

A CONTRIBUTION TO THE KNOWLEDGE OF THE DISTRIBUTION OF *Equisetum hyemale* L. (*Equisetaceae*) IN CROATIA

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During floristic and vegetational research of the region in Croatia to the north of the Sava River, *Equisetum hyemale* has been discovered in 12 new localities. In the Repaš forest area, fragments of the *Equiseto-Alnetum incanae* association have been registered, constituting its furthestmost point of expansion to the East.

Key words: *Equisetum hyemale*, *Alnus incana*, *Alnus glutinosa*, distribution, Croatia

Franjić, J., I. Trinajstić, Ž. Škvorc, M. Presečan, & I. Samardžić: Prilog poznavanju rasprostranjenosti vrste *Equisetum hyemale* L. (*Equisetaceae*) u Hrvatskoj. *Nat. Croat.*, Vol. 8, No. 2, 95–100, Zagreb

Tijekom florističkih i vegetacijskih istraživanja dijela Hrvatske sjeverno od rijeke Save otkrivena je zimska preslica (*Equisetum hyemale*) na još 12 novih nalazišta. Na području repaških šuma zabilježeni su fragmenti as. *Equiseto-Alnetum incanae* koji predstavljaju najistočniju točku rasprostranjenosti te zajednice.

Ključne riječi: *Equisetum hyemale*, *Alnus incana*, *Alnus glutinosa*, rasprostranjenost, Hrvatska

INTRODUCTION

As stated by ŠEGLJA (1994), *Equisetum hyemale* belongs to the third category of endangered plants (the sensitive-vulnerable kind). So far, this species has been known from a relatively small number of localities (cf. Fig. 1 and 2; SCHLOSSER &

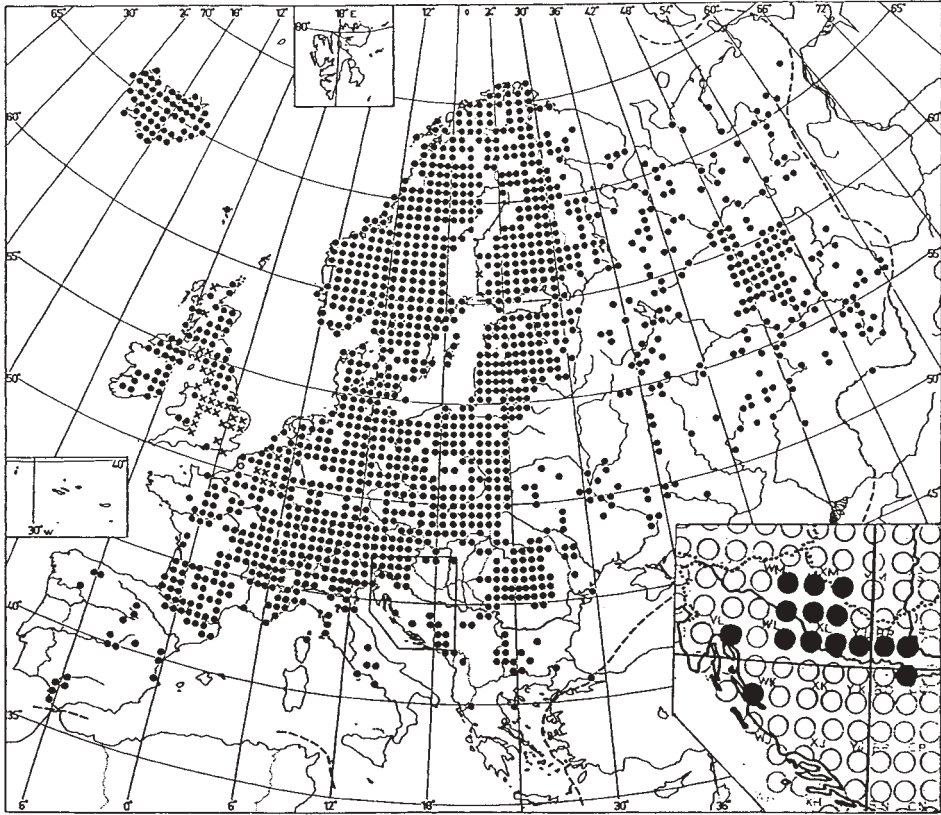


Fig. 1. Distribution of the species *Equisetum hyemale* L. in Europe (according to JALAS & SUOMINEN, 1972 supplemented and corrected)

VUKOTINVIĆ, 1869; DEGEN, 1936; HIRC, 1905; HORVAT, 1962; ŠUGAR, 1972; TRINAJSTIĆ, 1973, 1995; ŠEGULJA, 1974; REGULA-BEVILACQUA, 1978, 1991; RAUŠ & ŠEGULJA, 1983; ŠEGULJA, 1994), most often described with insufficient precision. *E. hyemale* is a pioneer species growing on sandy and moist habitats near water streams. As such habitats, due to the regulation of streams, have been reduced considerably in the last few decades, the survival of *E. hyemale* is very uncertain.

E. hyemale grows inside the forest association *Equiseto-Alnetum incanae* M. Moor 1958) Trinajstić 1973 (MOOR, 1958; TRINAJSTIĆ, 1973). This association belongs to the prealpine grey alder forests that extend along the Drava River banks to its middle stream (cf. MOOR, 1958; MÜLLER & GÖRS, 1958; SCHWABE, 1985). According to WENDELBERGER-ZELINKA (1952), the specie *E. hyemale* grows along the Danube inside the forest association *Alnetum incanae fraxinetosum* Wendelberger-Zelinka 1952.

The *Equiseto-Alnetum incanae* association represents a pioneer forest association described under this name by TRINAJSTIĆ (1973) for the area along the Drava River between Varaždin and Novo Selo.

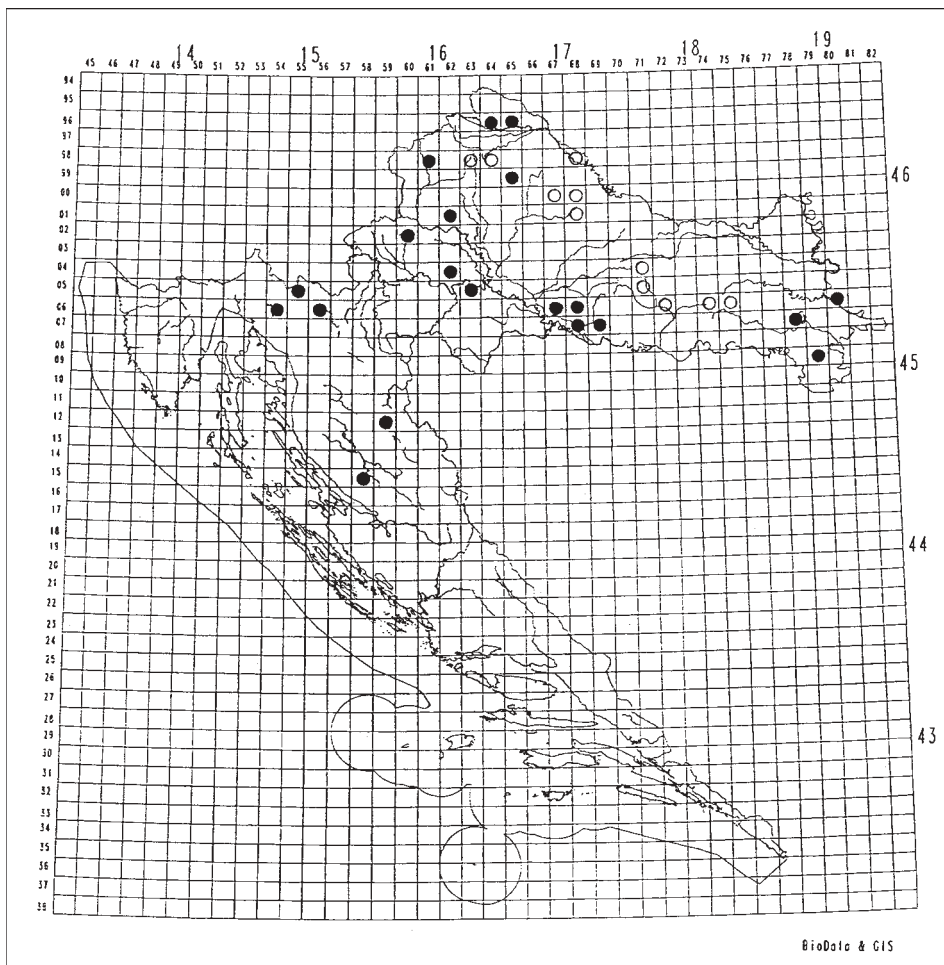


Fig. 2. Distribution of the species *Equisetum hyemale* L. in Croatia (● previously described localities, ○ new localities)

ANALYSIS OF THE DISTRIBUTION OF *Equisetum hyemale* IN CROATIA

In the last few years, the distribution of *E. hyemale* in Croatia was monitored, and was discovered in the following localities:

1. on the Drava River sand banks near Repaš village in Podravina (23. 07. 1995; Hb. Dr. I. TRINAJSTIĆ-ZA; UTM – XM4; MTB – 9868), where it grows abundantly. There it grows together with *Alnus incana* and *A. glutinosa*. As *E. hyemale* with *A. incana* does not occupy large surfaces, this combination of species

- can be considered only as fragments of the *Equiseto-Alnetum incanae* association, while on deep soils rich with nutrients *A. incana* has been pushed out by *A. glutinosa*, *E. hyemale* remaining in the shrub and herb layers;
2. along the Lonja River, not far from its source, at Paka village (along the Zagreb-Varaždin road, 14. 01. 1993; Hb. Dr. I. TRINAJSTIĆ-ZA; UTM – XM2; MTB – 9863). There, *E. hyemale* grows together with *A. glutinosa* in large amounts;
 3. along the Drenovčica stream between the villages of Drenovec and Jalševac (near Varaždinske Toplice, 12. 02. 1997; Hb. Dr. I. TRINAJSTIĆ-ZA; UTM – XM2; MTB – 9864). In this area, *E. hyemale* grows with *A. glutinosa* in several localities, and in all of these localities in large amounts;
 4. in the locality of Maretić jarak near the »Bjelovarska Bilogora« forest management unit (section 116b; 29. 06. 1998; Hb. Dr. I. TRINAJSTIĆ-ZA; UTM – XL3; MTB – 0067), at the altitude of about 150 m. In the same unit it occurs also in section 134a at the altitude of about 160 m. In both these localities *E. hyemale* grows inside the *Carpino betuli-Quercetum roboris typicum* Rauš 1971 association on marly soil;
 5. along the road near the Kozarevac village (near Kloštar Podravski; 31. 01. 1999; Hb. Dr. I. TRINAJSTIĆ-ZA; UTM – XL3; MTB – 0068) in the area of the »Seča« forest management unit (sections 42, 43 and in sections 57 and 58), at the altitude of about 180 m. There *E. hyemale* grows on several localities inside the *Carici pilosae-Fagetum* Oberdorfer 1957 association on marly soil;
 6. in one valley inside section 1d of the »Pisanička Bilogora« forest management unit (31. 01. 1999; Hb. Dr. I. TRINAJSTIĆ-ZA; UTM – XL3; MTB – 0168), at the altitude of about 140 m. There, *E. hyemale* grows inside the *Carici pilosae-Fagetum* association on pseudogley;
 7. along the small Lonđa River between the villages of Granice and Rozmajerovac (near Našice; 21. 12. 1997; Hb. Dr. I. TRINAJSTIĆ-ZA; UTM – BR2; MTB – 0674). There *E. hyemale* and *A. glutinosa* grow in a very small area (approximately 50 m²);
 8. around the source of the Breznice stream, not far from the village of Đakovačka Breznica (23. 12. 1997; Hb. Dr. I. TRINAJSTIĆ-ZA; UTM – BR2; MTB – 0675), where *E. hyemale* grows together with *A. glutinosa* in several smaller areas;
 9. around the source of the Vuka River source and near Borovik Lake not far from the village of Paučje (near Đakovo; 29. 12. 1997; Hb. Dr. I. TRINAJSTIĆ-ZA; UTM – BR2; MTB – 0675). On this locality *E. hyemale* grows together with *A. glutinosa* in large amounts;
 10. along the Brzaja stream down to Šušnjari (27. 04. 1996; Hb. Dr. I. TRINAJSTIĆ-ZA; UTM – XL4; MTB – 0571), on the border of the »Zapadni Papuk I« (of Kamensko, sections 45 and 50) and »Zapadni Papuk II« (of Zvečevo, sections 44, 47, 104) forest management units at the altitude of 290–330 m. There, *E. hyemale* grows together with *A. glutinosa*, on quartz sands in a narrow strip along the water course;

11. along the Duboka rijeka stream, in the »Zapadni Papuk II« forest management unit (sections 48, 73, 74; 23. 03. 1996; Hb. Dr. I. TRINAJSTIĆ-ZA; UTM – XL4; MTB – 0471), at the altitude of 360–380 m. On this locality again *E. hyemale* grows with *A. glutinosa* on quartz sands which contain small quantities of clay and colluvial;
12. along the Vučjak stream near the Požega-Vrhovci Gradski road (26. 05. 1997; Hb. Dr. I. TRINAJSTIĆ-ZA; UTM – YL2; MTB – 0672), in the »Babja gora« forest management unit (sections 64a, 65a), at the altitude of 180–210 m. There, *E. hyemale* grows together with *A. glutinosa* in a narrow strip along the stream on alluvial-colluvial sediments.

In Fig. 2, the actual state of the spread of *E. hyemale* is shown (the earlier known habitats and the new ones).

DISCUSSION AND CONCLUSION

Equisetum hyemale is very rare in the flora of Croatia, so it has been classified in the third category of endangered plants (cf. ŠEGULJA, 1994). So far, it has been known in a relatively small number of localities, but during the latest research it has been recorded in 12 new localities in the territory of Croatia to the north of the Sava River (cf. Fig. 2). As *E. hyemale* occurs on very permeable (sandy) soils, it is linked with water courses and very narrow zones along them.

In the 20th century, due to the construction of embankments, the digging of deep drainage channels, the making of reservoirs and similar activities, considerable changes in the areas along streams took place, which had a tremendous impact on the habitats in the vicinity of water courses. These habitats became much drier, which considerably affected the survival of *E. hyemale*, as well as that of the *Equiseto-Alnetum incanae* association, which is considered to be a pioneer plant association. It is a central European plant association developing in the middle part of the Drava and Danube streams (cf. WENDELBERGER-ZELINKA, 1952; MOOR, 1958; MÜLLER & GÖRS, 1958; SCHWABE, 1985), and in Croatia it is at the very edge of its spread (TRINAJSTIĆ, 1973). In the latest plant sociology research, this species has been found to be developed fragmentarily in the Repaš forest area, which is its most easterly habitat in Croatia.

Our opinion is that, due to many hydrological activities carried out in the Drava River area, the survival of both *E. hyemale* and the *Equiseto-Alnetum incanae* as. is very uncertain. As *E. hyemale* grows also outside the present habitat of *Alnus incana*, we think that because of the increased amounts of humus and soil swamping, *A. incana* has been pushed out by *A. glutinosa*, whose growth is favoured by such habitats, while *E. hyemale* continues to remain in the association with *A. glutinosa*.

In the Bilogora region, *E. hyemale* is part of the *Carpino betuli-Quercetum roboris typicum* association, which can be considered also a remnant of the former forests of *A. incana*. These forests, very likely by succession over many years, have passed through *A. glutinosa* forest into *Carpino betuli-Quercetum roboris* forests, which would be a normal succession sequence for this region.

Also, it is very interesting to note that in the locality of Jezero Borovik *E. hyemale* grows together with *A. glutinosa*, which in some of its morphological properties (leaf blade tip of acute shape, smooth white bark) is reminiscent of *A. incana*, which could be connected with introgression.

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