

SCULPTED SEEDING A PLANT COMMUNITY APPROACH TO REVEGETATION

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ABSTRACT

The sculptured seeding technique, an ecological approach to revegetation based on a knowledge and understanding of the natural vegetation of an area, establishes a diverse, effective native plant community capable of regeneration and plant succession. It is intended to match site capability with plant species known to thrive under particular conditions. Sculptured seeding is an option available to land managers interested in establishing and maintaining adapted native species and ecotypes within the limits of current technology and available seed sources. Field procedures for sculptured seedings are quite simple, involving only minor modifications to standard planting methodology. Seed mixtures based on range site capability of the revegetation site, must be assembled prior to the planting season. Planting zones must be delineated before seeding begins. Seed hill tops first, then move to the headlands. In most fields, only 10-15% more time is required for sculptured seeding versus regular seeding.

KEYWORDS

Revegetation, native plant material, range site, seeding, prairie

INTRODUCTION

Our experience in establishing native grass on cultivated fields in the northern Great Plains of the United States and Canada has shown that success is closely correlated with soil type, slope, moisture regime, and other site factors. Major differences occur within all natural plant communities. The relationship of certain species of grass to differences in climate, soil texture, and topography is significant. Realizing that these differences occur in natural plant communities, it seemed logical to design seeding mixtures to approximate the relative composition that occurred naturally on the planting site. Seed mixtures, therefore, are developed based on range site capability (Sedivec *et al.*, 1991). A range site is a distinctive area of natural grassland able to produce a characteristic native plant community.

While the logic of an ecological approach to revegetation is fairly straightforward, the logistical aspects of sculptured seeding were initially intimidating. Field procedures, however, are quite simple.

MATERIALS AND METHODS

To design the mixtures, start by researching the literature and consult with individuals with broad field experience and understanding of grassland/range management. Several references outline the soil, drainage regime gradient and moisture requirements of native species (Coupland, 1950; Dix and Smiens, 1967; Thornbury, 1982; Bultsma and Vannurden, 1988). The interrelationships between vegetation units within the landscape, drainage regime gradients, soils topography and other environmental characteristics are shown in a hypothetical block diagram (Figure 1).

If published guidelines are not available, the individual developing the seeding specifications should survey the kind and frequency of each major species on a similar site in the same vegetation zone. We recommend seeding different mixes of native plant material in each

range site or vegetational unit within the landscape. The objective of sculptured seeding is to re-establish, wherever possible, native plant material well-adapted to differing soils and drainage gradients encountered across a field.

Planting Mixes: For example, a high prairie mix is seeded on eroded knolls. A typical mix may consist of prairie sandreed (*Calamovilfa longifolia*), sand dropseed (*Sporobolus cryptandrus*), sideoats grama, (*Bouteloua curtipendula*), green needlegrass (*Stipa viridula*), and, to a lesser extent, western wheatgrass (*Pascopyron smithii*) and purple prairie clover (*Dalea purpurea*). Additional species such as blue grama (*B. gracilis*), white prairie clover (*D. candida*), little bluestem (*Schizachyrium scoparium*), needle and thread (*S. comata*), northern porcupine grass (*S. curtisetia*) and northern wheatgrass (*Elymus lanceolatus*) should also be used in the high prairie mix. The proportion used at a given site will vary with soil type. Prairie sandreed and sand dropseed are well-suited for sandy areas, little bluestem and blue grama to shallow eroded sites.

A mid-prairie mix seeded on medium to fine-textured soils consists of western wheatgrass, northern wheatgrass, green needlegrass, slender wheatgrass (*Elymus trachycaulus*), big bluestem (*Andropogon gerardi*), and switchgrass (*Panicum virgatum*). This habitat zone also receives limited amounts of purple prairie clover, white prairie clover and western snowberry (*Symphoricarpos occidentalis*).

Low prairie to wet meadow zones are seeded with species such as switchgrass, big bluestem, basin wildrye (*Leymus cinereus*), western wheatgrass, Indiangrass (*Sorghastrum nutans*), beardless wildrye (*Leymus triticoides*), whitetop (*Scolochloa festuacea*), slender wheatgrass, and northern reedgrass (*Calamagrostis canadensis*). Species composition and proportion in this mix will vary with moisture regime and salinity.

Planting Techniques: While the logic of an ecological approach to revegetation is fairly straightforward, the logistical aspects of sculptured seeding can initially be intimidating. However, the field procedures are quite simple.

To determine the required seed mix combine a field inspection with a review of aerial photos. Eroded soils are readily apparent both in the field and on the photo. Delineation of boundaries of the various planting zones on the air photo will enable accurate determination of the acreages involved. If air photos are not available, acreages can be estimated with reasonable accuracy in the field.

An easy guide to boundary delineation between high prairie and mid prairie mix is to look for the color change from light-eroded through grey-to-black in the soil along the gradient of the knolls. Present experience indicates it is advisable to seed the high prairie mix down to the grey/black soil interface.

Prior to seeding delineate the high and mid-prairie boundary. If air photos are available, a quick field review of the planting site with

the operator is recommended. Seed the high prairie mix on the knoll areas first. A 10-m overlap along the mix boundary is recommended to avoid drill misses.

Very little additional field time is required to carry out sculptured seeding. Experience to date indicates approximately 10-15% more time is required for sculptured seeding versus regular seeding.

Use commercial grass drills designed to facilitate planting of a wide range of native species. Drills equipped with special seed boxes, depth control bands, and packer wheels to meet the requirements of planting native mixed-grass prairie species are recommended. By following proven methods (Wark *et al.*, 1995), one can expect successful establishment.

Seed Sources: An understanding of the inherent variability within a native plant community is essential in selecting species and developing a seed mixture. When sourcing seed remember that selection of the proper ecotype is as important as selection of the proper species. Duebbert *et al.*, (1981) provide concise guidelines for the selection of varieties or ecotypes of native plant materials.

RESULTS AND DISCUSSION

Sculptured seeding produces a diverse, effective native plant community capable of regeneration and plant succession. We recommend developing site appropriate native species seed mixes for each range site or vegetational unit within the landscape. With experience, sculptured seeding can be accomplished at minimal additional cost compared to conventional seeding methodology. Considering the long term ecological potential of sculptured seedings, minor cost increases are easily justified.

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