

## **Effects of woody species encroachment and fire on the soil seed bank of Transylvanian dry basiphilous grasslands - perspectives for their restoration**

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### **Background:**

Semi-natural dry basiphilous grasslands in the Transylvanian Basin of Romania are among the most species-rich grasslands worldwide and protected according to the Habitats Directive of the European Union. They evolved in response to human impact over millennia (grazing and cutting) and to prevailing environmental conditions. Currently, they are under threat due to land use changes: abandonment and intensification of sheep farming. As soon as the management of the grassland ceases, litter accumulation begins, followed by the invasion and establishment of native and non-native shrubs and trees. In order to halt secondary succession, the deliberate burning of shrub-encroached grasslands has progressively been applied.

### **Questions:**

The establishment of woody species in grassland as well as the application of fire management to prevent the further spread of shrubs has recently increased in Transylvania. Still, little is known about the underlying mechanisms and the specific effects of encroachment by native and non-native woody species as well as fire on plant species and functional diversity of these grasslands. Likewise, there is a lack in efficient measures in Transylvania to restore grassland already invaded by woody plants. Consequently, we ask: (i) In which ways does woody species encroachment affect plant species and functional diversity, (ii) do native and non-native woody species differ with respect to their impact on grassland species composition and structure, (iii) is controlled burning a useful management tool to control shrub encroachment and to preserve biodiversity of these grasslands, and (iv) can soil seed banks contribute to the restoration of dry basiphilous grasslands in Transylvania?

### **Methods:**

We collected data on plant species richness, composition and structure, topsoil conditions and soil seed bank composition in 16 shrub encroached grassland sites in the Transylvanian Basin, Romania, from June to August 2016. We compared uninvaded grassland patches (0 % woody species cover) and shrub encroached grassland patches (> 70 % woody species cover). The soil seed bank samples collected in the field were transferred to Kiel, Germany, to allow seed germination. They were exposed to greenhouse conditions for three months.

### **Expectations, preliminary results and outlook:**

We expected that shrub encroachment in Transylvanian dry grasslands would be accompanied by a decrease in species and functional diversity, a homogenization of the functional trait space and an increase in number of shade and competition tolerating plant species. First results from our study confirm that diversity indices are significantly lower in shrub encroached grasslands compared to uninvaded grasslands. We further expected effects of non-native woody species on grassland species composition and structure to be more pronounced compared to native woody species, e. g. through their ability to modify soil conditions by N-fixation. Fire, a possible management tool to halt secondary succession in these grasslands, will certainly decrease the cover of shrub and tree species but may favor only a subset of the original grassland species pool.

The outcomes of our study will extend the theoretical base for an improved management of dry basiphilous grasslands in Transylvania and the conservation of these highly diverse ecosystems.