

Impact of Management Practices on Species Richness of Grasslands in Agricultural Region of Middle Slovakia



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Historical background

Collectivization process

- The cooperatives were formed on a basis of a rich tradition of an advanced cooperative system (latter part of the 19th century).



- The most important overall structural change - politically motivated socialistic collectivization and intensification of agriculture.
- High value of soil - small farmers were willing to join the cooperative but richer landholders had to be coerced.

After 1989

- privatization of land started in 1992
- forty-two percent of cooperative property belongs to children of former cooperative members
- younger generation had lost positive affection toward the land (lack of knowledge of the small farms, no management experience).
- diminishing agricultural output (highly productive areas (mainly in lowlands) have been intensified but marginal areas with poorer soils have been abandoned).
- stock decrease
- fragmentation of large-scale fields, decrease in use of fertilizers and pesticides = positive effect on biological and landscape diversity.

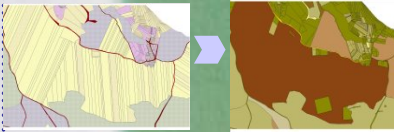
At present, limited company Rolan owns 150 cattle. Cattle is grazing on a fenced pasture or freely with attendance of shepherd.



Compare with last decades, number of cattle in private ownership has decreased. One of the reasons is that houses in this territory are more and more used as cottages for recreation (from 550 of family houses, 120 are used only for recreation). People that use houses for recreation do not raise cattle and so they do not need grassland for producing hay and pasture. As a result, there are grasslands that are being abandoned.

- Fertilization, which leads to increased biomass and to dominance of a few species reduces species richness in temperate grasslands (Goldberg and Miller, 1990) (Eriksson, Å., et. al, 1995)
- Historical factors, i.e. duration and intensity of management is also important for species richness in grasslands (Watt, 1981)
- Area is an important determinant of species richness, irrespective of habitat heterogeneity. Isolation in space also play significant role. (Bruun, H., 1999)
- Cutting intensity/ abandonment (Krahulec et al., 1996)

The result of agricultural intensification was that in 1971 the average field size was 10 – 15 ha (compare to 4 are in 1949), and after 1979 the some fields were up to 300 ha large.



Intensification brought small rise in productivity (lack of know-how)

The result: badly managed fields, devastated plant and animal production and loss of relationship of previous owners toward land were the main negative impacts of this process.

- Main reasons for biodiversity loss due to intensification of agriculture:

- Liquidation of hedges (e.g. non-forest wood vegetation)
- Fragmentation of natural biotopes
- Hydro melioration
- Intensive pasture



- High loads of pesticides and fertilizers, short rotation periods of crops
- Abandonment of agricultural land caused by lack of machinery

Study area

MALÁ LEHOTA



Cadastre (400 - 818 m a.s.l.) has marginal position in Žarnovica district. Main features of the territory is disperse type of settlement (so called štále) and prevailing agricultural and forest utilization.

The region was settled in 14th century. Tending of cattle and sheep, growing cereals, woodcutting and charcoal burning were the main activities of people.



MANAGEMENT OF GRASSLANDS

Establishment of grasslands in the territory was connected with raising of cattle. Traditional management of grasslands with a scythe is continuing today mainly on small patches of private meadows. After collection of hay, some meadows are grazed.



Occasionally, farmers improve meadows with seeds or fertilize them with inorganic or organic fertilizers.

Grasslands in holding of limited company Rolan (former cooperative) are intensively managed, improved with seed mixtures and fertilized with sanytr.

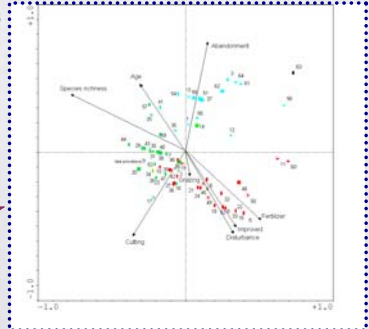
METHODOLOGY

Goal of the methodology: evaluate main factors that influence diversity of grasslands in agriculturally utilized landscape.

Relevés performed on meadows, pastures, orchards, grassland stripes and hedges in order to cover all the grassland habitats in different levels of intensity (from abandoned to intensively managed grasslands)

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|--|--|---|
| 1. Abandonment <ul style="list-style-type: none"> Not abandoned Abandoned Abandoned – sprouted with shrubs | 2. Age (time since cultivation) <ul style="list-style-type: none"> Existence of grassland 12 years ago Existence of grassland 47 years ago Existence of grassland 71 years ago | 3. Fertilizer <ul style="list-style-type: none"> Not used Used |
| 4. Cutting intensity <ul style="list-style-type: none"> No cutting Irregular cutting Regular cutting | 5. Grazing <ul style="list-style-type: none"> Not grazed Irregular grazing Regular grazing | 6. Soil disturbance <ul style="list-style-type: none"> No disturbance Harrowed or ploughed |

RESULTS



Variables disturbance, fertilizer, improved show negative correlation with species richness. Positive correlation is between species richness and age of grassland.



Extensive pasture app. 60 species on 25 m²



Dactylorhiza sambucina



Abandoned grassland app. 45 species on 25 m²

Intensive meadow app. 25 species on 25 m²



Former hedges = ecotone biotopes, high species richness (app. 50 species on 25 m²)



Orchis purpurea



Orchis tridentata

1. poor soils	cutting	decrease in diversity, oligotrophy
	cutting + fertilization	increase in biodiversity
	no cutting	succession toward forest, decrease in diversity
3. moderately rich soils	cutting	increase in diversity
	cutting + fertilization	maintenance or decrease in biodiversity
	no cutting	DF (Polygonum bistorta) decrease in diversity
4. rich soils	cutting	slow increase in biodiversity
	cutting + fertilization	maintenance or decrease in biodiversity
	no cutting	decrease in biodiversity