

SEED PRODUCTION OF SITE-SPECIFIC GRASSES AND HERBS IN AUSTRIA

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In Austria, many thousands of hectares are restored each year following such infrastructural interventions as road building, flood protection, construction of torrent- and avalanche barriers or as a part of compensation measures. But also other areas like roughs on golf courses, sporting fields, railway reserves, industrial sites, flat roofs and public areas are interesting open space that should be used to provide biodiversity preservation.

In the last 20 years the Federal Research and Education Centre for Agriculture (AREC) Raumberg-Gumpenstein, Austria, established systematically a scientific basis for the exploitation, propagation and practical use of site specific grasses and herbs. At the same time the commercial propagation of species for restoration in high altitudes and for landscape construction was set up. Thus, for innovative farmers and seed producers, new possibilities for a profitable, not regulated production emerged.

The propagation of site specific species is riskier than conventional seed propagation and bears a much higher complexity. For a viable seed production are costs, yield and revenue essential. Preconditions are above average care, high willingness to take risks and a learning process of several years. At present, about 65 site specific grasses and herbs are propagated in Austria on more than 150 hectares. In addition, a seal for local, site specific seed and plant material as well as a land register of potential donor sites for the collection of native plant material are under development.

Keywords: ecological restoration, site-specific seed mixtures, semi-natural grassland, seed propagation

Introduction

In most European countries a dramatic decrease in the number of farms with grazing animals can be noticed in recent decades and the traditional agricultural use of semi-natural grasslands seems to be no longer competitive. Milk and meat production, being traditional and productive land-use systems for many generations, are increasingly given up and grassland abandonment is occurring in many regions (Peeters 2008). In alpine and mountainous regions of Europe, grassland is still the dominant element of cultural landscapes. The increasing loss of semi-natural grasslands is therefore a very serious threat to rural development resulting in negative consequences for ecology, economy and society.

The use of site-specific plant and seed material for ecological restoration could counteract to these negative changes. In Austria, as in all European countries, many thousands of hectares are restored each year following such infrastructural intervention as road building, flood protection, construction of torrent- and avalanche barriers or as a part of compensation measures (CIPRA 2001, Kirmer and Tischew 2006, Krautzer and Wittmann 2006). But also other areas like roughs on golf courses (Burgin and Wotherspoon 2008), sporting fields, railway reserves or public areas would be interesting open space that could be used to provide offsets for biodiversity.

Site-specific species are well adapted to local conditions. With the correct selection of species, erosion-stable, appealing and often high-quality nature-conservation plant communities can be formed under even extreme site conditions (low nutrition content, long dry periods and extreme pH values). The positive ecological and economic effects of such site-specific restoration could already be proved in the course of a great many trials (Scotton et al. 2005, Kiehl et al. 2006, Krautzer et al. 2006, Donath et al. 2007, Jongepierova et al. 2007, Leps et al. 2007, Woodcock et al. 2007, Krautzer and Klug 2009).

A good method for the exploitation of site specific seed material, which is meanwhile practiced in several countries, is the large-area production of seed of suitable species with the aid of agricultural techniques. Above all species used often and in larger amounts can be produced at a

comparatively reasonable price and implemented on appropriately large project areas. In Austria, this method is meanwhile well established. The following abstract gives a short overview on implementation of production and use of site specific species in Austria during the last two decades.

Results and discussion

According to conservative estimation in Austria alone, areas amounting to 2,000 to 2,500 hectares require re-cultivation in high zones in which the use of site-specific seed mixtures are desirable or necessary each year. This estimation includes all of the restoration measures in the agricultural sphere (alpine-meadow paths, alpine-meadow improvements), for tourism exploitation (ski runs and lifts, tourism infrastructure), path construction, power-station construction, avalanche barriers and erosion protection. Europe-wide, the extent of the area is probably at least doubled. Added to this are thousands of hectares requiring restoration. The potential need for Austria alone can be projected at about 200 tons of alpine seed annually, in the assumption that principally site-specific mixtures are used. Many failures, irrespective of whether in the restoration of banks, forest roads or ski runs, are to be traced back to false economy in the choice of seed mixtures, or the restoration technique chosen. Together with the basic scientific work that took place at AREC Raumberg-Gumpenstein, a partner for the commercial realisation of the project was necessary. It was here that cooperation with the company “Kärntner Saatbau” took place. With a great deal of enthusiasm, the basis for the commercial production of these species was drawn up together. “RENATURA” is the brand name for the result of the many years of innovative cooperation through science and practice. The research results and concepts of AREC Raumberg-Gumpenstein were realised in practice by “Kärntner Saatbau” (Tamegger and Krautzer 2006). The result of these endeavours is restoration mixtures for the colline, montane, subalpine and alpine zones of Austria, containing a high share of site specific seeds.

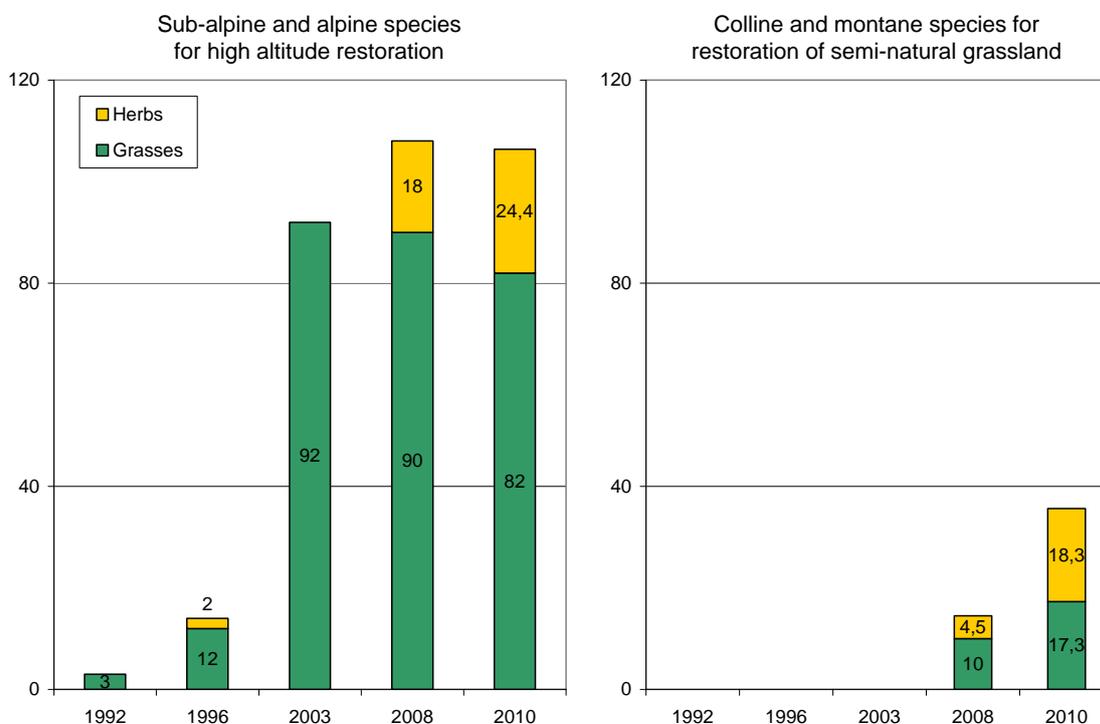


Figure 1. Development of seed production area (ha-1) of site-specific species in Austria

Several fundamental and general valid comments on the seed production of site specific grasses and herbs can be made, as follows.

The production of site-specific species is much more risky and significantly more costly than for conventional seed production. Profits and yields are essential for profitable production. An economic evaluation of the production of site-specific species within the sphere of a research project for the optimization of seed production showed a satisfactory producibility for most of the species. Great care, preparedness for high risk and a learning process of several years are a prerequisite. Nevertheless, the niche sector of the production of site-specific seed varieties has its own rules. The market is relatively limited. A lack of legal regulations still enables commercial mixtures of ecologically unsuitable species, which are significantly cheaper, to be used. Site-specific seed mixtures can only be sold through the intensive service and expertise of seed buyers.



Photo 1. More than 70 different grasses and herbs are propagated for ecological restoration of semi-natural grassland in Austria (Bernhard Krautzer)

Compared to cultivated agricultural species and varieties, all site-specific species have the common characteristic of an early slow development and low competitiveness. All species need a perfectly prepared seedbed. Measures for plant protection must be undertaken as early as possible to avoid large deficiencies in yields. Organic production is therefore out of the question for most species (Krautzer et al. 2004).

Many grasses show a high tendency to rust diseases. Only early control with suitable fungicides can prevent damage to the plant stand over a wide area. The regulations of the respective

countries should be observed with regard to permission, use and precautionary measures when using pesticides. Weeds are one of the most significant problems in the production of site-specific seeds. Most herbicides giving good results in practice are not permitted for the relevant types of culture.

External qualities such as purity and germinating capacity are mostly within the producers' sphere of influence. Balanced and timely supply of nutrition optimizes the development and yield capacity of the species produced. Irrigation is indispensable in dry areas during the summer, and helpful at all sites in dry years. Harvesting time and technique can decisively influence yield as well as the quality of the product. Rapid transportation from the field to the drying facility is important for grasses above all because of the relatively high water content of the seeds and excessive independent heating of the threshed material.

Conclusions

Seed production of site-specific species is meanwhile well established in Austria. Compared to other possible methods of seed exploitation, propagated seeds are comparatively cheap and such material can be implemented on large project areas. It may be that in principle several interesting species suitable for site-specific restoration may also be commercially available, but they are generally to be described as being of non-local provenance. Therefore, to guarantee the use of site specific plant or seed material, approved certification procedures for such material have to be developed. Also to be indicated is the contradiction prevailing in some countries, which repeatedly leads to conflict, between seed law (which promotes the planting of certified varieties) and nature-conservation law (which prohibits the planting of species of non-local provenance and origin in open terrain).

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