ABANDONED LOESSY GRAPE YARDS AS REFUGES OF RARE STEPPE PLANT SPECIES

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Abstract: Nature protected plant species characteristic for loess grasslands of the Hungarian Great Plain can be found in several grape yards of hilly areas that have been abandoned different times (20–200 years) ago. Small parcels of abandoned grape yards were studied in the Putnok Hills micro region of the Northern Hungarian Mountain Range. Rare loess plant species could be detected as a consequence of erosion driven by century-old hoeing and great slope angle, as loessy parent material has appeared on (or near) the surface of the soils, resulting in the appearance of plant taxa characteristic for loess grasslands of plain and foothill regions.

Keywords: grape yard, secondary loess steppe, land abandonment, erosion, landscape history

Introduction

Land abandonment and, in parallel, regeneration of vegetation on the abandoned areas are characteristic processes in Hungary. Direction of these processes leads attention onto several problems of nature conservation and environmental protection (Centeri and Vona, 2006; Vona et al., 2007). Habitats generated by abandonment and being in a close-to-natural state usually differ from natural vegetation. Centuries old agricultural activities on diverse habitats of the Putnok Hills resulted in specially structured landscape mosaics. Agricultural landscape should play a role also in nature conservation (Szemán, 2007; Tasi, 2007).

This paper presents results of studies started in 1999. Species richness of the mosaic-like areas was highly visible, leading to more detailed surveys. Besides floristical data, also habitats and historical and current forms of landscape management are also observed. Exploring pedological relations and state of soils has got a high importance as well, since as a consequence of great slope angles in parallel with anthropogenic processes, water and wind erosion has been strengthened on several areas during the latest decades (Várallyay, 2006; Várallyay, 2007). Landscape management and long term maintenance and conservation of main characteristics of soils is only possible by preserving the diversity of living beings generated on them in parallel (Birkás et al., 2006; Kádár, 2007).

Materials and methods

The studied area (consisting of two slopes of one valley: Iván-tető and Ragyás-szőlő) is situated between Szuhafő and Zádorfalva villages within the Putnok Hills (North-East Hungary). Its botanical relations have been explored between spring 1999 and spring 2007 (Malatinszky and Penksza, 2004), while landscape management, landscape history and pedological conditions were observed between 2002 and 2007.

During floristical surveys, enumeration of plant taxa follows the nomenclature of Simon (2000). During coenological investigations describing the most valuable habitats on their typical vegetation patches, the method of Braun–Blanquet (1964) was followed. Coenological relevés were prepared in 2005. Sizes of quadrates were 2x2 meters.

Relevés are not presented in the current paper. Habitat types were observed several (at least 4) times, in different stages and in different parts of the vegetation period.
Pedological surveys (and, in parallel, ones concerning erosion) were prepared during the vegetation period of 2003, 2004 and 2005 years. Field observations were made partly by using a Pürckhauer sampler (Finnern, 1994). Soil factors that are important from vegetation ecological aspect (pH, lime content, organic matter and nutrient content, water management factors) were analyzed on collected samples based on the soil and agro chemistry analyses method books of Buzás (1988, 1993) in the laboratory of the Department of Pedology and Agro Chemistry of Szent István University. Analyzed parameters were the following ones: pH/H_2O, pH/KCl, humus % (with Tyurin method), total organic matter %, $CaCO_3$ %, AL-P_2O_5, AL-K_2O.
Sources used during observations on historical forms and current methods of management, landscape history and effects of land abandonment were the following ones: narrations of local inhabitants, of colleagues of the Ecological Institute (Miskolc) and of the Aggtelek National Park Directorate (Jósvafő); maps of military mappings (based on which changes in land use can be followed up well); descriptions given to the first military mapping (Csorba, 1993); various literature on ethnography in the region; and collections on the history of villages in Gömörszőlős.

Results and discussion

Viniculture, that is management of grape yards (as well as fruit orchards in an extensive way) in the observed area has been present since the Middle Ages and has reached its maximum size in the early 1880's. During that decade, vine-pest has destroyed all the areas covered by grape. Although reintroduction of grape yards has started closely after the vine-pest epidemic, parcels of several grape yards remained out of management (Dobány, 2004; and narrations of local inhabitants). In many cases, fruit orchards (plum, apple, pear breeds and walnut) were established on the slopes. Only a small area of grape yards, that could meet the local needs (without commerce), was reestablished.
The observed areas are situated near villages that are surrounded by poorly fertile arable lands. After development of heavy industry in the vicinity (Borsod Basin) in the 1960's, a significant part of the inhabitants became employed in mining and industrial centers and moved away from the observed area or started to commute, therefore the traditional land use was abandoned in several areas. Abandoned arable lands are currently in different stages of succession, depending on the time passed since abandonment.
Slopes of abandoned grape yards are characterized by thin fertile soil layer, caused by strong natural erosion (due to high slope angle) and hoeing during the 18–19th centuries. Parent material has been found usually already at 10 cm deepness, being loess or loessy sediment, with high $CaCO_3$ content. Besides that, these soils are characterized by bad soil structure, strong compaction, low humus content (around 1 %) and low nutrient content (phosphorous and potassium below 50 ppm). These soil features basically determine which plant species may appear on their surface (Csontos et al., 2007).
Eroded slopes of abandoned grape yards served the generation of dry grasslands similar to those on steppes, giving home for nature protected plant species. Exposition of slopes played a significant role in abandonment. Terraces of grape yards with a northwestern exposition had been abandoned from grape production cca. 200 years ago (according to

military mappings), therefore, time passed since then could have been enough for revegetation and generation of a secondary dry grassland. Its structure refers to the dry loess steppes. Dominant grass species of this slope is *Brachypodium pinnatum*, which refers to the stabilization of the grassland, giving home for valuable loess steppe species indicating low nutrient content such as *Linum falvum*, *L. tenuifolium*, *Pulsatilla grandis*, *Polygala major* and *Prunella grandiflora*.

Sites with southeastern exposition that have been abandoned from grape production after the vine-pest epidemic, that is cca. 120 years ago, are currently covered mainly by *Brachypodium pinnatum*, giving home for several rare species of natural and semi-natural steppes, including *Prunus fruticosa, Pulsatilla grandis, Linum tenuifolium, L. flavum, L. hirsutum, Polygala major, Aster amellus, Dianthus collinus, Orchis purpurea, O. tridentata, O. militaris, O. ustulata* and *Senecio erucifolius*.

Sites that are affected by regular burning (induced by local elder people who wish to sustain the view of landscape without shrubs) has become featureless, with much lower number of species, including those referring to disturbance (*Bothriochloa ischaemum*).

Parcels still under grape cultivation are dominated mainly by weed species. *Molinia arundinacea* appearing among currently cultivated parcels (with southeastern exposition) of the upper parts of slopes refer to one-time oak forest coverage in the area (found also in historical geography works).

In the foothill regions of grape yards, characterized by colluviums with deeper fertile layer, succession after abandonment starts with regeneration of grasslands, followed by appearance of different shrub species, however, this process is strongly set back by annual burning, and the regeneration of forests (eradicated in the early Middle Ages) is almost impossible due to erosion. *Festuca* species and *Stipa pennata* have become dominant on the driest and steepest zones. Less steep and less dry zones, not affected by burning are usually dominated by *Crataegus monogyna* and *Prunus spinosa* shrubs. Succession processes affect the directions of reforestation and generation of mosaic-like forested steppe. Gradually after abandonment, number of species is growing and character species of surrounding areas settle next to the disturbance tolerant weeds. Number of steppe species grows constantly and they take dominant position from weeds. In parallel with growing number of species, number of degradation tolerant ones is decreasing and naturalness value category of occurring species is growing. Forest steppe species appear in the parcels (such as *Linum* spp., *Crepis praemorsa*).

Among habitat types registered during our researches, the following one is declared as priority habitat type of community interest in the Annex I of the Habitat Directive (92/43/EEC) of the EU: no. 6210 that is Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) as important orchid sites.

Conclusions

The view of nature has changed elementarily on the observed areas in the presence of humans during the past centuries. Changes in the environment have been accelerated in the past decades: with its direct and indirect effects, heavy industry founded in the vicinity has decreased the size and naturalness of habitats further. On the other hand, however, by attracting the working population away, it has helped nature's new expansion and increasing mosaic-like areas in the landscape.

Natural environment of the studied area basically determines the types and intensity of management activities, which fact is verified also by data gained during landscape historical studies. Processes in grasslands are basically determined by their exposure, angle of slopes and vegetation cover, which affect water regime of the soil as well. In case of abandonment of small parcel grape yards, valuable plant species appear on the previously disturbed or eroded surfaces. Natural or induced burning of grasslands in some years may play an important role in avoiding closing of vegetation cover and becoming shrubbier, however, it may be undesirable considering invertebrate fauna.
The abandonment of small parcels of grape yards in the Putnok Hills launched processes favorable for nature conservation (due to geological backgrounds). As a consequence of erosion driven by century-old hoeing and great slope angle, loessy parent material appeared on the surface, resulting in the appearance of protected plant taxa characteristic for loess grasslands of foothill and plain regions.

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