

## European Green alder (*Alnus viridis* (CHAIX) DC) - alien plant in the Krkonoše Mts. National Park?

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Abstract: In 1998 field revision started focused on European Green Alder occurrence in the area of the Krkonoše Mountains National Park. It has been found that this alder species is not native in respected area and that there is a risk of threat for natural vegetation through strong dispersal ability of the species. Based on the field data and Nature Protection Act No. 114/1992 clearance of green alder started. In four years programme (1999 – 2003) number of sites was reduced approximately on one half of original state. In 2004 this programme will continue. There is still discussion on possible use of this species in forest regeneration.

Keywords: the Krkonoše Mts., *Alnus viridis*, forest regeneration.

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### Introduction

Not native plants are used in wide range of human activities. This applies especially to agriculture and forestry where these plants are used mainly because of their production characters, different from native species. Introduction of new species is always questionable. There is potential danger in not native species that they will turn to alien in their new habitat. This is the case of *Alnus viridis* in the Krkonoše Mts. NP. Within Europe is this species native in the Alps and the Carpathian range. The natural range reaches southern border of the Czech Republic. Thus we distinguish some locations in the south of the Czech Republic with natural occurrence of *Alnus viridis*. It is mainly southern part of the Šumava and the Novohradské Mountains as well as in the Třeboň

basin (VYSKOT 1962, VAŠINA 1998). Further north this species was artificially planted especially in mountain ranges along the Czech Polish border, i.e. the Jeseníky and the Beskydy mountains and the Labské pískovce National Park (LOKVENC 2000).

In natural habitats green alder creates wide spread stands important in soil protection and snow retention. Out from the Alps and Carpathians green alder is replaced to some extent by the mountain pine (*Pinus mugo*), which has similar role in mountain ecosystem.

In the Krkonoše Mountains *Alnus viridis* was planted for the first time at the beginning of the 20<sup>th</sup> century. There were two main reasons, first this species was planted to fix the banks of regulated streams and second to enhance the nitrogen level in soil. From the middle of the 20<sup>th</sup> century the experiments started on use of the *Alnus viridis* as a pioneer tree. After that it was planted within reforestation of clear cuts induced by air pollution or wind throws.

The main aim of this report is to contribute to the discussion about alien species in forest practices and to share our experience.

## Material and methods

First field verification started in 1998 according to records about plantation of green alder. Original records on European Green Alder plantation were taken from different sources. It was mainly from the forest management plans related to particular forest districts. More data were provided by forest management authority, the Lesprojekt, which was responsible for conducting of the forest management plans for whole area of the national park. Historical data documenting first plantations of the alder species were obtained in local public records. Beside forest practices plantations there were also scientific experiments focused on European Green Alder carried out by Forestry and Game Management Research Institute. Clearance of the European Green Alder started in 1999, based on all the records. First were cleared 19 localities in the first and the second zones of the national park. The individuals were cut and on the stubs RoundUp-Biaktiv herbicide was applied (50 – 90% solution), which is the only one herbicide allowed to use in the Krkonoše national park (JIŘIŠTĚ 2002).

In 2004 field revisions continued, all stands were checked and compared with original state. Based on the present situation further clearance will be organised.

## Results and discussion

During the first period of European Green Alder monitoring, in 1998, 43 localities were found in total. This review showed that approximately 5000 alder individuals survived, what makes 10% from whole amount of planted trees. After the revision in 2004 only 23 localities of green alder occurrence were found. Apparently the best season for clearance is late summer and autumn. The shrubs cannot recover in the same vegetation period; hence in the next year regeneration is low (JIŘIŠTĚ 2002). Green alder is adopted to survive on

disturbed land. Therefore the recover potential is very strong in this species. However it spreads easily it has not reached the parameters of invasive species yet. It seems that green alder evolved to cope with more rough environmental conditions in its natural range. Generally it occurs in the Krkonoše mountains in lower altitudes than in the Alps or Carpathians and there are probably no adequate regulating factors reducing spreading capacity of the species. Opposite to literature references *Alnus viridis* occurs in good condition on permanent waterlogging stands in the Krkonoše mountains. Presumably not native species in new range is exposed to different habitats and environmental conditions. From this point of view it is very vague to predict behaviour of such species. Not native species can thus turn to real alien putting down native species. In the Krkonoše Mountains this would apply first of all for *Alnus incana* occupying the same habitat.

In the Krkonoše Mountains there *Alnus viridis* is planted on different habitat types. It is mainly along streams where the oldest plantations can be found. The other type is located on wide clear cuts where this species was used as one of the pioneers. Such habitat is not typical for alders but on the other hand together with opening of the weakened forests soil became wet. There were no more "biological pumps" taking water thus these localities started to change into water logging habitats. Alders of all three species, *A. glutinosa*, *A. incana* together with *A. viridis* were used as species able to cope with the changed conditions.

Stands of European Green Alder in the Czech Republic are different from original stands in Alps or Carpathians, but abundant occurrence in the southern Bohemia holds up a prediction about original state. European Green alder can represent alpine migrant in our autochthonous flora (HEJNÝ, SLAVÍK 1990).

European Green Alder is shrub tolerating higher soil humidity and it grows only on silicated rocks (HIEKE 1978, HUML 1979). In Alps and Carpathians there it is a component of vegetation on steep slopes in alpine valleys.

Native type of community with *Alnus viridis* was observed by HUML et al. (1979) in Făgăraş Mts. in Romania. Plant community was found on northern very steep humid slopes in upper alpine zone. Phytosociological relevees recorded on these areas belong to *Saliceto (silesiaca)-Alnetum viridis* GOLIČ, MISIČ & POPOVIČ 1963. At the same time authors showed syngeneses of this community in line *Montion – Adenostylian - Alnion viridis*.

The only research on green alder in the Krkonoše Mountains was carried out by the Forestry and Game Management Research Institute at Opočno, Czech Republic. This research was focused on reforestation of disaster areas in exposed localities where introskeleton erosion was probable to start (KRIEGEL 2001). There was wide range of tree species tested on experimental sites, mainly their resistance to different environmental factors, such as climate conditions, immission, game damage, etc. Outcomes obtained showed that the best resistance in *Betula*, *Sorbus* and *Salix* species. *Alnus viridis* showed the best resistance especially to air pollution, damage of game and efficiency of amelioration (VACEK 2001).

## Conclusion

Field experience of the authors together with other staff of the Krkonoše National Park Administration lead back to discussed question if it is really necessary to employ not native species in forest regeneration. From the research data it is apparent that the particular species, *Alnus viridis*, is not the best one in tested range of resistance. However it is very efficient in soil protection there is potential risk for nature vegetation to be threatened through uncontrolled dispersal of seeds and seedlings. The area of national park has to be protected against such species following among other principles the Nature Protection Act No. 114/1992. The Krkonoše National Park Administration will therefore continue in clearance of the European Green Alder and will be very grateful for every experience with this issue.

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