

LOW MAINTENANCE TRIALS OF COOL-SEASON SPECIES ON SURFACE MINES

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INTRODUCTION

Lands that have been drastically disturbed can seldom be returned to their original condition (Thornburg, 1982). Box (1978) defines drastically disturbed lands as areas in which the native vegetation and animal communities have been removed and most of the topsoil lost, altered, or buried, often preventing vegetation from occupying the area for many years. Vegetation is important for rehabilitating the land and hastening the natural processes of rebuilding the chemical and physical properties of the soil. The Soil Conservation Service has been testing plant species and cultivars on drastically disturbed lands for more than 40 years. Many of these plants have performed well and are widely used in reclamation programs (Thornburg, 1982). Wolfe (1992) tested 24 warm-season grass and legume species on surface mines in Mississippi and Louisiana, and found weeping lovegrass [*Eragrostis curvula* (Schrad.) Nees] and switchgrass (*Panicum virgatum* L.) were better adapted than bermudagrass [*Cynodon dactylon* (L.) Pers.] or bahiagrass (*Paspalum notatum* Flugge) where soil fertility is limited. However, a complete reclamation program must be one which provides year-round soil protection. Therefore, both warm and cool-season vegetation must be considered.

In the fall of 1985, a plan was developed to test 20 cool-season species at surface mines in Hattiesburg (Forrest County) and Crystal Springs (Copiah County), Mississippi. Objective of this study was to identify cool-season species for revegetating drastically disturbed lands where no management, other than for establishment, is provided.

MATERIALS AND METHODS

Plant materials used in this trial were grasses, legumes, and small grains (Table 1). Some of these species have been used for erosion control on drastically disturbed lands, but others were species that had been used in other parts of the United States for reclamation work but their

Table 1. Plant species evaluated on surface mines in Hattiesburg and Crystal Springs, Mississippi.

<u>Plant Species</u>	<u>Variety</u>
annual ryegrass (<i>Lolium multiflorum</i> L.)	Commercial
arrowleaf clover (<i>Trifolium vesiculosum</i> Savi.)	Meechee
ball clover (<i>Trifolium nigrescens</i> Viviani)	Commercial
birdsfoot trefoil (<i>Lotus corniculatus</i> L.)	Mackinaw
cereal ryegrass (<i>Secale cereale</i> L.)	Aroostook
cicer milkvetch (<i>Astragalus cicer</i> L.)	Lutana
crimson clover (<i>Trifolium incarnatum</i> L.)	Dixie
flatpea (<i>Lathyrus sylvestris</i> L.)	Lathco
hairy vetch (<i>Vicia villosa</i> Roth)	Commercial
oats (<i>Avena sativa</i> L.)	Commercial
perennial ryegrass (<i>Lolium perenne</i> ssp. <i>perenne</i> L.)	Linn
Subterranean clover (<i>Trifolium subterraneum</i> L.)	Mt. Barker
tall fescue (<i>Festuca arundinacea</i> Schreb.)	KY 31
tall wheatgrass [<i>Elytrigia elongata</i> (Host) Nevski]	Jose
wheat (<i>Triticum aestivum</i> L.)	Commercial
white clover (<i>Trifolium repens</i> L.)	LA-S1
white sweet clover (<i>Melilotus alba</i> Medikus)	Commercial
woolypod vetch [<i>Vicia villosa</i> ssp. <i>varia</i> (Host) Corb.]	Lana
yellow sweet clover [<i>Melilotus officinalis</i> (L.) Lam.]	Commercial
western wheatgrass [<i>Pascopyrum smithii</i> (Rydb.) A. Love]	Arriba

adaptability was not known in the Southeast. Species were sown in 8' by 12' plots on 17 October and 5 November 1985 at Hattiesburg and Crystal Springs locations, respectively. Soils at both locations were droughty, sandy, and infertile. Plots were prepared by leveling and incorporating fertilizer at 500 lb/acre of 13-13-13 and lime at two tons/acre. Seeds were mixed with sand to facilitate even distribution and applied by hand broadcasting. Following planting, seeds were raked into the soil. No additional fertilizer was applied for the duration of the study to provide similar conditions encountered in a typical mine reclamation program where the problem is not establishing vegetation but failure to fertilize and manage it. Experimental design used in this study was a randomized complete block with four replications.

Stand (STAND) was estimated canopy cover made in the fall the first year (1985) and again in the spring (1986). Plant vigor (VIGOR) and seed production (SEED-AMT) were rated on a scale of 1 to 10 where 1 = excellent, 5 = good, 7 = fair, 9 = very poor (almost dead) and 10 = none. Foliage height (FOL-HT) and seedhead height (SEED-HT) were averages measured in centimeters. Data was collected for three years.

RESULTS AND DISCUSSION

Species performance data for 1985-1987 are presented in Table 2 and 3 for the Hattiesburg and Crystal Springs locations, respectively. Since plant height, vigor, and seed

	4	**	**	**	7	**	**	5	0	0	**	**	**	**	**	**	**	**	
	Ave.	**	7	**	7	**	**	5	0	0	**	1	**	**	10	**	**	**	
Fescue, tall 'KY-31'	1	**	5	6	7	4	9	3	10	2	**	5	8	**	10	10	**	**	**
	2	**	7	7	6	7	*	2	10	3	**	3	6	**	10	10	**	**	**
	3	**	5	6	7	6	7	2	10	3	**	5	7	**	10	10	**	**	**
	4	**	6	6	7	6	8	2	10	3	**	5	10	**	10	10	**	**	**
	Ave.	**	6	6	7	6	8	2	10	3	**	4	8	**	10	10	**	**	**
Wheatgrass, tall 'Jose'	1	**	7	5	8	5	8	5	5	3	**	5	10	**	10	10	**	**	**
	2	**	5	8	7	6	8	5	10	3	**	5	5	**	10	10	**	**	**
	3	**	6	6	6	7	9	5	10	5	**	10	8	**	10	10	**	**	**
	4	**	7	7	6	7	9	5	10	5	**	5	5	**	10	10	**	**	**
	Ave.	**	6	6	7	6	8	5	9	4	**	6	7	**	10	10	**	**	**
Wheatgrass, western 'Arriba'	1	**	7	8	8	6	8	1	5	2	**	3	5	**	10	10	**	**	**
	2	**	7	8	7	7	8	1	5	3	**	5	5	**	10	10	**	**	**
	3	**	7	7	7	6	8	1	5	1	**	5	8	**	10	10	**	**	**
	4	**	7	8	7	7	9	1	5	3	**	5	8	**	10	10	**	**	**
	Ave.	**	7	8	7	6	8	1	5	2	**	4	6	**	10	10	**	**	**
Wheat	1	**	7	**	5	*	**	40	10	0	**	15	**	**	7	**	**	20	**
	2	**	7	**	6	*	**	20	10	0	**	15	**	**	7	**	**	25	**
	3	**	7	**	6	*	**	30	15	0	**	15	**	**	8	**	**	30	**
	4	**	7	**	6	*	**	20	20	0	**	15	**	**	8	**	**	30	**
	Ave.	**	7	**	6	*	**	28	14	0	**	15	**	**	8	**	**	26	**
Clover, white 'LA-S1'	1	**	*	**	8	**	**	1	0	0	**	**	**	**	**	**	**	**	**
	2	**	*	**	7	**	**	1	0	0	**	**	**	**	**	**	**	**	**
	3	**	*	**	8	**	**	0	1	0	**	**	**	**	**	**	**	**	**
	4	**	**	**	*	**	**	0	0	0	**	**	**	**	**	**	**	**	**
	Ave.	**	*	**	8	**	**	0	0	0	**	**	**	**	**	**	**	**	**
Sweetclvr white	.1	**	5	**	6	*	**	5	2	0	**	1	**	**	10	**	**	**	**
	2	**	6	**	6	*	**	5	2	0	**	1	**	**	10	**	**	**	**
	3	**	*	**	7	**	**	1	0	0	**	**	**	**	**	**	**	**	**
	4	**	6	**	7	*	**	1	2	0	**	2	**	**	5	**	**	55	**
	Ave.	**	6	**	6	**	**	3	2	0	**	1	**	**	8	**	**	55	**
Vetch, woolypod 'Lana'	1	**	*	**	8	**	**	10	0	0	**	**	**	**	**	**	**	**	**
	2	**	*	**	8	**	**	2	0	0	**	**	**	**	**	**	**	**	**
	3	**	9	**	8	*	**	5	2	0	**	7	**	**	10	**	**	**	**
	4	**	*	**	8	**	**	5	0	0	**	**	**	**	**	**	**	**	**
	Ave.	**	9	**	8	**	**	6	0	0	**	7	**	**	10	**	**	**	**
Sweetclvr yellow	.1	**	5	**	7	*	**	2	1	0	**	1	**	**	10	**	**	**	**
	2	**	*	**	7	**	**	2	0	0	**	**	**	**	**	**	**	**	**
	3	**	*	**	6	**	**	2	0	0	**	**	**	**	**	**	**	**	**
	4	**	*	**	7	**	**	2	0	0	**	**	**	**	**	**	**	**	**
	Ave.	**	5	**	7	**	**	2	0	0	**	1	**	**	10	**	**	**	**

Rating scale: 1 = Excellent, 5 = good, 7 = Fair, 9 = Very Poor, 10 = None.

* No germination or plants observed.

	Ave.	**	*	**	7	**	**	1	0	0	**	**	**	**	**	**	**		
Flatpea 'Lathco'	1	**	4	**	5	*	**	10	5	0	**	2	**	**	10	**	**	**	**
	2	**	7	**	4	*	**	10	5	0	**	2	**	**	10	**	**	**	**
	3	**	5	**	5	*	**	5	5	0	**	2	**	**	10	**	**	**	**
	4	**	5	**	5	*	**	40	20	0	**	3	**	**	10	**	**	**	**
	Ave.	**	5	**	5	*	**	16	9	0	**	2	**	**	10	**	**	**	**
Vetch, hairy	1	**	*	**	8	**	**	10	0	0	**	**	**	**	**	**	**	**	**
	2	**	9	**	8	*	**	10	1	0	**	3	**	**	10	**	**	**	**
	3	**	*	**	8	**	**	5	0	0	**	**	**	**	**	**	**	**	**
	4	**	*	**	8	**	**	20	0	0	**	**	**	**	**	**	**	**	**
	Ave.	**	9	**	8	**	**	11	0	0	**	3	**	**	10	**	**	**	**
Oats	1	**	7	**	4	*	**	30	30	0	**	10	**	**	7	**	**	30	**
	2	**	6	*	4	3	**	40	10	0	**	15	**	**	8	**	**	30	**
	3	**	7	**	6	*	**	25	10	0	**	20	**	**	7	**	**	40	**
	4	**	7	**	6	*	**	40	20	0	**	15	**	**	9	**	**	25	**
	Ave.	**	7	**	5	*	**	34	18	0	**	15	**	**	8	**	**	31	**
Ryegrass, perennial 'Linn'	1	**	7	**	5	*	**	20	10	0	**	3	**	**	10	**	**	**	**
	2	**	6	9	4	*	*	30	20	1	**	5	3	**	10	10	**	**	**
	3	**	7	*	5	8	**	10	25	0	**	5	**	**	10	**	**	**	**
	4	**	6	*	5	*	**	20	20	0	**	5	**	**	10	**	**	**	**
	Ave.	**	6	9	5	8	*	20	19	0	**	4	3	**	10	10	**	15	**
Clover, sub. 'Mt.Barker'	1	**	*	**	9	**	**	5	0	0	**	**	**	**	**	**	**	**	**
	2	**	*	**	7	**	**	1	0	0	**	**	**	**	**	**	**	**	**
	3	**	*	**	9	**	**	1	0	0	**	**	**	**	**	**	**	**	**
	4	**	*	**	9	**	**	1	0	0	**	**	**	**	**	**	**	**	**
	Ave.	**	8	**	9	**	**	2	0	0	**	**	**	**	**	**	**	**	**
Fescue, tall 'KY-31'	1	**	7	8	4	3	*	20	10	1	**	3	6	**	10	10	**	**	**
	2	**	6	**	5	*	*	10	20	0	**	5	**	**	10	**	**	**	**
	3	**	6	7	5	6	*	15	30	2	**	5	10	**	10	10	**	**	**
	4	**	6	9	5	*	8	15	20	1	**	5	5	**	10	10	**	**	**
	Ave.	**	6	8	5	4	8	15	20	1	**	4	7	**	10	10	**	**	**
Wheatgras tall 'Jose'	s,1	**	6	7	5	7	9	10	5	2	**	7	5	**	10	10	**	**	**
	2	**	6	7	5	7	9	10	5	2	**	5	5	**	10	10	**	**	**
	3	**	6	9	6	8	*	10	10	1	**	5	5	**	10	10	**	**	**
	4	**	7	8	6	7	8	10	10	1	**	5	6	**	10	10	**	**	**
	Ave.	**	6	8	6	7	9	10	8	2	**	6	5	**	10	10	**	**	**
Wheatgras western 'Arriba'	s,1	**	7	7	7	7	9	2	5	1	**	5	5	**	10	10	**	**	**
	2	**	7	7	7	7	*	2	5	2	**	5	7	**	10	10	**	**	**
	3	**	6	8	7	7	*	5	5	2	**	5	8	**	10	10	**	**	**
	4	**	7	9	8	7	9	5	5	1	**	5	5	**	10	10	**	**	**
	Ave.	**	7	8	7	7	9	4	5	2	**	5	6	**	10	10	**	**	**
Wheat	1	**	7	**	6	*	**	20	15	0	**	10	**	**	8	**	**	25	**
	2	**	7	**	6	*	**	40	40	0	**	15	**	**	8	**	**	30	**
	3	**	8	**	7	*	**	20	10	0	**	20	**	**	8	**	**	30	**
	4	**	7	**	7	*	**	40	25	0	**	15	**	**	8	**	**	30	**

	Ave.	**	7	**	6	*	**	30	15	0	**	15	**	**	8	**	**	29	**
Clover, white 'LA-S1'	1	**	6	**	8	*	**	1	1	0	**	1	**	**	10	**	**	**	**
	2	**	*	**	9	**	**	1	0	0	**	**	**	**	**	**	**	**	**
	3	**	*	**	8	**	**	1	0	0	**	**	**	**	**	**	**	**	**
	4	**	*	**	8	**	**	1	0	0	**	**	**	**	**	**	**	**	**
	Ave.	**	6	**	8	**	**	1	0	0	**	1	**	**	**	**	**	**	**
Sweetclvr white	1	**	5	**	5	*	**	2	2	0	**	2	**	**	10	**	**	**	**
	2	**	5	**	7	*	**	1	1	0	**	2	**	**	10	**	**	**	**
	3	**	*	**	7	**	**	1	0	0	**	**	**	**	**	**	**	**	**
	4	**	*	**	7	**	**	1	0	0	**	**	**	**	**	**	**	**	**
	Ave.	**	5	**	7	**	**	1	1	0	**	2	**	**	10	**	**	**	**
Vetch, woolypod 'Lana'	1	**	*	**	7	**	**	5	0	0	**	**	**	**	**	**	**	**	**
	2	**	*	**	8	**	**	5	0	0	**	**	**	**	**	**	**	**	**
	3	**	8	**	8	*	**	5	1	0	**	10	**	**	10	**	**	**	**
	4	**	*	**	8	**	**	5	0	0	**	**	**	**	**	**	**	**	**
	Ave.	**	8	**	8	**	**	5	0	0	**	10	**	**	10	**	**	**	**
Sweetclvr yellow	1	**	*	**	7	**	**	1	0	0	**	**	**	**	**	**	**	**	**
	2	**	*	**	8	**	**	1	0	0	**	**	**	**	**	**	**	**	**
	3	**	*	**	7	**	**	1	0	0	**	**	**	**	**	**	**	**	**
	4	**	*	**	9	**	**	1	0	0	**	**	**	**	**	**	**	**	**
	Ave.	**	*	**	8	**	**	1	0	0	**	**	**	**	**	**	**	**	**

Rating scale: 1 = Excellent, 5 = Good, 7 = Fair, 9 = Very Poor, 10 = None.

* No germination or plants observed.

** Not applicable

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