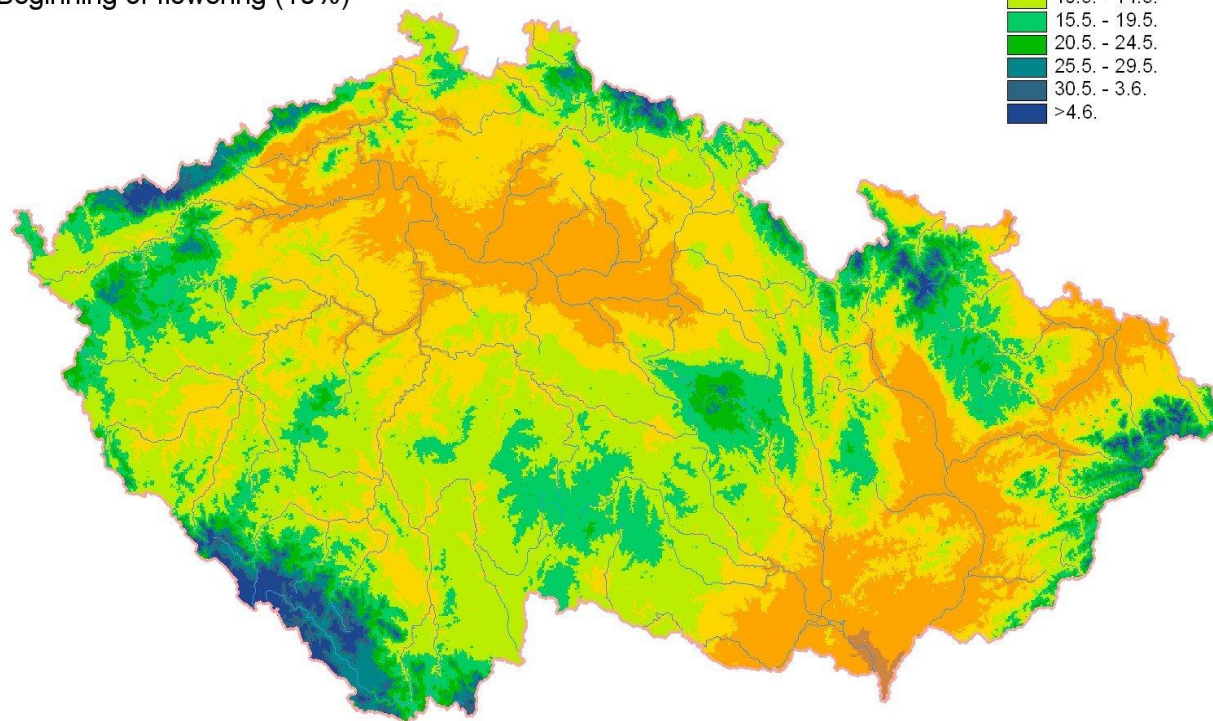
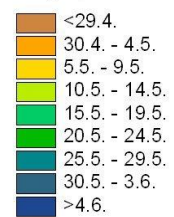




Convallaria majalis L.

Beginning of flowering (10%)

Average phenophase onset

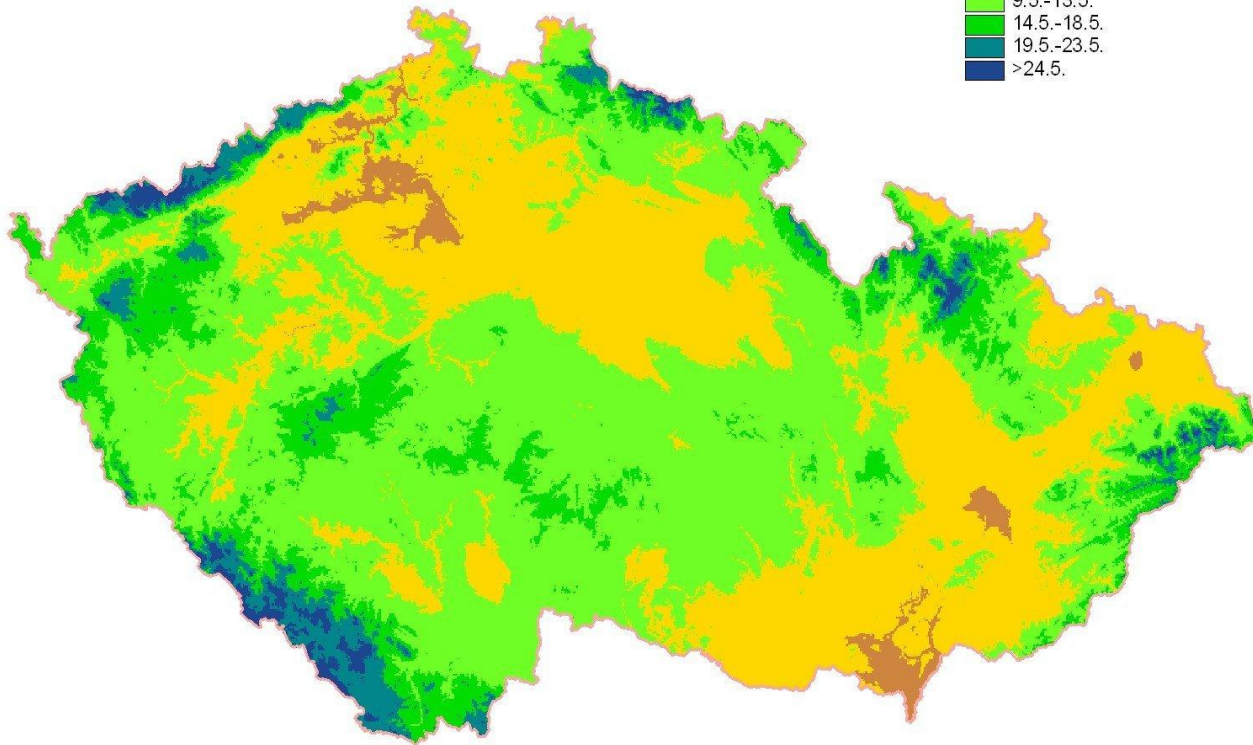
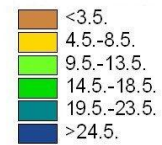




Alopecurus pratensis L.

Beginning of flowering (10%)

Average phenophase onset

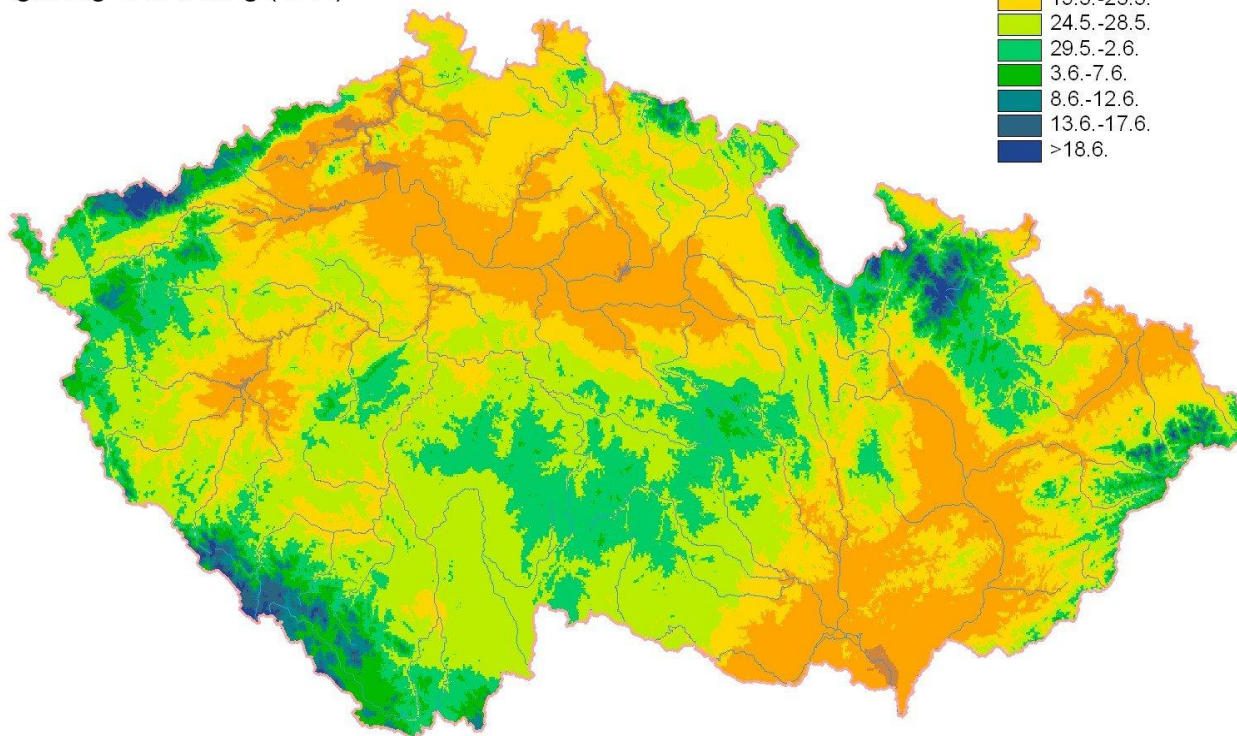
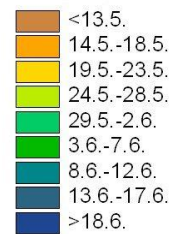




Dactylis glomerata L.

Beginning of flowering (10%)

Average phenophase onset

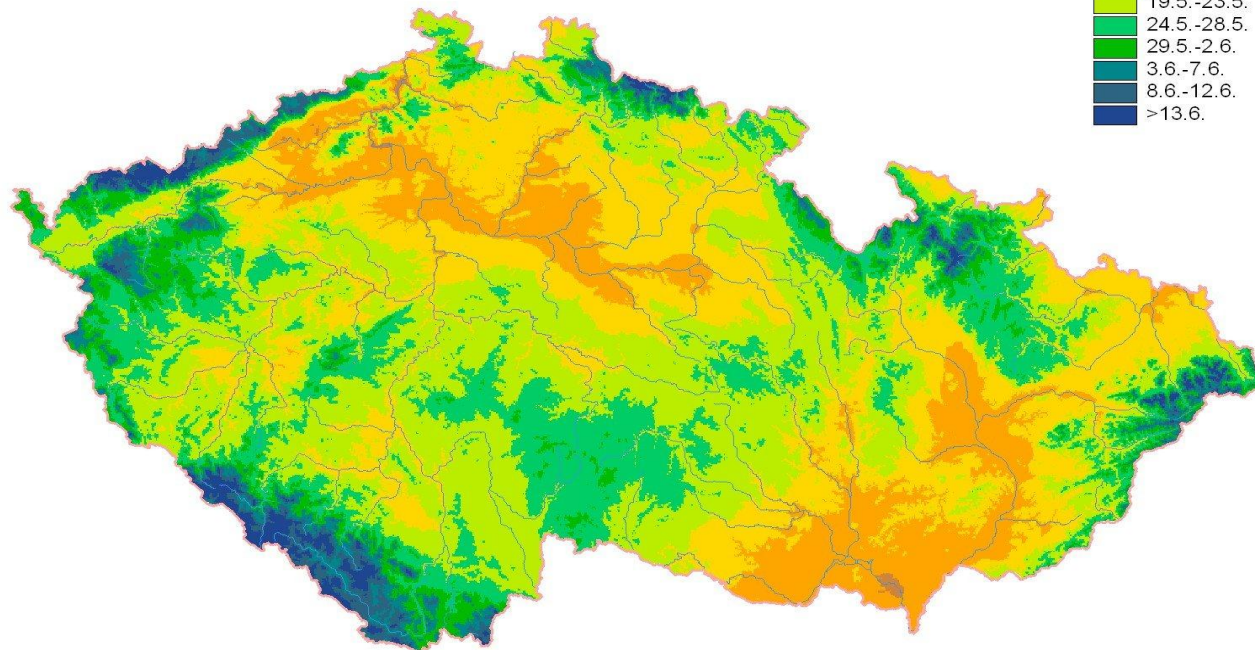
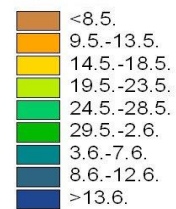




Chrysanthemum leucanthemum L.

Beginning of flowering (10%)

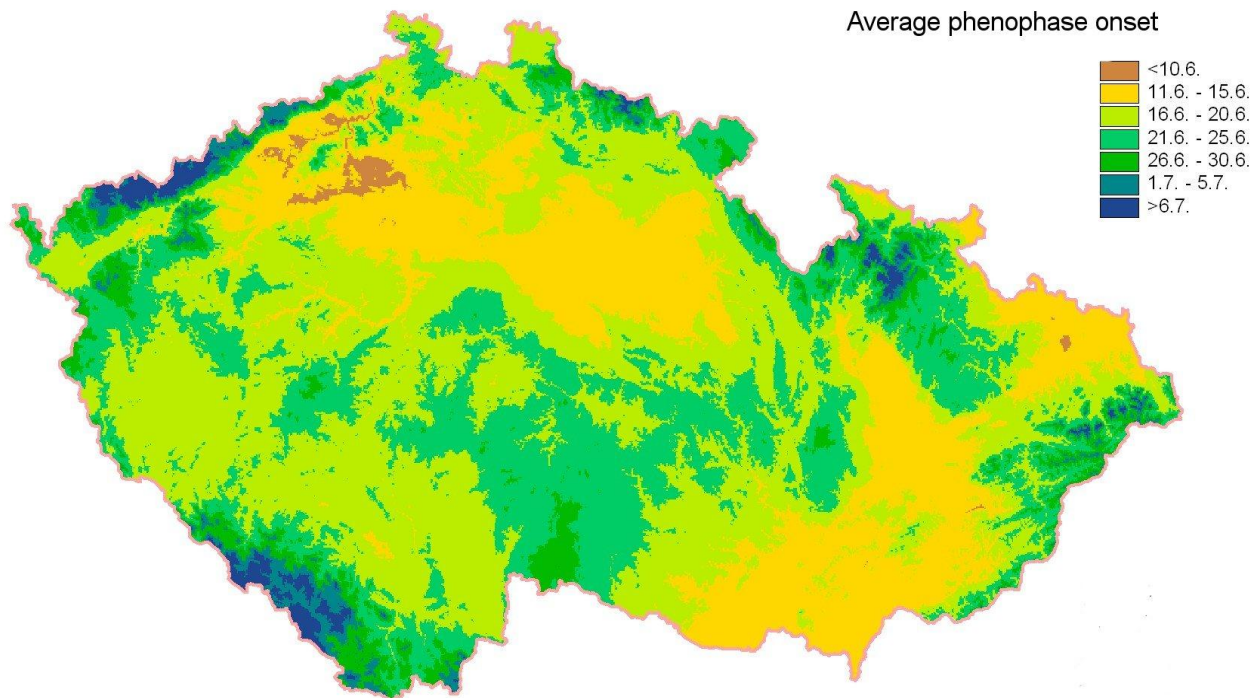
Average phenophase onset





Hypericum perforatum L.

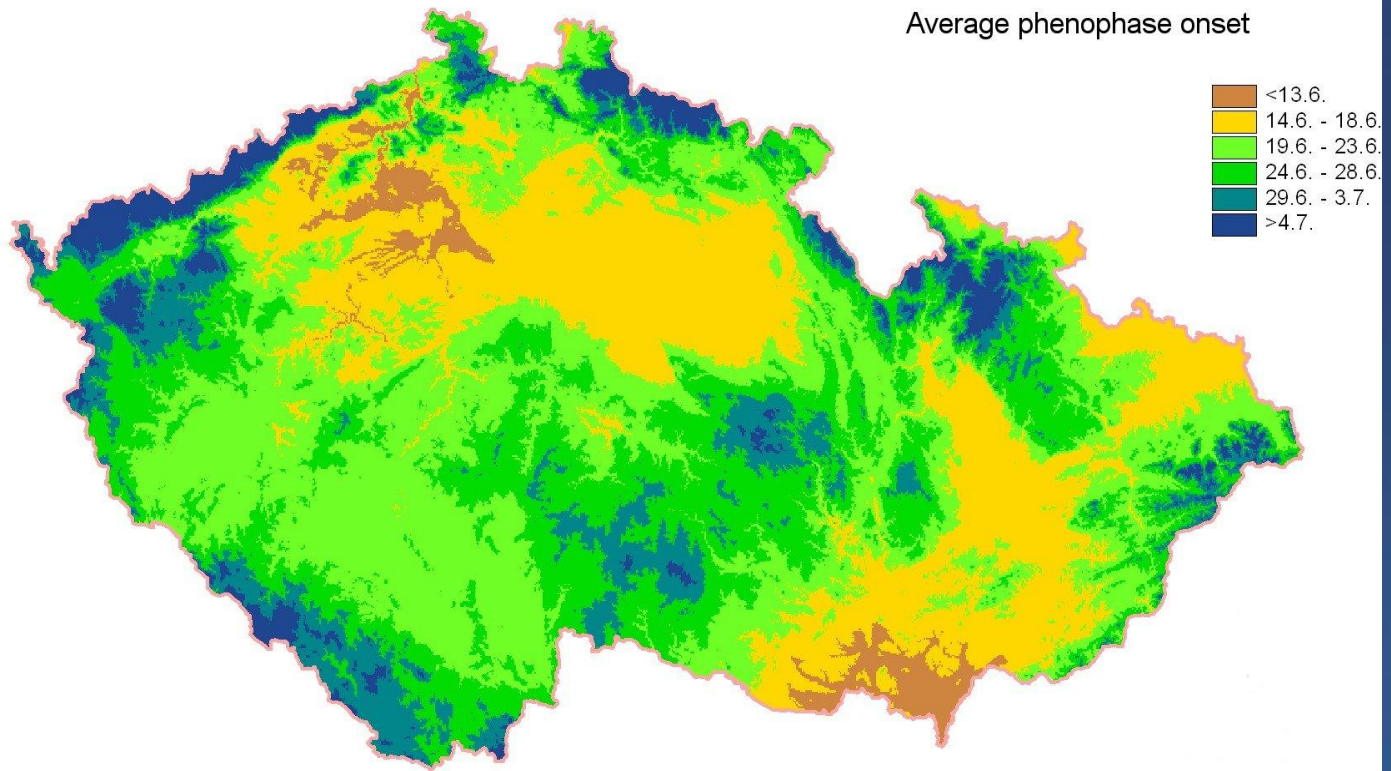
Beginning of flowering (10 %)





Chamerion angustifolium (L.) Holub

Beginning of flowering (10 %)

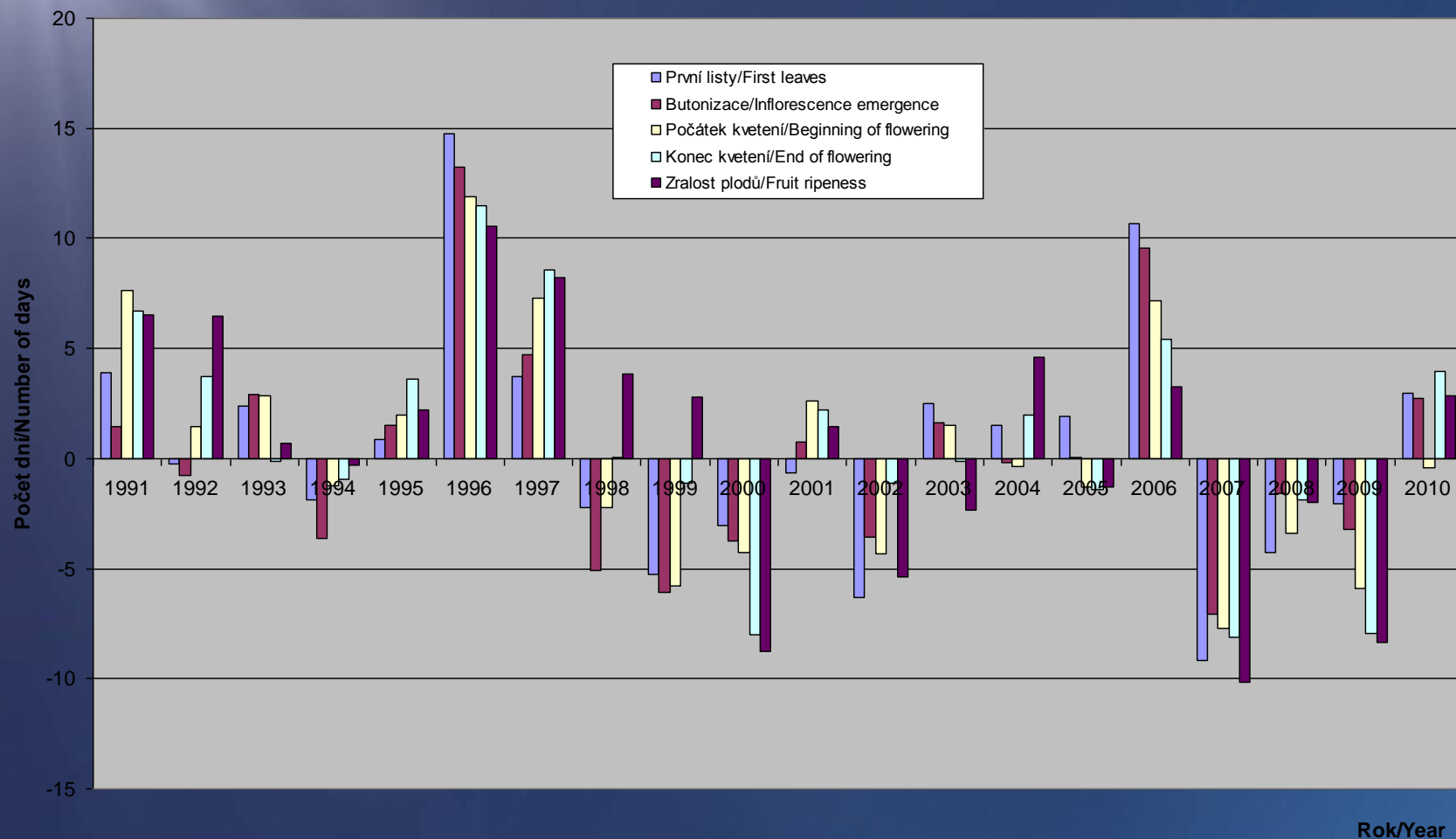




Caltha palustris L.

Deviations from perennial average 1991 - 2010

Odchytky nástupu vybraných fenofází blatouchu bahenního od dlouhodobého průměru 1991 - 2010

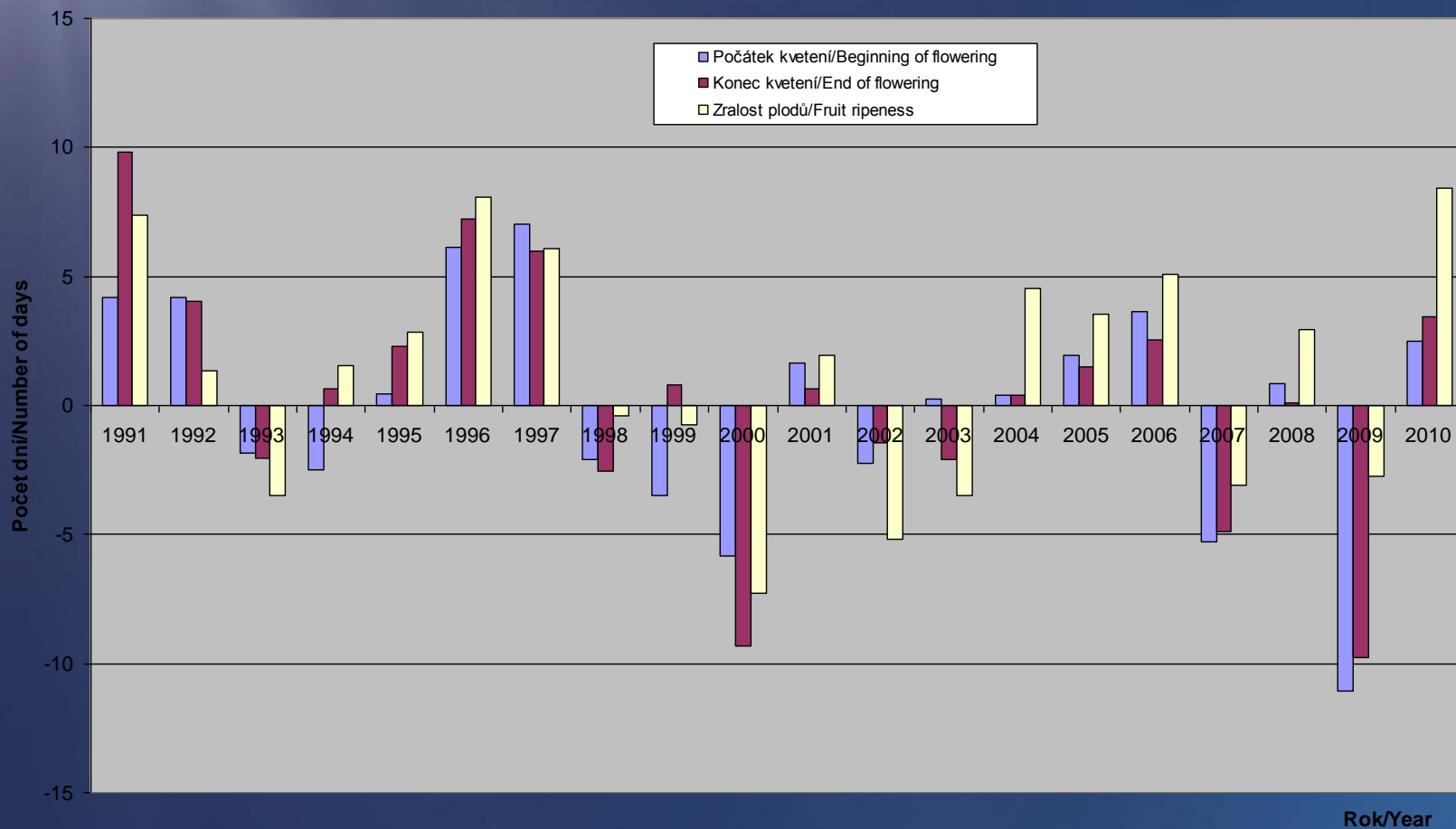




Vaccinium myrtillus L.

Deviations from perennial average 1991 - 2010

Odchytky nástupu fenofází brusnice borůvky od dlouhodobého průměru 1991 - 2010

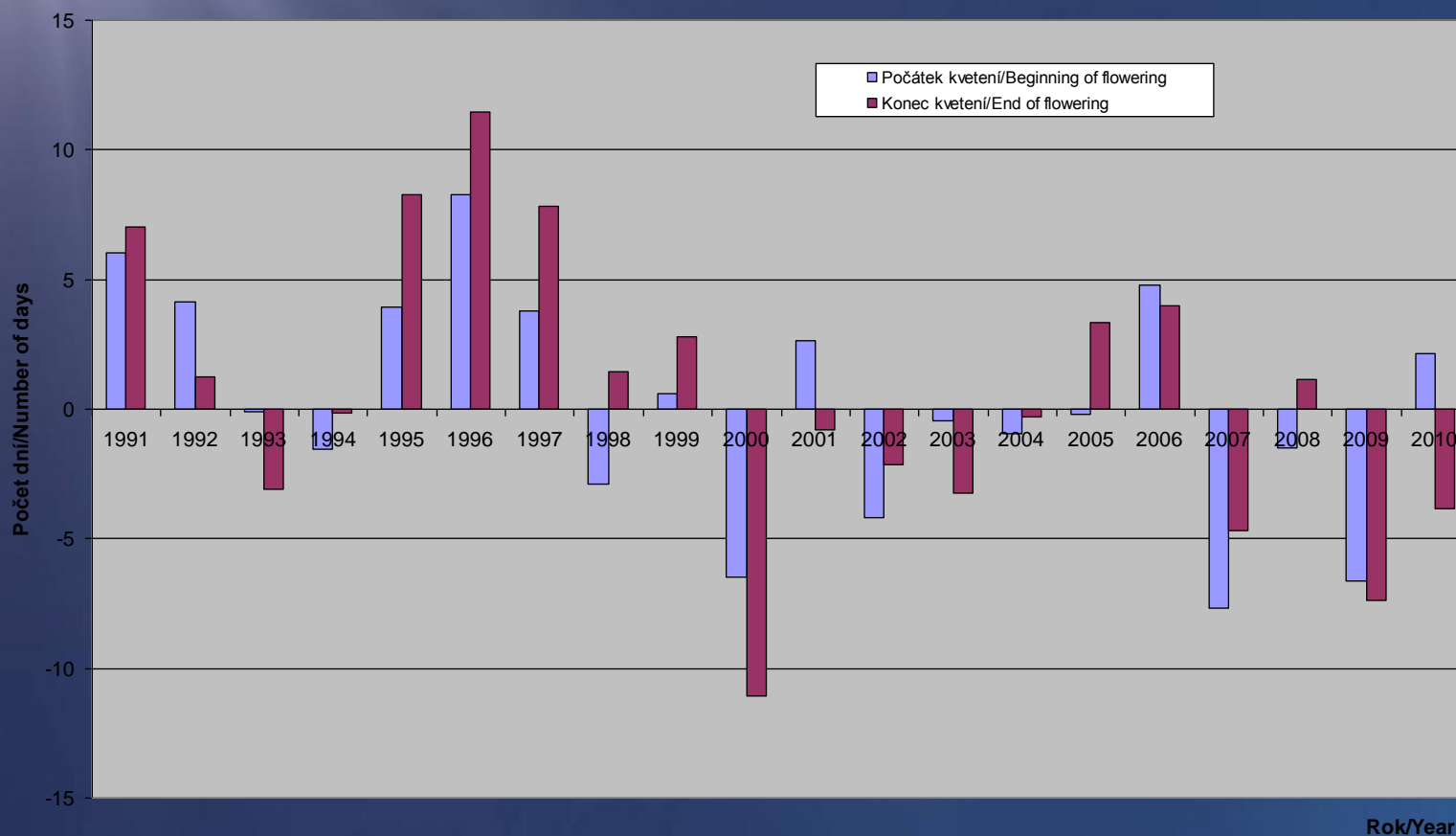




Lamium album L.

Deviations from perennial average 1991 - 2010

Odchytky nástupu vybraných fenofází hluchavky bílé od dlouhodobého průměru 1991 - 2010

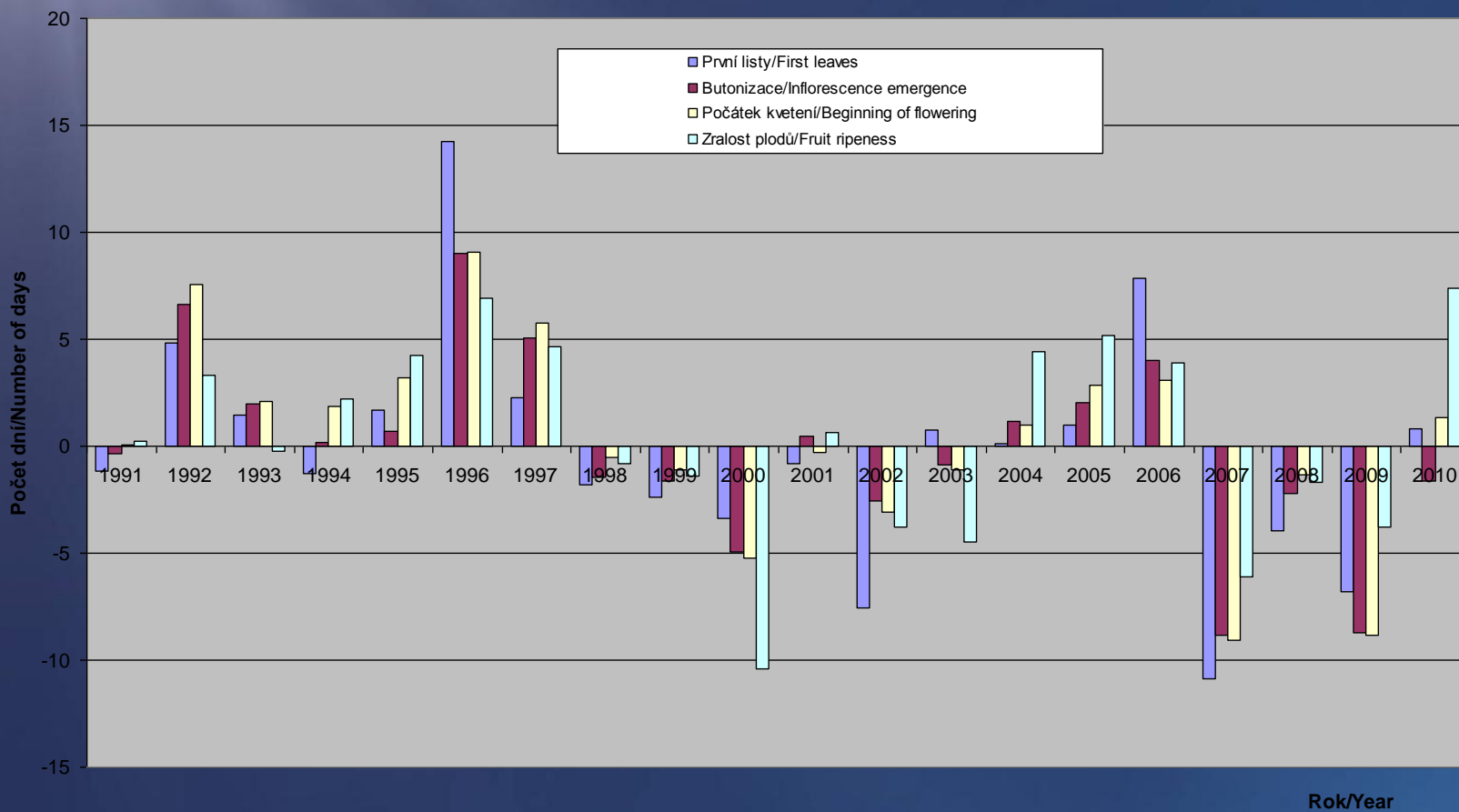




Fragaria vesca L.

Deviations from perennial average 1991 - 2010

Odchyly nástupu vybraných fenofází jahodníku obecného od dlouhodobého průměru 1991 - 2010

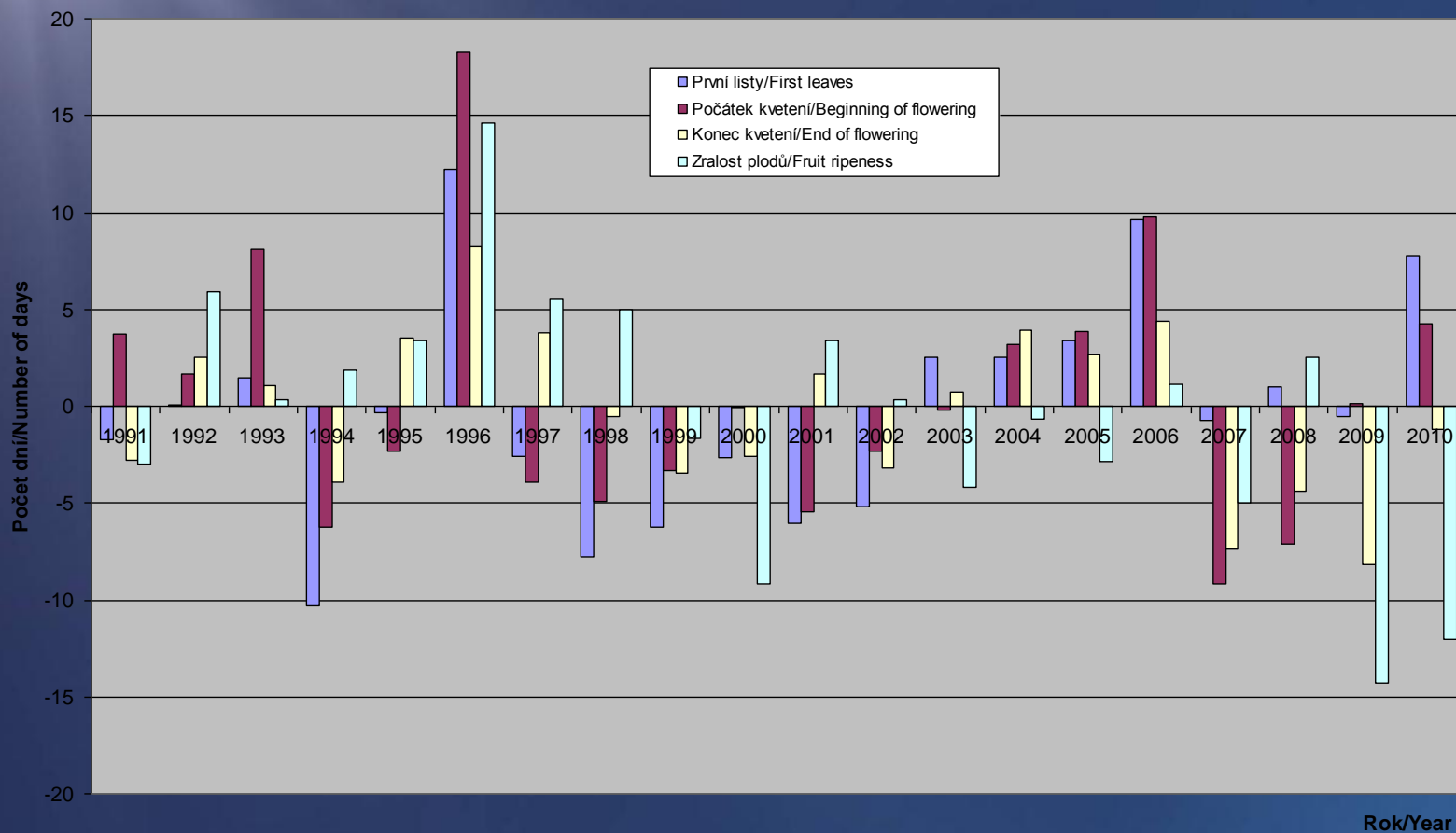




Hepatica nobilis Mill.

Deviations from perennial average 1991 - 2010

Odchytky nástupu vybraných fenofází jaterníku podléška od dlouhodobého průměru 1991 - 2010

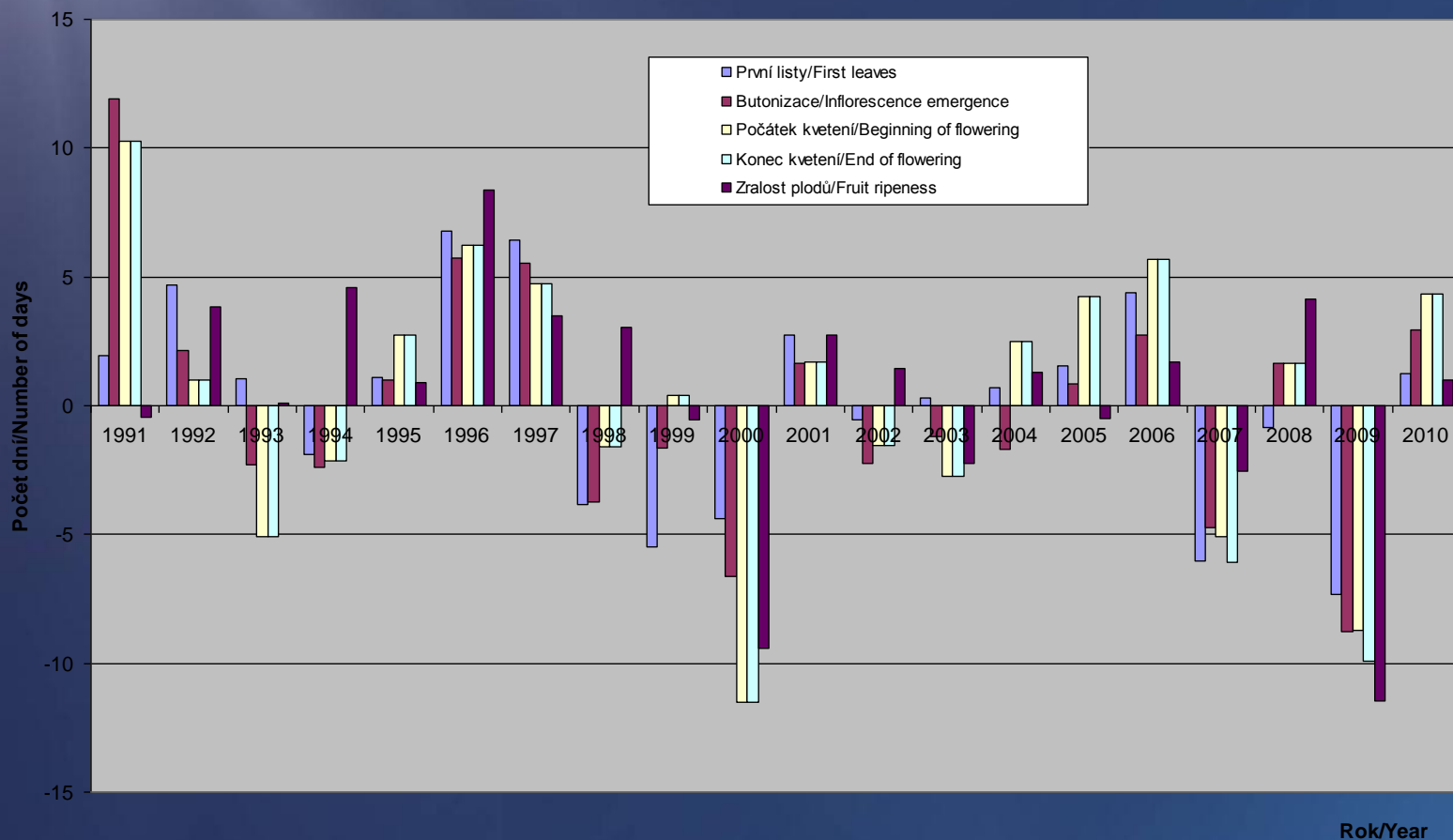




Convallaria majalis L.

Deviations from perennial average 1991 - 2010

Odchytky nástupu vybraných fenofází konvalinky vonné od dlouhodobého průměru 1991 - 2010

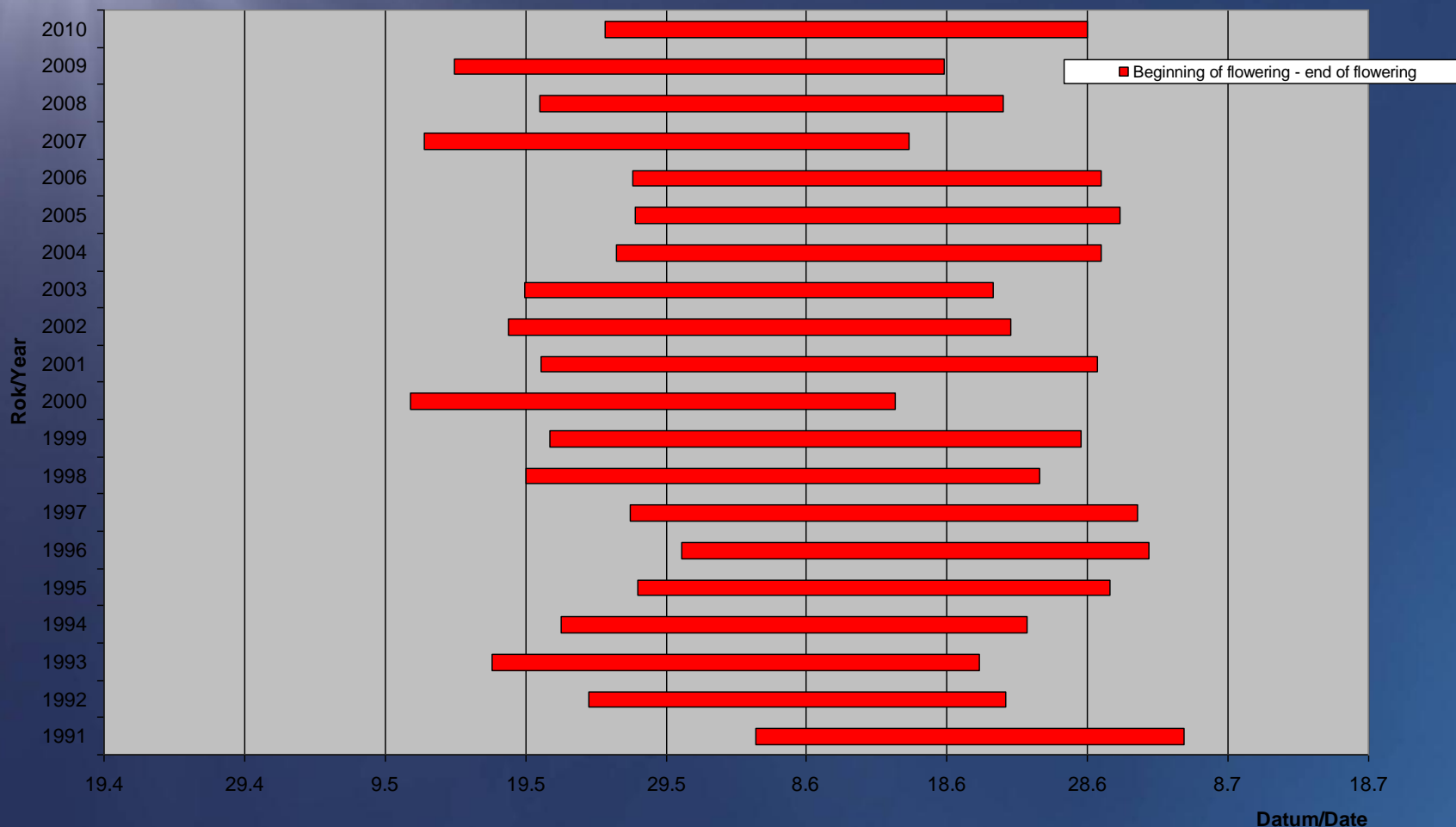




Chrysanthemum leucanthemum L.

Temporal variability of flowering

Průměrné trvání kvetení u kopretiny luční v letech 1991 - 2010

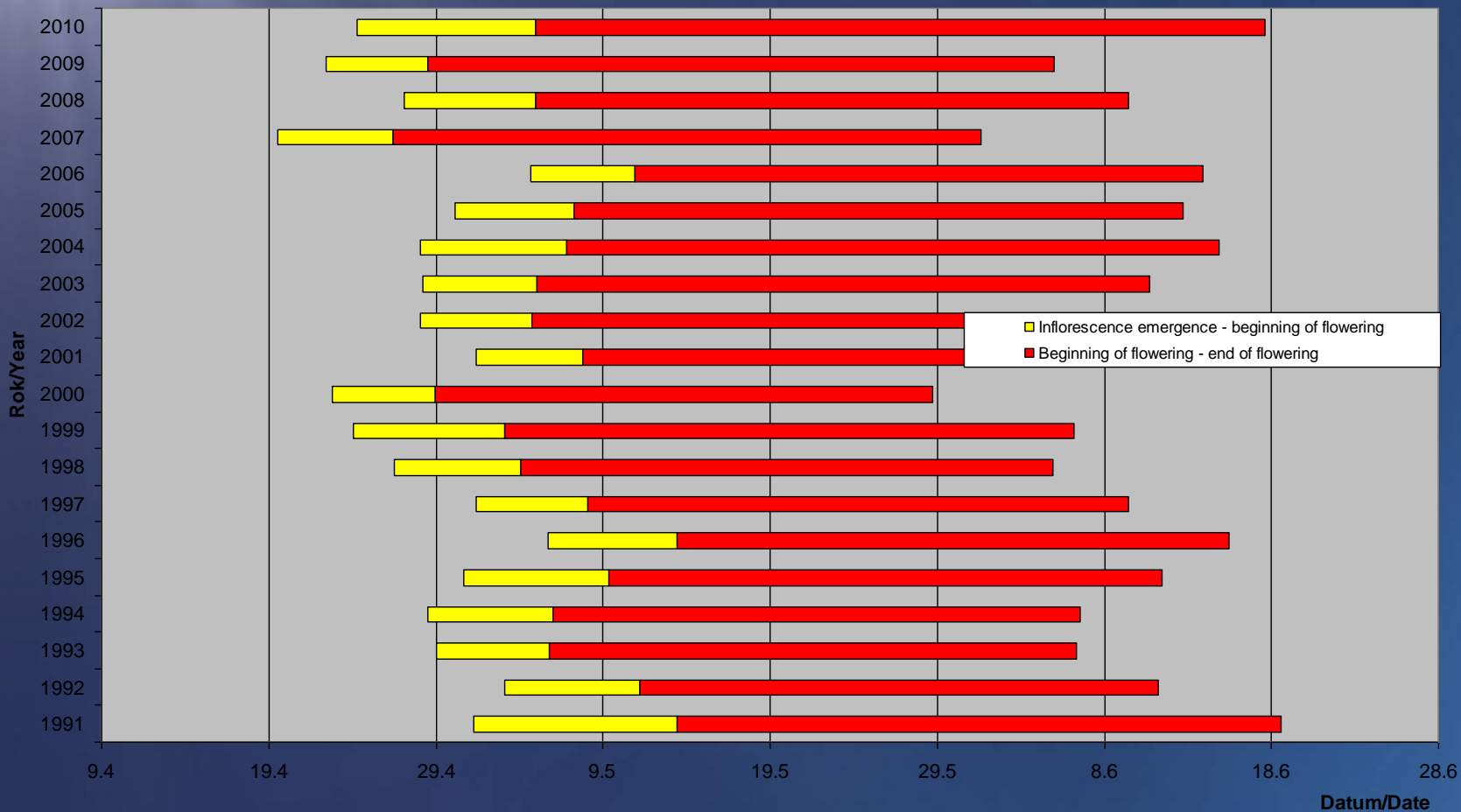




Ranunculus acris L.

Temporal variability of flowering

Průměrné trvání kvetení včetně butonizace u pryskyřníku prudkého v letech 1991 - 2010

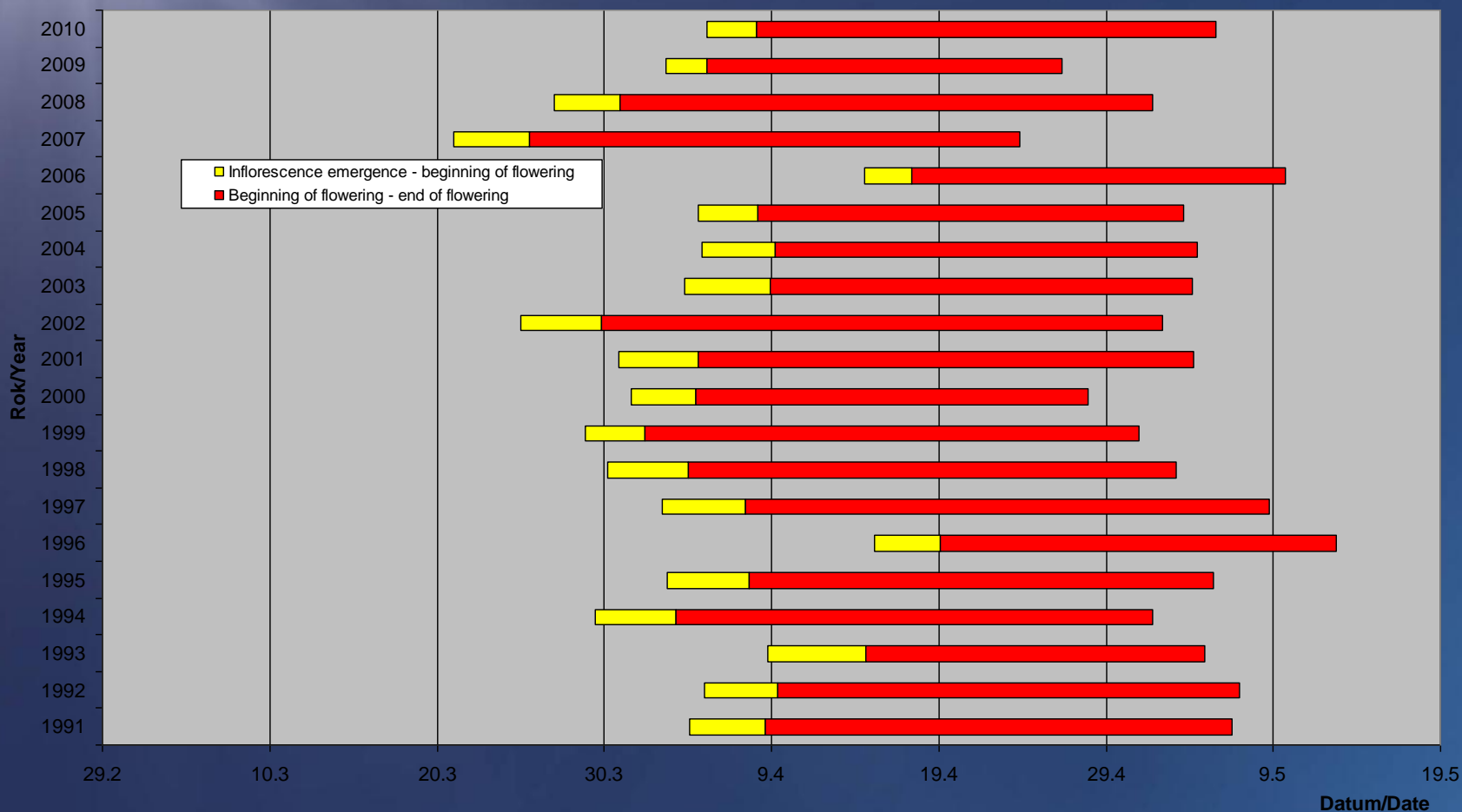




Anemone nemorosa L.

Temporal variability of flowering

Průměrné trvání kvetení včetně butonizace u sasanky hajní v letech 1991 - 2010

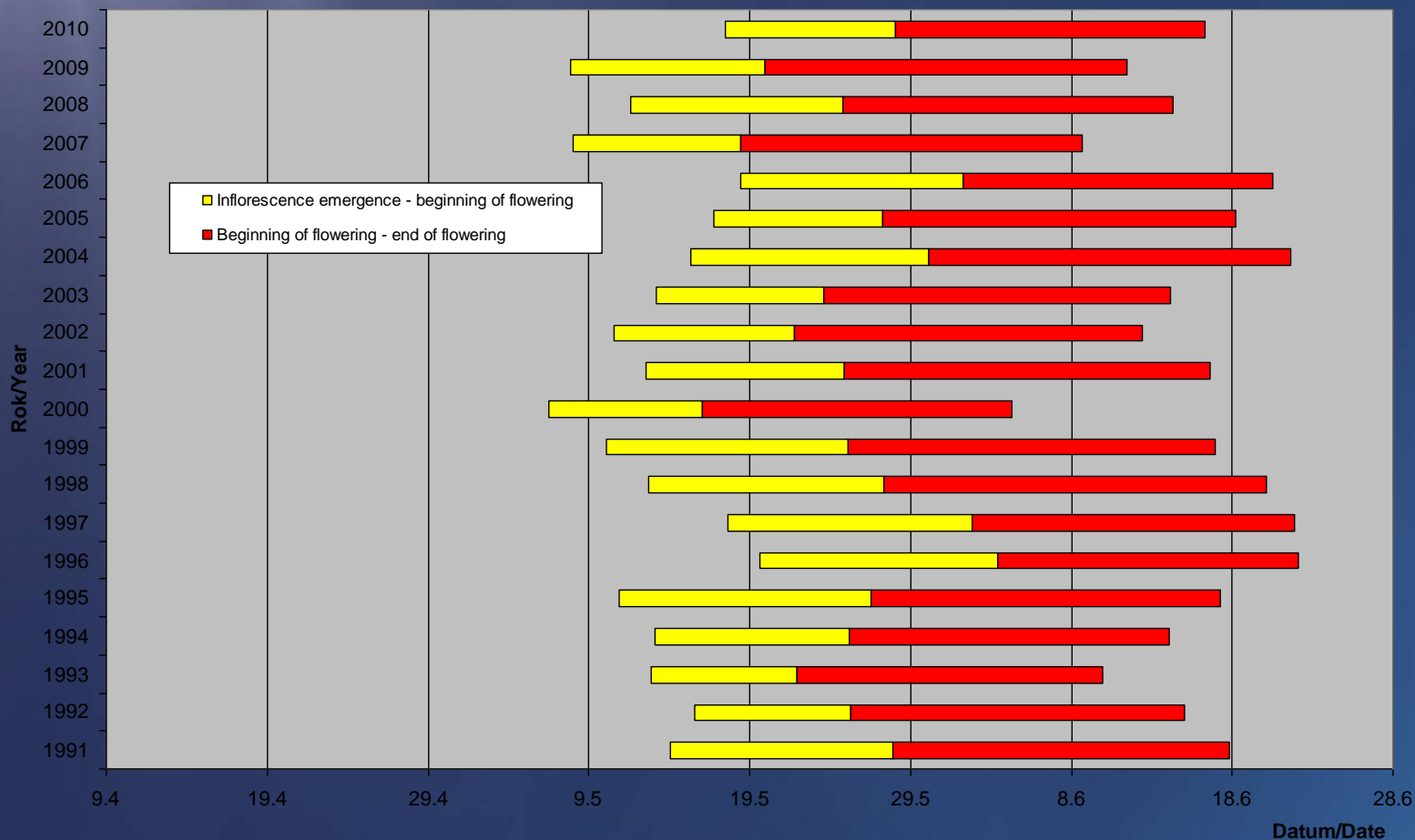




Dactylis glomerata L.

Temporal variability of flowering

Průměrné trvání kvetení včetně butonizace u srhy říznačky v letech 1991 - 2010





Alopecurus pratensis L.

	Inflorescence emergence (BBCH51)			Beginning of flowering (BBCH61)			End of flowering (BBCH69)		
m n. m.	*	**	***	*	**	***	*	**	***
≤200	29.4.	11,0	12,5	5.5.	9,0	14,1	25.5.	8,3	16,4
201 - 400	3.5.	9,8	12,4	9.5.	9,7	13,7	29.5.	9,5	16,1
401 - 600	7.5.	8,3	11,5	13.5.	8,8	12,8	2.6.	10,3	15,4
601 - 800	11.5.	7,1	10,7	17.5.	7,2	12,0	6.6.	10,8	14,5
≥801	17.5.	9,7	9,8	23.5.	8,2	11,1	12.6.	10,0	13,2



Caltha palustris L.

Beginning of flowering - end of flowering

*	**	***	****	*****
29	1,1	394	189	7,5
27	1,4	373	185	7,5
27	1,6	320	195	7,9
27	2,2	249	191	8,0
27	3,1	242	196	8,4



Conclusion

1) Temporal shift of phenophases for period 1991 - 2010

All phenophases have tendency to earlier onset

Exception - latest onset:

first leaves (BBCH 07) – Hepatica

beginning of flowering (BBCH 61) – Kamath weed

end of flowering (BBCH 69) - Fireweed

2) Vertical phenological gradients

2 – 5 days/100 m

Extreme years: 2000, 2007, 2009 (earlier onset)

1996, 2006 (later onset)

deviations (15 – 15 days)



Conclusion

Meteorological characteristics:

Pentade air temperature: descending trend

Sum of air temperature: descending trend

Sunshine duration: indifferent trend

Number of days with precipitation total above 1 mm:
increasing trend

Thank you for your attention...



hajkova@chmi.cz