

Restoration with Site-Specific Seed Mixtures From Theory to Practical Realisation

Begrünung mit standortgerechten Saatgutmischungen Von der Theorie zur praktischen Umsetzung

Inerbimento con miscugli di sementi idonei al sito Dalla theoria alla realizzazione pratica

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Summary

Only through close cooperation between science, the seed trade and users could site-specific seed mixtures for restoration in high zones prevail on the market. But this process took more than a decade and was accompanied by many failures.

Legal incompatibilities exist as before. There was initially no demand for site-specific seed, and from the beginning there was no obligation to use it. The market had first to be created, and site-specific seed mixtures were a great deal more expensive than conventional mixtures. A "pain threshold" was soon established for this high-priced product. Only through the accompanying drawing up of scientific fundamentals, which confirmed the ecological and economical advantages of these methods and materials, could wide acceptance be achieved in practice. Extensive consultation with the confronted authorities, restoration firms and ski-run operators proved to be essential. The drawing up of clear stipulations and recipes were of great significance. Personal contact and substantial information given to the persons in question led to long-term success.

Zusammenfassung

Nur durch eine enge Zusammenarbeit zwischen Wissenschaft, Saatguthandel und Anwender konnten sich standortgerechte Saatgutmischungen für die Begrünung in Hochlagen am Markt durchsetzen. Dieser Prozess dauerte aber mehr

als ein Jahrzehnt und war von vielen Rückschlägen begleitet.

Nach wie vor existieren gesetzliche Unvereinbarkeiten. Anfänglich herrschte kein Bedarf nach standortgerechtem Saatgut, es bestand keine Verpflichtung zu dessen Verwendung. Der Markt dafür musste überhaupt erst geschaffen werden. Standortgerechte Saatgutmischungen waren von Anfang an um ein vielfaches teurer als konventionelle Mischungen. Sehr bald konnte auch eine „Schmerzgrenze“ für dieses hochpreisige Produkt festgestellt werden. Erst durch die begleitende Erarbeitung wissenschaftlicher Grundlagen, die die ökologischen und ökonomischen Vorteile dieser Methoden und Materialien bestätigten, konnte in der Praxis eine breite Akzeptanz dafür erreicht werden. Eine intensive Betreuung der damit konfrontierten Behörden, Begrünungsfirmen und Pistenbetreiber erwies sich als wesentlich. Die Erarbeitung klarer Vorgaben und Rezepte war von großer Bedeutung. Persönlicher Kontakt und ausgiebige Information der betroffenen Personen führte zum langfristigen Erfolg.

Riassunto

I miscugli di sementi idonei al sito per l'inerbimento delle aree d'alta quota hanno potuto affermarsi sul mercato solo grazie ad una stretta collaborazione tra la ricerca, le ditte sementiere e gli utilizzatori del prodotto. Questo processo è durato però più di un decennio ed è stato accompagnato da molte difficoltà.

Come già in passato, esistono ancora incompatibilità a livello legislativo. In principio la richiesta di miscugli di sementi idonei al sito era assente. Sin dall'inizio non esisteva alcun obbligo relativo al loro impiego. Il mercato doveva ancora essere creato da zero. I miscugli di sementi idonei al sito erano molto più costosi dei miscugli convenzionali. Ben presto è stato possibile constatare che esisteva un livello critico per questo costoso prodotto. Solamente in seguito all'elaborazione di pari passo delle basi scientifiche, che confermano l'esistenza di vantaggi ecologici ed economici derivanti dall'impiego di questi metodi e di questi materiali, è stato possibile raggiungere una larga accettazione del prodotto nella pratica. L'assistenza tecnica alle autorità locali coinvolte, alle ditte operanti nel campo dei ripristini ambientali e ai gestori delle piste da sci si è dimostrata essenziale per il raggiungimento di questo obiettivo. L'elaborazione di direttive e soluzioni chiare è stata molto importante. Il contatto personale e un'informazione esaustiva delle persone coinvolte hanno condotto ad un successo duraturo.

Introduction

Human intrusion in the landscape is as old as landscapes have been settled. But it has only been since the immensely technical intrusions in the balance of landscapes that it has been necessary to undertake comprehensive measures for the stabilising and renaturalisation of the areas affected. It was in the 1960s and 1970s, for example, that the first large areas of the Alps were opened up, predominantly for the purposes of tourism. The intrusions generally took place without knowledge of the related ecological issues, which above the forest line led to numberless devastated or at least inadequate recultivated areas. Necessary awareness of problems in respect of permanent restoration and enduring erosion protection in high zones following technical intrusion also grew parallel to the researching of causes. For this reason the development of suitable strategies were demanded in the 1980s for a permanent solution to the problems. The most suitable solution proved to be a

combination of high-quality application techniques and seed mixtures of site-specific subalpine and alpine grasses and herbs. But the realisation of this concept proved to be far more difficult in practice than expected. Many of the experiences gained are of general validity and are thus listed in the following.

The scientific elaboration of solutions

Awareness of the special problem of permanent restoration of the areas damaged became obvious soon after the first extensive technological development of high zones for the sport of skiing. The relationship between site, climate, vegetation and use in high zones were then examined in many studies (e.g. KÖCK 1975, CERNUSCA 1977, MEISTERHANS 1988, FLORINETH 1982, SCHÖNTHALER 1984, SPATZ, PARTSCH, WEIS 1987, PRÖBSTL 1990, KLUG-PÜMPPEL 1992, LICHTENEGGER 1992). The importance of the recultivation of such areas was also soon seen as essential in those days, nevertheless it quickly became apparent that the common methods of restoration in practice remained unsuccessful according to the level of technological development of the day (KLÖTZLI, SCHIECHTL 1979, PARTSCH 1980). Attempts at using site-specific plant materials on large areas failed due to a lack of suitable material, respectively, the costs for production and application (GRABHERR, HOHENGARTNER 1989, HASLER 1992).

Seed mixtures were combined from species of grassland farming in valley locations as a solution to the problem, whereby the combination of species was in respect of their differing suitability for restoration in higher zones. With costly and, in part, ecologically questionable measures, such as permanent fertilisation, regular subsequent seeding and, where necessary, the removal of resulting biomass, these seedlings were kept alive artificially. Such problems as soil erosion, increased surface drainage, insufficient vegetation cover, high cultivation costs and flora falsification were only some of the resulting related consequences. It was very quickly recognised that this approach to a solution for permanent

recultivation in high zones was inadequate (MEHNERT, VOIGTLÄNDER, WEIS 1985, URBANSKA 1986, GREIF 1987).

Thus the use of seed from suitable subalpine and alpine grasses and herbs was given as an alternative. Research leading to the promise of success took place very early in Austria, but was to a great extent forgotten (WEINZIERL 1914, ZÜRN 1949). In the past twenty years the basis for this research was finally created in Austria, Switzerland, Italy and Germany. Site-specific seed mixtures for high-zone restoration have been commercially available for the last fifteen years. In various ongoing research projects, some of which run parallel to these developments, it could be proved that a combination of high-quality application techniques and site-specific vegetation or seeds in high zones leads to stable, enduring and ecologically adapted plant stands of a high nature-conservation value. Fertilising- and cultivation methods can be significantly reduced, which also makes these methods economically viable in the medium term (KRAUTZER, PARENTE, SPATZ et al. 2003, PERATONER 2003, MÜHLENTHALER 2003, KRAUTZER, WITTMANN 2006).

The practical implementation

If in the early years only individual components of site-specific grasses and herbs were available - and they were subject to severe fluctuation from year to year - in the meantime there are a large number of species in sufficient amounts available as individual components as well as ready made site-specific mixtures (TAMEGGER, KRAUTZER 2006). This has all included a great deal of effort, coupled with failure, in the attempt to convince the responsible authorities, engineering offices and seed buyers to use site-specific seed mixtures. The most significant problems arising through realisation, and the experience gained, is given here in the following.

One law prohibits what another law demands

A fundamental problem in the use of site-specific seed mixtures in Austria is seen in the incompatibility of (regional) nature-conservation laws

and (national) seed law. Nature-conservation law prohibits the use of non-site-specific species, the seed law demands the use of cultivated species for agricultural use. Despite the fact that mostly nature-conservation factors are in the foreground in the restoration of high zones, most ski-run areas in Austria are grazed in summer. Even if this situation is confronted very pragmatically in practice, a solution to the problem would be welcome.

When is a seed mixture site-specific?

Which species are suitable for a site and which are not was the subject of vehement discussion up to a few years ago. It was therefore very important to create a definition for the term "site-specific" (OEAG 2000).

It was not at first possible in practice to offer mixtures containing exclusively site-specific species. Mixtures with a 50 % share of site-specific species were offered initially. This share was continuously increased over the years and is now practically at 100 %. Above all for restoration in lower zones below the tree line, there is nevertheless still a preference in practice for seed mixtures with a share of suitable conventional species for grassland farming.

Most seed-producing firms avoid or negate these efforts and offer reasonably priced, conventional seed mixtures, sometimes with a slighter share of site-specific species (about 5 %). Because there is generally no obligation to use the considerably more expensive site-specific seed mixtures, the buyer must be convinced of the quality of the product.

What is the market?

If one considers the potential market for site-specific seed mixtures for high-zone restoration many of the suitable species could be used, at least in the region of the Alps, in the Apennines, the Pyrenees and the Carpathians. This represents an annual potential restoration area (ski runs, infrastructure, erosion- and facility protection, road- and power-station building, mainten-

ance cultivation) of more than 10,000 hectares or at least 1,500 tons of seed. The theoretical market in the alpine region alone amounts to over 7,000 hectares, or just on 1,000 tons of seed. The figures confined to Austria show that there is an average of 3,100 hectares in high zones annually requiring restoration, with a seed equivalent of about 450 tons.

So much for the theory. In practice a market for site-specific seed mixtures for high-zone restoration did not really exist at the beginning of the 1990s. Site-specific seed may well have been vehemently demanded by experts and ski-run operators (LICHTENEGGER 1994), but when the first amounts of seed were on the market, only with a great deal of effort could two ski-run operators be convinced to use the comparatively expensive material in small amounts. Only through the interplay of many of the activities, given briefly in the following, could from a theoretical need a real, slowly but continuously increasing need be created. In the meantime about 30% of site-specific seed mixtures are turned to for restoration in the subalpine zone, and it is already 50% in the alpine zone. Naturally, seed production had to be and must be constantly adapted to actual demand.

What is the price?

The production of site-specific species is cost intensive and very risky (KRAUTZER, PERATONER, BOZZO 2004). For which reason one concentrated initially and mainly on species of a broader ecological range, and at the same time on a few species that can be used for restoration under extreme site conditions. But in respect of an acceptable seed price it was not possible to include all of the costs (paying dearly) arising in the early phases. As a basis of pricing for reproducers, with average yields all risks were covered by a sufficiently calculated profit margin. With an appropriate surcharge for costs, as well as a profit margin for seed firms, the market price was then given. It was very quickly seen in practice that with a sales price of somewhat over ten euro per kilo, a margin of acceptance was achieved. It was

therefore important to ensure a relatively constant mixture price with the additional mixing in of species that are more expensive to produce.

This was possible because the production costs of many species decreased with increasing experience, rising yields and increasing production areas. There are nevertheless great differences among various species. If for example with *Festuca nigrescens* it is possible to achieve average yields of 870 kg per hectare and top yields of 1,300 kg per hectare, the figures for *Poa alpina* with an average of 350 kg per hectare are just over 600 kg per hectare. Among some species the yield potential is at most about 100 kg per hectare. Through a practical combination of the available species, as well as the cultivation of further species (mainly leguminosae and herbs), it was possible in recent years to constantly improve the quality of restoration mixtures for a price that remained stable.

Scientific fundamentals are necessary

In the first practical experiments the advantages of using site-specific seed mixtures were soon apparent. But the authorities, restoration firms and ski-run operators require a high degree of assurance to be able to stipulate or to use this material. Moreover, parallel to the build up of seed production it was necessary to start alpine-wide research, the results of which could provide the necessary scientific arguments in favour of the use of site-specific seed mixtures (KRAUTZER, WITTMANN, PERATONER et al. 2006). Thus, and with constant specialist conferences and workshops, during which trial areas are viewed and discussion takes place with the authorities, restoration firms and ski-run operators, it was also possible over a period of years to convince these bodies of the ecological and economical advantages of site-specific restoration.

A medium-term economic comparison of costs for the establishment and cultivation of site-specific restoration, as opposed to conventional restoration in high zones, also showed the economic advantages of restoration with site-specific seed mixtures (KRAUTZER, PARENTE, SPATZ et al.

2003). Practical realisation was greatly helped with these arguments.

Intensive consultation for seed buyers is important

That the combination of high-quality restoration techniques and site-specific seed mixtures bring enduring success was essential knowledge gained from the above mentioned researches. It repeatedly occurs in practice that ski-run operators, for example, combine high-quality seed with cheap application techniques and consequently suffer failure. The first reaction is always that the seed is at fault. In such situations, good consultation is required on the spot to be able to mutually get to the bottom of the cause of these problems and (possibly also accommodating) to draw up solutions. Intensive customer consultation by the seed salesperson is essential for long-term success.

Authorities, restoration firms and ski-run operators need recipes

For most of the persons and institutes concerned the matter is too complex and costly for them to be able to examine it intensively. This led early to the demand for recipes in respect of the techniques as well as mixtures. It would naturally be optimum if every large building project could be accompanied by an expert in the field. But in practice it is decisive that the stipulating authority, as well as the planning- and restoration firms, are fully aware of the latest technological developments and are able to make clear stipulations.

The human factor

Behind every authority, institution or firm are people with their personal approach to the tasks given to them. This repeatedly leads to situations that make the realisation of set objectives difficult.

Persons who have carried out tasks over a long period are very difficult to convince of the need for change (I have long and excellent experience and do not see why I should change anything). For this reason site-specific restoration in high

zones is practiced extensively in some provinces of Austria, in others only there where individual persons give their support.

If the use of appropriate methods and materials is stipulated, appropriate control of success is very important. It also gives the necessary feedback to those undertaking the work. There is no real obligation without control.

Personal experience is extremely important. The theme, the possible problem solution and arguments for and against methods and materials must be heard more often and, if possible, seen. Constant information, discussion and inspection of the site-specific areas restored are essential for success.

The conviction of "leading firms" often results in a regional boom.

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