

Occurrences of Adventive Plant Species and their Coenological States in Plant Communities in Four Sample Areas in Hungary

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Abstract – In the framework of „Genetic researches and risk analysis of invasive animal and plant species in the region of West and North Transdanubia” project (TÁMOP-4.2.1.B-09/1/KONV), four sample areas have been examined (Tétényi-fennsík, Cserhát, Tolnai-dombság, Pannonhalmi-dombság) in Hungary from 2010 to 2012. Our aims were to detect the most dangerous invasive species in the region, and to examine their importance in non-woody plant communities. The most frequent and multitudinous invasive species have occurred in the quadrates were the Canadian goldenrod (*Solidago canadensis* L.) (Cserhát, Tolnai-dombság, Tétényi-fennsík) and the giant goldenrod (*Solidago gigantea* AIT) (Pannonhalmi-dombság). Another common invasive species of dry grasslands is *Ailanthus altissima* (MILL.) SWINGLE, which was found en masse in Tétényi-fennsík, but it presented in other sample areas too. The high abundance of *Asclepias syriaca* L. has been found in fallow habitat inhibiting the process of natural succession.

Keywords: invasive plant species / grasslands / coenological survey / seed bank

1. INTRODUCTION

In the framework of „Genetic researches and risk analysis of invasive animal and plant species in the region of West and North Transdanubia project”, 4 sample areas have been examined (Tétény highlands, Cserhát hills, Tolna hills, Pannonhalma hills) in Hungary from 2010 to 2012. Our aims were to detect the most dangerous invasive species in the region, and to examine the importance of these species in the plant communities. We studied only non woody associations.

Direction of secondary succession of dry grasslands is strongly influenced by the type and the intensity of former disturbance (DOBSON et al. 1997). After TURNER (1989) disturbance means discrete proceedings, when the structure of the population or ecosystem change as well the physical environment or the accessibility of the sources. The publications analysing the succession and regeneration of dry and semi-dry grasslands affect to variable parts of vegetation and ecology sciences (PRÉCSÉNYI 1995, MARGÓCZI 1995, VIRÁGH és BARTHA 1998, BARTHA et al. 2000, CSECSERITS et al. 2005, RUPRECHT 2006, KELEMEN et al. 2010).

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2. MATERIALS AND METHODS

5 sample quadrates were marked out in each micro region, their area were 4 m x 4 m. Coenological surveys were made with the method of BRAUN-BLANQUET (1928), moreover soil samples were collected from two different layer (5 cm and 10 cm) for the seed bank research. By the seed bank we can conclude the process of vegetation change, the regeneration potential of grasslands, the changes of the dominance and future prediction of it. We collected samples from two soil strata which were examined in greenhouse from 2011 March to October. All of the sample areas are situated in hilly region between 150-250 meters sea elevation. The soil of Cserhát hills, Tolna hills and Pannonhalma hills were formed on sandy-loess sediments, till the Tétény-highlands structured limestone. In Cserhát hills, which is close to the Hungarian Northern Hills, the potential forest association is *Quercus petraeae-cerris*, while the Tolna-hills and Pannonhalma-hills covered by *Aceri tatarico – Quercetum* association. Because of the strong submediterranean effect and the edaphic factors the Tétény-highlands are covered with *Quercetum pubescentis* and wide range dry grasslands. In view of the naturalness the common features of the four regions are the low cover of semi-natural habitats, just as the low species number of the natural plant communities. In Cserhát hills and Pannonhalma-hills the increase of the fallow areas is revealing, till in Tétény-highlands the building of areas causes the main degradation.

3. RESULTS AND CONCLUSION

The most frequent and multitudinous invasive species are the *Solidago gigantea* (Tolna-hills, Tétény-highlands, Pannonhalma-hills) and *Solidago canadensis* (Cserhát hills) (*Picture 1*). The latter species we detected in the last year also in Pannonhalma hills, it spreads quickly from the east towards to Kisalföld region. Another common invasive species in dry grasslands is the *Ailanthus altissima*, which was found in Tétény highlands, but it is present in other sample areas also (*Picture 2*). The abundance of *Asclepias syriaca* is high in fallow habitats; it impedes the process of natural succession. *Aster lanceolatus* which occurred in big quantity next to the rivers and appeared in dry grasslands also in the last years. Besides the mentioned invasive plants the following species spread quickly in these areas: *Celtis occidentalis* (Tolna-hills), *Erigeron annuus* (Cserhát hills), *Syringa vulgaris* and *Rhus typhina* (Tétény-highlands). A few adventive species are not considered invasive yet, but their speed of adaptation shows to this direction: *Juglans regia*, *Gleditsia triacanthos*.



Picture 1. Old vine yard with the Solidago gigantea
(Photo: D. Schmidt)



Picture 2. Ailanthus altissima
(Photo: M. Korda)

We came to the conclusion from distribution of Raunkiaer life forms that examined sample areas has already abandoned a long time ago. That is why therophytes and hemitherophytes were supplanted comparing with disturbance tolerant and generalist perennials. Disturbance of domestic animals is the reason of high number of therophytes in grazed grasslands. The warm, steep dry grasslands are more sensitive for the “natural” disturbance such as erosion, than the degraded areas, therefore these territories contains more therophytes. In grazed and natural grasslands the number of chamaephytes is relatively high (Figure 1).

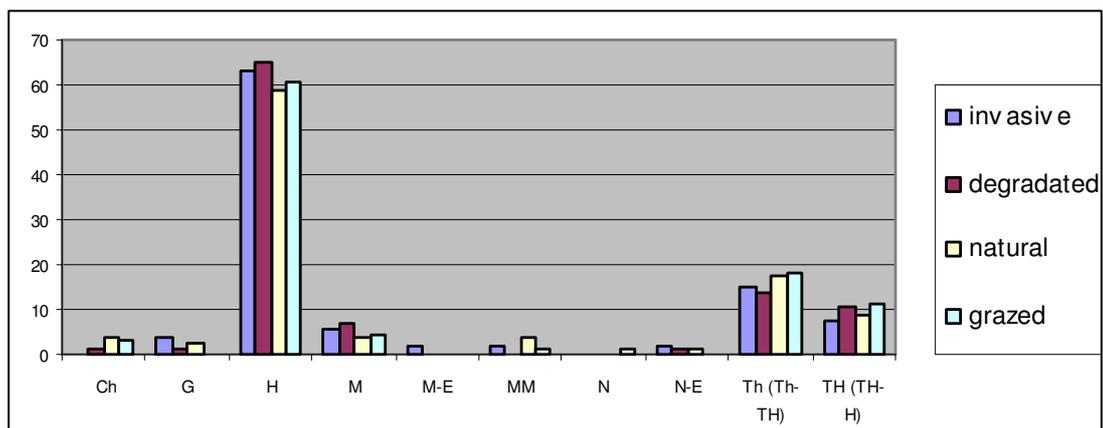


Figure 1. Distribution of Raunkiaer life forms in grassland categories (%) of coenological data

Abbreviations: Invasive: Grasslands infected by invasive plant species, 2. Degradated: degraded grasslands, 3. Natural: Natural grasslands, 4. Grazed: Grazed grasslands

We used the same estimation method in the seed bank research but the result of this was mainly different. The generalist perennial plants number decreased in the first year. The proportion of generalist perennials was 50% but only in the grasslands which infected by invasive plants. In all grassland category the rate of therophytes and hemitherophytes increased, which shows the higher seed bank production of these plants. Its competition ability is the highest in the first year, after it is supplanted and finally the perennials replace it. The proportion of chamaephytes, geophytes and trees are not higher than 10% in seed bank research, neither in coenological surveys (Figure 2).

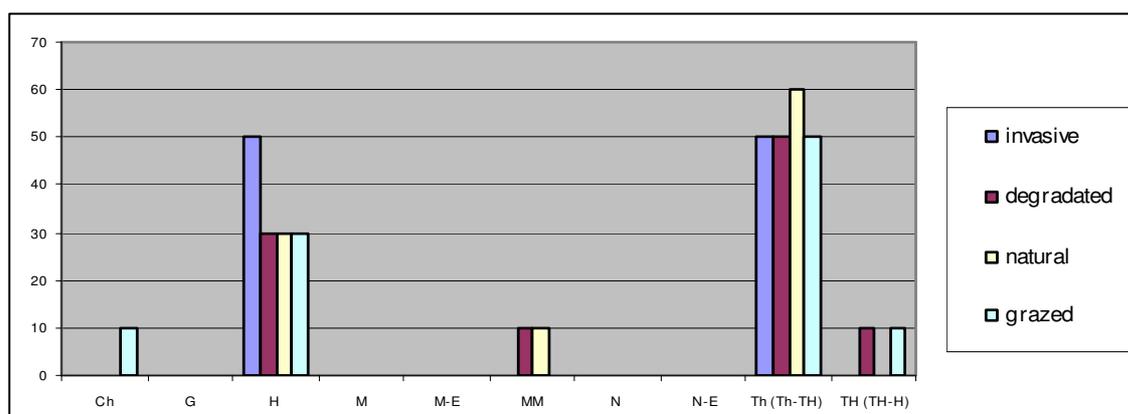


Figure 2. Distribution of Raunkiaer life forms in grassland categories (%) of seed bank data

Abbreviations: Invasive: Grasslands infected by invasive plant species, 2. Degradated: degraded grasslands, 3. Natural: Natural grasslands, 4. Grazed: Grazed grasslands

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