

Renewal of endangered habitats by using cultivation of protected species in ex-situ conditions in Botanical Garden of the Slovak Agricultural University in Nitra.

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Introduction

One of the main activities of the SUA Botanical Garden in Nitra, besides the building of simulated habitats, is the cultivation of chosen species in *ex-situ* conditions and subsequent replanting of these species in their original locality. The last completed project of this type was a project for the cultivation of *Alkanna tinctoria* (L.) Taush. and *Colchicum arenarium* Waldst. et Kit., prepared in co-operation with the State Nature Conservancy of the Slovak Republic. The aim was to cultivate seedlings and then replant them in their original localities in the National Nature Reserve in Cenkovska steppe and Cenkovska lesosteppe areas. Part of the cultivated population will be saved in the collections of the Botanical Garden as a back-up source of genetic material.

Materials and methods

The project, focused on the cultivation of *Alkanna tinctoria* and *Colchicum arenarium*, was carried out in co-operation with the State Nature Conservancy of the Slovak Republic. The object of the project was the cultivation of these two species, involving the cultivation of individuals in artificial conditions and the subsequent planting of young individuals within the Botanical Garden as well as in the natural localities of these species.

The seeds were gathered from the wild (the Cenkovska Steppe National Nature Reserve and Cenkovska forest steppe and on Szentendre Island), by the employees of the National Nature Conservation of the Slovak Republic in 2010 and 2011, in total 952 pcs of *Alkanna tinctoria* (Table 2) and 1494 pcs of *Colchicum arenarium* (Table 1). Seeds were sown in containers and put into a prepared hotbed. The whole experimental area was secured against moles and birds.

Results and discussion

Colchicum arenarium

Year 1: The seeds of *Colchicum arenarium* did not germinate in the first year after planting, but considering the long period of germination of this species, it was not alarming.

Year 2: The second year brought observable changes to *Colchicum arenarium*. In March 2011, 159 germinated plants were counted, all of them from sowings of 2010. The original seeds had been gathered on the individual localities in the range of three days, altogether at the same time. They were sown in one day and in the same conditions. Based on this, we are concluding that the marked differences in the germination of seeds are caused by different maturing of seeds from the different localities. The individuals will be planted in their original localities as soon as they reach sufficient size (considering the long development cycle of this species).

Alkanna tinctoria

The seeding of *Alkanna tinctoria* was the first germination for either species. All together 51 seedlings were germinated up until 30th October 2010.

Germinated individuals of *Alkanna tinctoria* started to grow again at the end of March 2011. More germinating seedlings appeared as well. From these seedlings 60 pcs were picked in May and

these were given to the employees of the National Nature Conservation of the Slovak Republic and planted in the localities in the Mužla district.

The rest was left on the experimental area and watched henceforward. After a relatively rich quantity of flowers, which appeared at the beginning of April, seeds started to be created as well. At the beginning of June they were gathered and put off for further sowing. We made this step because of obvious destructive changes on mother plants. The main part of old mother plants started gradually to dry up or to decay from the roots. We noticed a similar process on the related species (*Onosma tornensis* Jáv.) from the family *Boraginaceae*, so we think that it is a natural display of some species of this tribe.

Table 1. Schedule of gathering and sowing of *Colchicum arenarium*

Location of gathering	Date of gathering	Number of diasporas in pcs	Date of sowing of diasporas
Čenkovská	28. April 2010	150	21. May 2010
Szentendrej	29. April 2010	190	21. May 2010
Čenkovská lesostep	30. April 2010	625	21. May 2010
Čenkovská lesostep	3. May 2011	529	9. May 2011

Table 2. Schedule of gathering and sowing of *Alkanna tinctoria*

Location of gathering	Date of gathering	Number of diasporas in pcs	Date of sowing of diasporas
Čenkovská	15. June 2010	252	1. July 2010
Čenkopevská	22. June 2010	700	6. August 2010

Conclusion

Biotopes (habitats) based on sandy soils appear in Slovakia in separated localities and therefore it is necessary to maintain the diversity of the species from different areas. *Ex-situ* cultivation helps to keep the structure of species, but it does not solve the problem of conserving endangered valuable biotopes. First of all it is necessary to stop the sand-mining, artificial afforestation and the building in of sand dunes, as well as to control and remove the invasion of woody species.