

## Cultivation of *Colchicum arenarium* and *Alkanna tinctoria* in terms of ex-situ from the diasporas in the Botanical Garden of the Slovak Agricultural University in Nitra

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Abstract: In order to keep biological diversity there are many protected areas, not only in Slovakia. Xeric sand calcareous grasslands and Pannonic sand steppes belong to the most important biotopes with European meaning. These are sand societies on inland flying sand with a specific grassy-herbaceous constitution. The purpose of the project of cultivation of *Colchicum arenarium* and *Alkanna tinctoria* in the terms of ex-situ from the diasporas was to cultivate individuals in artificial conditions and consecutively to plant them into the areas with natural presence in Čenkovska step and Čenkovska lesostep. in the register Mužla in region of Nove Zámky. The whole project was realized in co-operation with the National Nature Conservation of the Slovak Republic.

Keywords: cultivation, flying sand, project, Čenkovska step, Čenkovska lesostep

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### Introduction

The main premise to keep the variability and the diversity of natural sources is the need to protect and keep as large scale of plants as possible for the next generation. Today it is very difficult to realise this target therefore the activity of

botanical gardens in this field is so important. Natural biotopes are changing every year and human intervention is a kind of double-edged weapon for them. The human is either responsible for their devastation or he is fighting against the power of nature and human impact in order to save the volatile biotopes in their natural version.

Xeric sand calcareous grasslands and Pannonic sand steppes belong to the most endangered biotopes in Slovakia. These are sand biotopes on inland flying sand with a specific grassy-herbaceous constitution on sand hills and dunes. The biotope is endangered first of all because of sand-mining and natural succession as well. Both biotopes have only limited appearance in Slovakia, more locally on Podunajska plane and Vychodoslovenska lowland.

These societies are characterized by the presence of rare and endangered species. For example on sand calcareous grasslands it is an endemic and critically endangered species *Colchicum arenarium* Waldst. et Kit. and on Pannonic sand steppes it is an critically endangered and proprietary *Alkanna tinctoria* (L.) Taush. (VICENÍKOVÁ & POLÁK 2003)

## Material and methods

The project of cultivation of *Colchicum arenarium* and *Alkanna tinctoria* was realized by the Botanical garden of the SAU in Nitra in co-operation with the National Nature Conservation of the Slovak Republic. The subject of the project was the cultivation of mentioned species, thus the cultivation of individuals in artificial conditions and consecutively the planting of young individuals on prepared areas in Botanical garden as well as on original localities of these species in the register Mužla in region of Nove Zamky. The diasporas were gathered on the natural localities by the employees of the National Nature Conservation of the Slovak Republic in 2010 and 2011, totally 952 pcs of *Alkanna tinctoria* (L.) Taush. and 965 pcs of *Colchicum arenarium* Waldst. et Kit. There is a schedule of gathering and sowing in the following Tables 1,2.

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

| <b><i>Colchicum arenarium</i> Waldst. et Kit.</b> |                   |                            |                     |
|---------------------------------------------------|-------------------|----------------------------|---------------------|
| Location of gathering                             | Date of gathering | Number of diasporas in pcs | Sowing of diasporas |
| Čenkovská step                                    | 28. 4. 2010       | 150                        | 21. 5. 2010         |
| Szentendrei Sziget                                | 29. 4. 2010       | 190                        | 21. 5. 2010         |
| Čenkovská lesostep                                | 30. 4. 2010       | 625                        | 21. 5. 2010         |
| Čenkovská lesostep                                | 3. 5. 2011        | 529                        | 9. 5. 2011          |

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

| <b><i>Alkanna tinctoria</i> (L.) Taush.</b> |                   |                            |                     |
|---------------------------------------------|-------------------|----------------------------|---------------------|
| Location of gathering                       | Date of gathering | Number of diasporas in pcs | Sowing of diasporas |
| Čenkovská step                              | 15. 6. 2010       | 252                        | 1. 7. 2010          |
| Čenkovská step                              | 22. 6. 2010       | 700                        | 6. 8. 2010          |

Diasporas were sowed into containers and put into prepared seed-bed. The seed-bed was secured in the lower part with a net against moles and with a bonded textile against washing up the sand into lower parts of soil. The sand was overlaid on the textile up to 30 cm. Each container was filled with draining layer of grit, thin layer of mix of peat and sand and finally with pure sand. Seeds were sowed on gently stemmed surface, floured by a small layer of sand and put into prepared seed-bed. The whole experimental area was covered by a net to prevent scrabbling of birds.

## Results and discussion

In the first year of handling no changes were noticed on the sows of *Colchicum arenarium*. But concerning the long period of germination of this species it was not alarming. By sows of *Alkanna tinctoria* there was a first germination in both cases till the first month since the sowing. By 30.10.2010 together 51 seedlings were germinated.

In the second part, second year of handling there were noticeable changes on *Colchicum arenarium* as well. In March 2011 together 159 germinated plants were counted, all of them from sowings of 2010. The ratio of germinated plants to sowed diasporas is in Tab. 3.

**Tab. 3. The ratio of germinated plants to sowed diasporas.**

| Location of gathering      | Number of sowed diasporas | Number of grown individuals |
|----------------------------|---------------------------|-----------------------------|
| Čenkovská step             | 150 pcs                   | 6                           |
| Szentendrei sziget         | 190 pcs                   | 132                         |
| Čenskovská lesostep (2010) | 625 pcs                   | 21                          |

As it was noticed in the methods (Tab. 1) the diasporas were gathered on the individual localities in the range of three days, altogether at the same time. They were sowed in one day and by the same conditions. Based on this we are concluding that the marked differences in the germination of diasporas are caused by different maturing of seeds on individual localities.

Considering the long development cycle of this species the individuals will be planted on the original localities as soon as they reach sufficient size of abscess.

Germinated individuals of *Alkanna tinctoria* started to grow again at the end of March 2011. More germinating seedlings appeared as well. In May some containers with small plants were picked out from the seed-bed and seedlings were divided into small flower-pots, all together 60 pcs. These were given to the employees of the National Nature Conservation of the Slovak Republic and planted in the localities with natural presence in the register Mužla. The rest was left on the experimental area and watched henceforward. After 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 similar process on the related species

(*Onosma tornensis* Jáv.) from the tribe *Boraginaceae*, so we think that it is a natural display of some species of this tribe.

## Conclusion

Biotopes of sand societies appear in Slovakia only locally and therefore it is necessary to keep the diversity of the species. Cultivations in the terms of ex-situ help to keep the structure of species but they don't solve the problem of endangered valuable biotopes. First of all it is necessary to stop the sand-mining, artificial afforestation and building in of sand dunes, as well as to control and remove the raids of woody species.

## References

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