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## ***PHLEUM PHLEOIDES* (L.) H. KARST. – AN INVASIVE SPECIES?**

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### **ABSTRACT**

It was observed during field investigations that *Phleum phleoides* show expansive character at some stations. Three populations were selected from 31 stations of the species known from the central-eastern Poland. At each of these stations 10 tufts were chosen randomly in two repetitions: the first in typical grassland, the second in grassland with visible disturbed upper layer of soil (in Bohukały, Mołożew, Popowo Kościelne). The following parameters were measured: quantity of inflorescences in one tuft, length of each inflorescence shoot and length of each inflorescence ear in investigated tuft. Average values for each tuft and investigated stations were calculated. Obtained results were compared with parameters of typical grasslands in Gnojno and Kisielany and three populations from xerothermic grasslands in southern Poland.

It was noted, that at all stations, where upper layer of soil was disturbed the grass shows strongly expansive character and behaves as a "neophyte".

**Key words:** *Phleum phleoides* (L.) H. Karst., distribution, population parameters, central-eastern Poland.

### **INTRODUCTION**

During our studies on vegetation of central-eastern Poland special attention was paid to the fact that in habitats with disturbed upper layer of soil *Phleum phleoides* shows expansive character. The species is dominant element of grasslands reaching cover 4 or 5 in Brown-Blanquet scale [15]. Its morphological features attain higher parameters than similar populations from grassland developing at typical habitats.

Model of ecological expansion [12] is characteristic for such native species as e.g.: *Puccinella distans* and *Calamagrostis epigeios*. Among from species brought to Poland similarly behaves e.g. *Antoxanthum aristatum* rapidly spreading in fields and wastelands [4] and *Eragrostis minor*, establishing in ruderal habitats – lawns, pavements, roadsides [11].

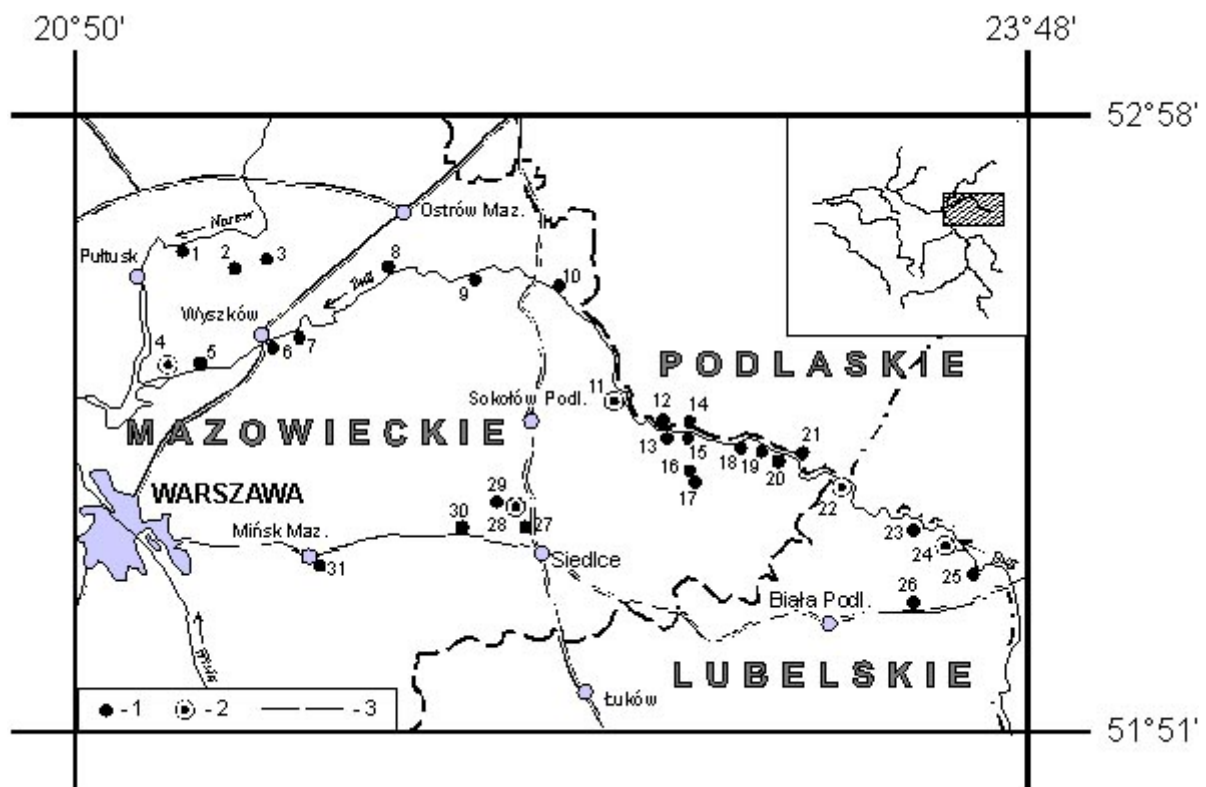
*Phleum phleoides* (L.) H. Karst. is a characteristic species of xerothermic grasslands from *Festuco-Brometea* class [14]. The species was noted in whole Poland, however center of its occurrence is the south of the country. Fijałkowski [8] stressed that it occurs numerously in the flora of Lubelska Upland.

Farther to the north stations of *Phleum phleoides* become rarer. Celiński [1] described stations from xerothermic grasslands in Mielnik and Drohiczyn. Sokołowski [16] mentions three stations from Drohicza Upland. Only one, historic station, situated to the north of Supraśl is known from Knyszyńska Forest [17].

The taxa occurs sporadically in eastern central Poland – Południowopodlaska Lowland and neighboring areas [13]. The species was listed by Głowacki [9,10] and Ciosek [2] from that area. Ciosek at al. [3] described several stations from “Podlaski Przełom Bugu” Landscape Park. Ćwikliński [5] reports the station of *Phleum phleoides* from oak forests in Chodów range near Siedlce. Another one from Mińsk Mazowiecki [6].

31 stations of *Phleum phleoides* in Południowopodlaska Lowland mesoregion have been known till now (Fig. 1). Most of them are situated in the Bug and Liwiec valleys.

**Fig. 1. Localization stations of *Phleum phleoides* in Południowopodlaska Lowland mesoregion. 1 – stations, 2 – stations studied in the paper, 3 – voivods borders**



#### LIST OF STATIONS

1. Zambski Kościelne, Obryte commune, leg. M. Ciosek; 2. Rzańnik, Rzańnik commune, leg. M. Ciosek; 3. Porządzie, Rzańnik commune, leg. M. Ciosek; 4. Popowo Kościelne, Somianka commune, Ciosek (1990); 5. Barcice, Somianka commune, Ciosek (1990); 6. Wyszaków, Wyszaków commune, 19.06.1987, leg. M. Ciosek; 7. Kamieńczyk, Wyszaków commune, leg. M. Ciosek; 8. Brok, Brok commune, leg. M. Ciosek; 9. Bojary, Kosów Lacki commune, Głowacki (1989); 10. Kamionka Nadbużańska, Nur commune, leg. M. Ciosek; 11. Mołożew, Jabłonna Lacka commune, Głowacki (1976); 12. Drohiczyn, Drohiczyn commune (Celiński 1961), leg. M. Ciosek; 13. Drażniew, Korczew commune, Głowacki (1976); 14. Zajączniki, Drohiczyn commune, leg. M. Ciosek; 15. Mężenin, Platerów commune, 22.06.1994, leg. M. Ciosek; 16. Myszkowice, Łosice commune,

Głowacki (1976); **17.** Patków-Prusy, Łosice commune, Głowacki (1976); **18.** Kózki, Sarnaki commune, *Ciosek et al.* (1993); **19.** Fronolów, Sarnaki commune, *Ciosek et al.* (1993); **20.** Mierzvice, Sarnaki commune, *Ciosek et al.* (1993); **21.** Mielnik, Mielnik commune (Celiński 1961), *Ciosek* (1992); **22.** Gnojno, Konstantynów commune, *Ciosek et al.* (1993); **23.** Zaczopki, Rokitno commune, *leg. M. Ciosek*; **24.** Bohukały, Terespol commune, *Ciosek et al.* (1993); **25.** Neple, Terespol commune, 23.06.1994, *leg. M. Ciosek*; **26.** Horbów, Zalesie commune, Wierzba, Marciniuk (1995 pers. com.); **27.** Chodów, Siedlce commune, Ćwikliński (1990); **28.** Kisielany, Mokobody commune, 13.07.1988, *leg. M. Ciosek*; **29.** Mokobody, Mokobody commune, Głowacki (1976); **30.** Bojmie, Kotuń commune, 07.07. 1994, *leg. M. Ciosek*; **31.** Mińsk Mazowiecki, Mińsk Mazowiecki commune, Ćwikliński & Bartnik (1990).

## METHODS OF INVESTIGATIONS

Studies were focused on analysis of some morphological features of *Phleum phleoides* as a result of disturbances in upper layer of soil. Investigations were carried out in 1998 in full florescence period (June - July).

The investigations were carried out on population of *Phleum* in three following localities: Bohukały – Terespol commune, Lublin Province; Mołożew – Jabłonna Lacka commune and Popowo Kościelne – Somianka commune, Mazowsze Province. In each of the localities two areas, in distance of about 5 – 10 m, were distinguished and their parameters were measured. Both populations were situated in the same soil and climatic conditions. Difference between them resulted from human interference in superficial layer of soil (area I).

Studied areas were selected to achieve enough acreage of the community and the species, both in typical and degenerated plot. Attention was also paid to regular distribution of investigation areas.

Location and description of stations:

1. Bohukały I – visible traces of former ploughing, disturbed upper layer of soil,
2. Bohukały II – xerothermic grassland, lack of traces of human interference,
3. Mołożew I (nature reserve) – visible erosion of upper layer of soil, slope - inclination about 60°,
4. Mołożew II (nature reserve) – compact xerothermic grassland without traces of human activity, top of the slope,
5. Popowo Kościelne I – xerothermic grassland, overgrowing path in the area of station,
6. Popowo Kościelne II – xerothermic grassland, no traces of human activity.

From each station 10 tufts were chosen randomly (throw with circle) and the following features were measured:

- quantity of inflorescences in one tuft,
- length of each inflorescence shoots in every examined tuft,
- length of each inflorescence ear in investigated tuft.

The obtained results were compared with results of measurements of two populations of *Phleum phleoides* from typical xerothermic grasslands in Południowopodlaska Lowland – station in Gnojno and Kisielany.

Average values for each tuft and for every station were calculated. Besides, in each station, the tuft with greatest number of inflorescences was found.

Results of measurements of *Phleum phleoides* from stations in central eastern Poland were compared with parameters of features of three populations occurring in xerothermic grasslands of *Festuco-Brometea* class in nature reserves in southern Poland (Świętokrzyskie Province): Skowronno Dolne – Pińczów commune, Krzyżanowice – Pińczów commune and Mt Zelejowa – Chęciny commune.

Obtained results were placed in the summary table ([Tab. 1](#)).

**Table 1. Selected parameters of features of *Phleum phleoides* (L.) H. Karst.**

	Station	Height of shoots (cm)		Length of inflorescence (cm)		Numer of inflorescences in one tuft	
		mean	extreme values	mean	extreme values	mean	extreme values
Stations from central-eastern Poland	Bohukały I	79	108-50	12	17-6	33	73-7
	Mołożew I	69	90-38	7	15-3	12	21-4
	Popowo Kościelne I	53	79-27	8	16-2	15	23-10
	Bohukały II	61	77-21	7	16-2	10	30-3
	Mołożew II	54	74-32	5	9-3	7	14-3
	Popowo Kościelne II	54	74-31	7	15-1	10	17-6
	Gnojno	58	80-24	6	10-2	7	13-2
	Kisielany	46	74-20	5	8-2	8	15-4
Stations from southern Poland	Skowronno Dolne	58	73-42	5	7-2	4	7-2
	Krzyżanowice	57	71-39	7	12-3	12	25-3
	Góra Zelejowa	42	57-18	4	9-2	5	13-2

Significance of differences among values of the features from each station was calculated according to t-Student test and of Tukey's correlation coefficient [18].

## RESULTS

Results of measurements show the visibly differences between stations with disturbed upper layer of soil and stations from typical grasslands. The differences are the most clearly noticeable in Bohukały I ([Tab. 1](#)).

The greatest values of studied morphological features were noted there: average height of shoots – 79 cm, the greatest inflorescence shoot – 108 cm, average length of inflorescence – 12 cm, the longest inflorescence – 17 cm. The station was also characterized by the greater mean number of inflorescence shoots– 33; the greatest tuft had 73 inflorescence shoots. At the same station (Bohukały II), at typical grassland (no disturbances in upper soil layer) the parameters of the features were respectively: 61 cm; 77 cm; 7 cm; 16 cm; 10; 30. All the mean parameters of features between stations Bohukały I and II differ significantly.

Differences of studied parameters were observed also between stations Mołożew I and II. Mean values of the features were: height of inflorescence shoots 69 – 54 cm, length of inflorescence 7 – 5 cm, number of inflorescence shoots in one tuft 12 – 7, however significantly differ only the heights of inflorescence shoots.

The smaller differences between populations are observed in stations in Popowo Kościelne.

Values of the investigated features of the studied populations of *Phleum* in all remaining stations in the Południowopodlaska Lowland do not differ significantly. There are also no significant differences between those stations and data received from nature reserves in the Świętokrzyskie Province.

## CONCLUSIONS

Fertility and climatic parameters of all studied stations (Bohukały, Mołożew and Popowo Kościelne) were the same. The stations differed only in manner of soil use (ploughing, path in the study area). It seems to be the cause of differences in the parameters of populations.

- At all stations, where upper layer of soil was disturbed (station Bohukały I and Mołożew I) the grass shows strongly expansive character.

- All the measured parameters of the features at station in Bohukały I are significantly greater than similar values from stations Bohukały II. Station in Mołożew I significantly differs from the remaining only as to mean height of shoots.
- At all remaining stations, also in Świętokrzyskie Mts. and Nidziańska Basin, parameters of the studied features are similar (differences are statistically insignificant).

The investigation of condition of *Phleum phleoides* at stations with disturbed upper soil layer has been only initiated in the present paper. Deeper explanation of the problem requires further studies - establishing constant study areas (in order to observe succession) and phytosociological investigations.

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