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ESTABLISHMENT OF NATIVE PLANTS ON DISTURBED SITES

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ABSTRACT

Erosion from drastically disturbed sites is a major contributor to sediment loading of surface waters and deterioration of water quality. This study was conducted to evaluate establishment methods of native species with potential for reclamation of critically eroding and disturbed sites. Effects of seed treatment (scarification, hulled and non-hulled), mulch (with and without), planting date (fall and spring), and seeding rate (1x and 2x) were investigated at the Jamie L. Whitten Plant Materials Center (PMC) on a drastically disturbed site. Native species responded little or none to the establishment treatments. Partridgepea established successful stands the first year and volunteered well the following year.

INTRODUCTION

Throughout the service area of the Jamie L. Whitten PMC, adapted plants and proven establishment methods are needed for reclamation of critically eroding sites. Areas which have been drastically disturbed, either by man's activities or by natural causes, are often difficult to return to a stable condition. These disturbed areas may remain barren of vegetation for years, resulting in severe erosion, sediment loading of streams and watersheds, and deterioration of water quality.

For over forty years, the Plant Materials Program of the Natural Resources Conservation Service (NRCS) has been seeking vegetative solutions to conservation problems. Nationwide, critical area stabilization remains a high priority. New plants and establishment techniques for solving conservation problems are continually being tested and evaluated at the PMCs.

Conservation plans for stabilizing critical areas should tailor plant species to meet specific problem site conditions. Those plant materials selected must be climatically and site adapted, require little maintenance, and be tolerant of drought, infertile soils, and other hostile conditions. Planting diverse mixtures of compatible grasses, legumes, forbs, trees or shrubs rather than the establishment of a single species, simulates stable, natural conditions and improves the chances of successful restoration of the site. Objective of this study was to

evaluate establishment techniques for selected native grass and legume species planted on a critically eroding and disturbed site.

MATERIALS AND METHODS

The Study was conducted at the PMC on a borrow area from which soil had been removed for construction fill. After construction activities were concluded, the site was graded and shaped, and a veneer of topsoil was spread over the surface. Despite attempts by the contractor to revegetate the site, it remained compacted, droughty, infertile, and sparsely vegetated.

Plant species selected for the study consisted of native grasses and legumes commonly found on low maintenance and disturbed sites in Mississippi. Species included: partridgepea (*Chamaecrista fasciculata*), an annual legume; slender lespedeza *(Lespedeza virginica*), a perennial legume; purpletop *(Tridens flavus*), and beaked panicum *(Panicum anceps*), perennial grasses. These species have been evaluated at the PMC and superior ecotypes were identified (USDA, 1987 and 1990).

The project was designed so that each species underwent a series of contrasting establishment treatments. Treatments included spring (April) and fall (October) planting dates, mulch and no mulch, hulled and non-hulled seed, varied seeding rates, and planting species individually and planting seed mixtures. Project site was disked and harrowed to form a smooth, firm seedbed. Fertilizer (435 pounds 13-13-13 per acre) and basic slag (1000 pounds per acre) was applied only in the initial year of planting. Seed were evenly sown in 10'x 10' plots and covered lightly. Plots were arranged in a randomized complete block with four replications. Seeding rates for purpletop and beaked panicum at the 1X rate was five pounds/acre. Seeding rate for partridgepea and lespedeza at the 1X rate was 20 pounds/acre. Hay mulch was spread over designated plots at the rate of 1000 pounds per acre.

RESULTS AND DISCUSSION

Season of establishment, seeding rate, and mulch technique had little or no influence on establishment of the native species (Table 1). Partridgepea produced a seed crop the first year and dense, volunteer stands were observed in 1994. Its value as a pioneer plant species may be to provide initial soil protection, food and cover for wildlife, increase organic matter, fix nitrogen, and modify site suitability for successional vegetation (Graham, 1941). Partridgepea was the only species to establish in the mixed planting.

A sparse stand of slender lespedeza was present in the fall planted plots seeded to a 1x rate. On droughty soil sites, mulching is beneficial for protecting the site from further erosion and providing a favorable environment for seed germination and establishment. Where mulch was used as an establishment technique for slender lespedeza, a greater stand was evident that improved in 1994. None of the slender lespedeza established and persisted in the mixed plots.

None of the grasses responded to any of the establishment treatments. Volunteer annuals, particularly crabgrass *(Digitaria ciliaris*), and common lespedeza *(L. striata*), increased with soil disturbance and fertility and may have been too competitive for the slow establishing purpletop and beaked panicum. Seed dormancy in both of these native grasses may have inhibited germination. Removal of the hull that surrounds purpletop seed has shown to improve germination (USDA, 1990) but did not influence germination in this study. Exposure of the planted grass seed to natural field stratification in 1993-94 did not enhance germination. Poor seed quality may have influenced these results.

CONCLUSIONS

None of the establishment methods proved to be superior for establishing native species in this study. Partridgepea established easier than the other species and produced a seed crop and volunteered next year. Slender lespedeza only occurred in the fall planted plots and responded favorably to mulch. Neither beaked panicum nor purpletop responded to any of the establishment treatments.

There has been considerable interest in a partridgepea source that is better adapted to the South than 'Comanche', a cultivar released by the James E. "Bud" Smith PMC at Knox City, Texas. A cooperative effort has begun between NRCS, Department of Wildlife and Fisheries at Mississippi State University and Mississippi Agriculture and Forestry Experiment Station to make available a southern source of partridgepea for conservation uses in the near future.

There are no future plans to continue to work with slender lespedeza, beaked panicum, or purpletop for conservation use.

Table 1. Response of partridgepea, slender lespedeza, purpletop, and beaked panicum to treatments on a critical area planting.

Species	Treatment	STAND 1993	STAND 1994
Partridgepea	fp, ss, m, s1x	good	good
Partridgepea	fp, ss, nm, s1x	fair	good
Partridgepea	sp, ss, m, s2x	fair	good
Partridgepea	sp, ss, nm, s2x	fair	good
Lespedeza	fp, ss, m, s1x	fair	good
Lespedeza	fp, ss, nm,s1x	poor	fair
Lespedeza	sp, ss, m, s2x	none	none
Lespedeza	sp, ss, nm, s2x	none	none
Beaked panicum	fp, m, s1x	none	none
Beaked panicum	fp, nm, s1x	none	none

Beaked panicum	fp, ss, m, s1x	none	none
Beaked panicum	fp, ss, nm, s1x	none	none
Beaked panicum	sp, m, s2x	none	none
Beaked panicum	sp, nm, s2x	none	none
Beaked panicum	sp, ss, m, s2x	none	none
Beaked panicum	sp, ss, nm, s2x	none	none
Purpletop	fp, snh, m, s1x	none	none
Purpletop	fp, snh, nm, s1x	none	none
Purpletop	fp, sh, m, s1x	none	none
Purpletop	fp, sh, nm, s1x	none	none
Purpletop	sp, snh, m, s2x	none	none
Purpletop	sp, snh, nm, s2x	none	none
Purpletop	sp, sh, m, s2x	none	none
Purpletop	sp, sh, nm, s2x	none	none
Mixture	fp, ss, sh, m, s1x (Partridgepea$^{=}$)	good	good
Mixture	fp, ss, sh, nm, s1x (Partridgepea)	good	good
Mixture	sp, ss, sh, m, s2x (Partridgepea)	good	good
Mixture	sp, ss, sh, nm, s2x (Partridgepea)	good	good

Treatment codes:

fp	fall plant	ss	seed scarified
sp	spring plant	sh	seed hulled
m	mulched	snh	seed not hulled
nm	no mulch	s1x	seed 1x planting rate
		s2x	seed 2x planting rate

$^{=}$Only species in mixture to germinate.

LITERATURE CITED

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USDA, 1990. Initial Evaluation Of Purpletop (1983-1988). USDA-SCS. Coffeeville Plant Materials Center Tech. Note No. 2.