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ALASKA COASTAL DUNE RESTORATION AND STABILIZATION WITH BEACH WILDRYE, *LEYMUS MOLLIS.*

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INTRODUCTION

Advanced mapping techniques indicate Alaska has approximately 44,000 miles (70,800 kilometers) of coastline. This shoreline supports large communities of the common coastal species of perennial grass; beach wildrye, Leymus mollis. The species is also common on much of the coastlines of North America from roughly 40 degrees N latitude to the Arctic coast. Beach wildrye is closely related to lyme grass, Leymus arenarius, the European/Asian niche equivalent (Hulten, 1968).

This species has been of extreme interest to the Alaska Plant Materials Center because of its overall ecological importance, ability to control erosion and to a limited degree, livestock forage value. Schiechtl (1980) referred to the species as one of the three most important grasses for stopping sand drift. Beach wildrye (American Dunegrass) was also described by Lewis (1982) as the only foredune grass native to Northwestern North America. Lewis (1982) further and unequivocally stated the species builds foredunes.

The author's professional interest in the species began in 1979 while evaluating beach wildrye for its potential in revegetation and erosion control. However, in 1983 practical applications for the species started appearing on Shemya Island at the western end of the Aleutian Island archipelago. Blowing sand was creating problems for a strategic military base. All attempts to re-establish vegetation by seeding failed. Transplanting beach wildrye was suggested, however, nobody had attempted to use it on a project of the scale needed (Wright, 1986).

METHODS

In May 1987, following two years of study, the 53 acre (21.5 hectare) beach wildrye sprigging project began on Shemya Island. By mid June the project was completed. The area was stabilized by that autumn prior to the winter storm period. Sand was no longer causing problems for aircraft, and dune formation was arrested with uniform spaced plantings of beach wildrye culms. Other areas adjacent to the runway were allowed to form dunes by planting random sized clumps of non-uniformly spaced beach wildrye culms (Wright, 1986; Wright, 1987).

A series of projects on and off the Aleutian Islands used beach wildrye as a revegetation species to re-establish plant communities after massive disturbances of naturally existing stands of coastal vegetation. However, among other studies a dune creation project was initiated by the author on Adak Island in 1989. Adak Island is located in the central Aleutian Island group.

Additional studies were initiated on beach wildrye to determine establishment success, seasonal timing for successful transplanting, man-hour requirements for transplanting and techniques for establishing the species with seed. Additionally, results and data were disseminated as they became available in the form or reports and presentations. The development of commercial cultivars for beach wildrye followed standard protocols and procedures in cultivar development.

RESULTS

In the early 1980's using beach wildrye for any aspect of large scale revegetation, erosion control or restoration was nearly unheard of in the Pacific Northwest including Alaska. Previous attempts of using the species in more southerly regions of its natural range suggested that only dormant culms or sprigs could be successfully transplanted Lewis (1982). The approach during the early projects and studies, attempted to use material as close to dormant as possible (Wright, 1987; Wright, 1988). Later studies and projects (Wright, 1990; Wright, 1992) in other regions started to dispel the idea that dormant material was need. By 1994 the use of dormant sprigs or culms in Alaska was no longer recognized as a necessary condition for successful establishment (Wright, 1994b). Mechanized techniques and sound horticultural procedures were melded into standard specifications that could be employed on the Aleutian Islands form April through September (Wright, 1994a; Wright, 1994b). A high degree of success ranging from 93-99% (Wright, 1994b) could be counted on when the newly developed techniques and procedures were used. Season of use compression did occur as the technique was used in more northern and Arctic sites. In northern sites the planting season ranges from June through August and the success rate was lower—60-96% (Wright, 1994b)

As foredune re-establishment and dynamics studies were completed, a wealth of new information was becoming available for beach wildrye and its use. In 1994 foredune restoration was deemed practical as successful techniques had been developed on Adak Island. In addition, sufficient data was available to initiate predictions in dune dynamics based on established accretion rates (Wright, 1994a). Beach wildrye could now be used as an engineering tool to manipulate either dune creation (actually growing dunes in place) or dune prevention (maintaining a level grade).

A culmination of the research resulted in the 1994 publication of *Beach Wildrye Planting Guide for Alaska* (Wright, 1994b) a manual for the effective use of beach wildrye throughout Alaska. The techniques developed for harvest, storage and transplanting the species have proven to be cost effective and highly successful and are now standard procedures available for the management and protection of coastal dunes in Alaska. In addition, two commercial cultivars of beach wildrye, 'Benson' and 'Reeve' have been developed and

registered with *Crop Science* (Wright, 1994c; Wright, 1994d) for production in the U.S.

Additional uses for beach wildrye, as well a new techniques for using seed, harvesting seed from wild stands and its importance in coastal restoration have been further explored in Alaska (Wright, 1995). However, the species' true use lies in its ability to control sand and coastal erosion On numerous projects in Alaska, beach wildrye has proven its utility in solving extreme coastal erosion problems (within the standard limits of vegetation) and effectively restore dunes (Wright 1996; Wright, 1997).

Costs associated with transplanting are often cited as the reason the technique is not used on many construction projects. However, the value of the resulting success and effectiveness must be weighed against the cost failure, the cost of maintenance needed for other procedures and the cost of the overall project. Documented and verified production and planting rates for the use of beach wildrye sprigs in transplanting projects are within reasonable expectations for work of this nature. It has been determined that one person can dig and prepare 400 sprigs per hour and plant 350 sprigs per hour (Wright, 1994b). From these figures and spacing specifications costs per unit of area can be easily calculated. However, mechanization can further reduce the costs.

It is expected that research will continue on the species and its niche related species until the coastal areas can be effectively and efficiently restored and reclaimed as needed. An updated manual for more species complete coastal restoration in Alaska is now in the planning stage. It is expected to be ready for distribution in 2008 and will cover more ecological niches than the usual beach wildrye zones.

CONCLUSIONS

Beach wildrye is an extremely effective species for coastal erosion control and restoration. It is especially adapted for use on coastal dunes; especially the foredunes and other areas where accretion rates are high and sand deposition is rapid and ongoing. No other species in Alaska has the ability to effectively build dunes, control dune development or stabilize the dynamic regions of the coast. Putting a degree stability in these dynamic sites, beach wildrye allows other species to colonize the areas further stabilizing and diversifying the ecosystem. Using beach wildrye as a tool to restore damaged coastal areas or for controling erosion on coastal sites has also proven to be very cost effective.

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