PHENOLOGICAL ANOMALIES REGARDING THE FLOWERING OF SPONTANEOUS, SUBSPONTANEOUS AND CULTIVATED PLANTS IN THE BIHOR COUNTY (ROMANIA) DURING MARCH 1, 2023-APRIL 1, 2024

ILIE Aurelian Leonardo, MARINESCU Mariana, CIOBOIU Olivia, ILIE Lorena Cosma

Abstract. The paper presents observations about the phenological anomalies regarding the flowering of spontaneous, subspontaneous and cultivated plants in the Bihor county (Romania) during the period March 1, 2023 - April 1, 2024. These anomalies are consequences of global warming, being observed in 39 species belonging to 21 botanical families. Premature flowering, flowering extension and supplementary flowerings were observed. Most phenological anomalies were observed in the following botanical families: Asteraceae (11 species), Scrophulariaceae, Brassicaceae, Fabaceae (3 species), Ranunculaceae, Rosaceae (2 species). Two species: *Wisteria sinensis* Sims and *Rudbeckia triloba* L presented two phenological anomalies regarding flowering.

Keywords: spontaneous, flowering, phenological anomalies, Bihor county.

Rezumat. Anomalii fenologice privind înfloritul la plantele spontane, subspontane și cultivate din județul Bihor (România) în perioada 1 martie 2023-1 aprilie 2024. Lucrarea prezintă observații despre anomalii fenologice privind înfloritul la plantele spontane, subspontane și cultivate din județul Bihor (România) în perioada 1 martie 2023-1 aprilie 2024. Aceste anomalii sunt consecința încălzirii globale fiind observate la 39 de specii aparținând la 21 familii botanice. Au fost observate înfloritul prematur, extinderea înfloritului și înfloriri suplimentare. Cele mai multe anomalii fenologice au fost observate la următoarele familii botanice: Asteraceae (11 specii), Scrophulariaceae, Brassicaceae, Fabaceae (3 specii0, Ranunculaceae, Rosaceae (2 specii). Două specii: *Wisteria sinensis* Sims și *Rudbeckia triloba* L au prezentat două anomalii fenologice privind înfloritul.

Cuvinte cheie: spontane, înflorit, anomalii fenologice, județul Bihor.

INTRODUCTION

The Bihor county is located in the south-western part of the Crișana province, which is located in the north-western part of Romania. The climate changes determined the appearance of phenological anomalies regarding flowering in plants: prematurely flowering, flowering extension, supplementary flowerings. Data about the phenological anomalies regarding the flowering of spontaneous, subspontaneous and cultivated plants of Romania were published by different authors (ILIE et al., 2018; 2020; 2023).

MATERIALS AND METHODS

The observations were made during March 1, 2023-April 1, 2024 in the Bihor county, in plain and hilly areas: Tinca, Nojorid, Păușa, Oradea. The identification of plant species was made using different sources (CIOCÂRLAN, 2000; SÂRBU et al., 2013).

RESULTS AND DISCUSIONS

During the analysed period, phenological anomalies regarding flowering were observed in the 39 species of plants (Table 1).

Table 1. Phenological anomalies regarding the flowering of spontaneous, subspontaneous and cultivated plants of the Bihor county (original).

Botanical family, species	Data of observations in different areas	Phenological anomalies of flowering	Period of normal flowering (months)
Urticaceae			
Urtica dioica L.	19 X 2023, T; 30 X 2023, O	E. f	VI-IX
Rosaceae			
Agrimonia eupatoria L.	4 VIII-10 X 2023, T	S. f	VI-VIII
Pyrus domestica Medik.	The second flowering in parallel with the fruits, 17 V-5VI 2023, T	S. f	III-IV
Hypericaceae			
Hypericum perforatum L.	5 X 2023, T	E. f	VI-IX
Convolvulaceae			
Ipomoea purpurea Roth.	25 IX-15 XI 2023, T	S. f	VI-IX
Violaceae			
Viola tricolor L.	Many flowers, 28 IX 2023-22 II 2024, T	S. f	V-IX
Chenopodiaceae			
Chenopodium album L.	5 XI 2023, T	E. f	VII-X

Scrophulariaceae			
Verbascum blattaria L.	30 X 2023, O	S. f	V-VII
Linaria vulgaris Mill.	16 XI-10 XII 2023, O	S. f	VI-IX
Veronica persica Poiret	26 XII 2023-1 III 2024, T	P. f	III-VI
Asteraceae			
Inula britannica L.	26 XI-3 XII 2023, T	S. f	VII-IX
Carduus acanthoides L.	20 X-2 XII 2023, T	S. f	VI-IX
Chondrilla juncea L.	20-29 XI 2023, O	S. f	VII-IX
Sonchus oleraceus L.	20 XI-4 XII 2023, O	S. f	V-IX
Chrysanthemum vulgare L.	25 XI 2023, T, O	S. f	VII-IX
Achillea millefolium L.	20 XII 2023, T; 25 XII 2023, O	S. f	VI-VIII
Matricaria recutita L.	Many flowers, 10 XI-11 XII 2023, O	S. f	V-VI
Taraxacum officinale Web.	31 XII 2023-1 III 2024, T	S. f	IV-VI
Anthemis arvensis L.	4 I-7 II 2024, T	P. f	VI-VIII
Senecio vulgaris L.	14 II-1 III 2024, T	P. f	III-IX
Rudbeckia triloba L.	12 V-3 XII 2023, T	P. f, E. f	VII-X
Boraginaceae			
Anchusa officinalis L.	10 XI-2 XII 2023, O	S. f	V-VII
Apiaceae			
Daucus carota L.	15 XI-2 XII 2023, O	S. f	VI-IX
Brassicaceae			
Berteroa incana DC.	15 XI-2 XII 2023, O	S. f	V-IX
Draba verna L.	8 II-1 III 2024, T	P. f	III-IV
Capsella bursa-pastoris Medik.	17 II-1 III 2024, T	P. f	IV-VII, X-XI
Fabaceae			
Vicia lutea L.	25 XI 2023, O	S. f	V-VI
Robinia pseudoacacia L.	The second flowering: 20 VI 2023, P; 28 VII, 3-7 VIII 2023, T	S. f	IV-VI
Wisteria sinensis Sims.	25 IV-5V 2023 (the first flowering); 22 VI 2023 (the second flowering); successive flowerings: 24 VII-10 VIII 2023, 21 VIII-5 IX 2023, 3 X 2023 (a single flower), 14 X-21 X 2023, T	P. f, S. f	V-VI
Ranunculaceae			
Ranunculus bulbosus L.	Many flowers, 4 I-7 II 2024, T	P. f	V-VI
Potentilla reptans L.	19 IX-25 XII 2023, T	S. f	V-VIII
Euphorbiaceae			
Euphorbia helioscopia L.	7 XII 2023, O	S. f	IV-IX
Cannaceae			
Cana indica L.	2 XII 2023, T	E. f	VIII-IX
Solanaceae			
Nicotiana alata Link et Otto	2 XII 2023, T	E. f	VII-X
Fumariaceae			
Chelidonium majus L.	2 XII 2023, T; a flower bulb, 25 XII 2023, O	S. f	V-IX
Amaryllidaceae			
Galanthus nivalis L.	A flowering specimen, 25 XII 2023, 20 I 2024, O	P. f	II-III
Aristolochiaceae			
Aristolochia clematitis L.	The second flowering: 27-4 VIII 2023, the third flowering: 30 IX 2023, O	S. f	V-VI
Papaveraceae			
Papaver rhoeas L.	5 VIII 2023, N	E. f	V-VII
Magnoliaceae			
Magnolia soulangeana Soul-Bod	2-13VII 2023, T	S. f	III

Legend: T = Tinca; O = Oradea; N= Nojorid; P= Păușa; P. f = Premature flowering; S. f = Supplementary flowering; E. f = Extension of Flowering; I, II...XII = months of the year (January...December).

The observed species belong to 21 families. Most phenological anomalies were observed in the following botanical families: Asteraceae (11 species), Scrophulariaceae, Brassicaceae, Fabaceae (3 species), Ranunculaceae, Rosaceae (2 species), Euphorbiaceae, Cannaceae, Solanaceae, Fumariaceae, Amaryllidaceae, Aristolochiaceae, Papaveraceae, Magnoliaceae, Urticaceae, Hypericaceae, Convolvulaceae, Violaceae, Chenopodiaceae, Boraginaceae, Apiaceae (1 species). Premature flowering was seen in 7 species, extension of flowering in 6 species and supplementary flowering in 24 species. Two species presented two flowering anomalies: *Rudbeckia triloba* L, *Wisteria sinensis* Sims. The successive flowerings were observed in *Wisteria sinensis* Sims. Supplementary flowering and fructification were observed in *Pyrus domestica* Medik. Some plant species show a constancy regarding these anomalies in the last years: *Achillea millefolium* L., *Carduus acanthoides* L., *Rudbeckia triloba* L., *Taraxacum officinale* Web., *Potentilla reptans* L., *Robinia pseudoacacia* L., *Viola tricolor* L., *Galanthus nivalis* L.

CONCLUSIONS

During the analysed period, premature flowering, supplementary flowering and the extension of flowering were identified in 39 plant species of the Bihor county. Two species presented two flowering anomalies.

REFERENCES

CIOCÂRLAN V. 2000. *Flora ilustrată a României*. Edit. Ceres. București. 1138 pp.

ILIE A. L., NĂSTASE A., CIOBOIU OLIVIA. 2018. Phenological anomalies regarding the flowering of spontaneous and subspontaneous plants from four different parts of Romania. *Oltenia*. *Studii și Comunicări. Științele Naturii*. Muzeul Olteniei Craiova. **34**(1): 193-199.

ILIE A. L., MARINESCU MARIANA, HOZA I. 2020. New phenological anomalies regarding the flowering of spontaneous and cultivated plants from different parts of Romania. *Current Trends of Natural Sciences*. University Press. Pitești. **9**(17): 194-200.

ILIE A. L., MARINESCU MARIANA, HOZA I., CIOBOIU OLIVIA, NĂSTASE A. 2023. Phenological anomalies regarding the flowering of spontaneous, subspontaneous and cultivated plants of Romania during 2021-April 1, 2023. *Muzeul Olteniei Craiova*. *Oltenia.* Studii și Comunicări. Științele Naturii. **39**(1): 253-259.

SÂRBU A., ȘTEFAN N., OPREA A. 2013. *Plante vasculare din România. Determinator ilustrat de teren.* Edit. Victor B. Victor. București. 1320 pp.

Ilie Aurelian Leonardo
Nicolae Jiga Theoretical High School, 36A, Republicii Street, Tinca, Romania.
E-mail: aurelian_ilie@yahoo.fr

Marinescu Mariana
University of Oradea, Teacher Training Department, Universității Street, No 1, Oradea, Romania.
E-mail: marinescum54@yahoo.com

Cioboiu Olivia
The Oltenia Museum of Craiova, Str. Popa Șapcă No. 8, 200422, Craiova, Romania.
E-mails: oliviacioboiu@gmail.com; cioboiu.olivia@yahoo.com

Ilie Lorena Cosma
Gymnasium School No 1, Batăr, Romania.
E-mail: aurelian_ilie@yahoo.fr

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