

Table 4. Interactive canopy cover responses of dominant individual herbaceous species to wood residue and gypsum amendment treatments during the 9th (1990) growing season. ^{1,2}

Plant Species	Gypsum Regime	Wood Residue Rate (Mg/ha)			
		0	45	90	135
		-----Canopy Cover (%)-----			
<u>Agropyron smithii</u>	Gypsum-Amended	1 D	9 C	33 A	28 A
	No Gypsum	1 D	3 D	17 B	19 B
<u>Agropyron dasystachyum</u> + <u>A. riparium</u> ³	Gypsum-Amended	1 B	4 B	7 AB	10 A
	No Gypsum	1 B	1 B	4 B	10 A
<u>Atriplex suckleyi</u>	Gypsum-Amended	54 A	23 B	6 CD	6 CD
	No Gypsum	20 BC	9 CD	5 D	2 D

¹ Within each species, values followed by same letter are not significantly different at $P \leq 0.10$.

² No significant gypsum or wood residue treatment main effects nor treatment interactions occurred for cover of dominant individual shrub species in 1990.

³ Accurate field differentiation of these 2 species was not possible.

disappeared in the subsequent, drier year of 1990, it persisted for canopy cover of western wheatgrass, the most dominant individual perennial grass species (see Table 4). Canopy cover of the predominant annual forb species, rillscale, responded positively to gypsum amendment in 1990 only under the reduced grass competition regimes of non-residue and lightly (45 Mg/ha) residue-amended treatments (see Table 4). Responses of rillscale may have been different in absence of grass competition, since Voorhees et al (1987) noted that gypsum greatly improved production of rillscale monocultures only with concurrent application of wood residue.

Total live biomass of shrub species was higher in the gypsum than in the non-gypsum treatment in 1988 (under both N-fertilization treatments) and in 1989 (see Table 3). This rapid and positive response of shrubs to gypsum was surprising considering the relatively slow annual growth rates of these woody species, and the anticipated undetectability of differences in current year growth between treatments due to the masking effect of antecedent live biomass produced in years preceding gypsum amendment. However,

significant differences in shrub biomass between gypsum treatments disappeared in 1990. This may have been due to the high variability of shrub data and/or to an initial manifestation of competitive inhibition of shrubs by more gypsum-responsive perennial grasses in 1990.

Results indicate that the effectiveness of a 1987 surface application of gypsum in reducing spoil sodicity during 1988, 1989, and 1990 (Meining 1991) induced a remarkably rapid enhancement of plant growth during these 3 years. These findings are particularly significant considering gypsum's past performance as a relatively slow-acting inorganic amendment that is most effective when soil incorporated.

Conclusions

Vegetation responses during the 7th through 9th years of this continuing project strongly support the longer-term benefits from high rates of wood residue amendment for revegetation of non-topsoiled bentonite mine spoil, particularly for growth of dominant seeded perennial grasses. However, data also indicated that an inorganic Ca