

EFFECTS OF TOPSOIL DRESSING OVER MINE SPOIL ON ESTABLISHMENT OF VEGETATION AT SAN JUAN MINE-NORTHWESTERN NEW MEXICO¹

by

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Abstract. In 1981, a depth of topsoil study was installed by the Soil Conservation Service at the San Juan Mine in northwestern New Mexico. This study has been conducted for ten years to determine the optimum topsoil dressing depth over subbituminous coal mine spoil for sustaining maximum plant species diversity, density, cover and production at San Juan Mine.

Five topsoil treatments were applied in the spring of 1981; 0, 10, 20, 30, and 40 cm (0, 4, 8, 12, and 16 inches). The topsoil was a sandy loam texture; the spoil material was shale bedrock. A seed mixture of both warm and cool season grasses and shrubs was drilled into the topsoil treatments. The experimental design was a randomized complete block with four replications.

A limited soil study was performed on the study plots in the fall of 1990. Soil samples were taken at specific depths from one plot of each of the five topsoil treatments. Results showed that the spoil material and topsoil less than 25 cm above the topsoil-spoil interface was sodic (SAR > 15).

By the tenth growing season (1990), the treatment results were as follows. Of the ten species originally seeded, only four species persisted: galleta (*Hilaria jamesii*), alkali sacaton (*Sporobolus airoides*), fourwing saltbush (*Atriplex canescens*) and shadscale saltbush (*Atriplex confertifolia*). The following species did not persist: Indian ricegrass (*Oryzopsis hymenoides*), western wheatgrass (*Pascopyrum smithii*), black grama (*Bouteloua eripoda*), sand dropseed (*Sporobolus cryptandrus*) and Rocky Mountain penstemon (*Penstemon strictus*).

Vegetation production on the 20, 30 and 40 cm plots was significantly greater than yield on the 0 cm plot but significant difference among the treatments, excluding control, were not noted. Species diversity showed no significant difference across the 10 to 40 cm topsoil treatments. Vegetation density on the 40 cm topsoil treatment was significantly greater than densities measured on the thinner topsoil treatments. Species composition was affected by topsoil depth. Fourwing saltbush was more common on bare spoil. Galleta density was greatest on the thickest (40 cm) topsoil treatments. Alkali sacaton exhibited its its greatest density on the intermediate (20 cm) topsoil treatment.

Keywords: Reclamation, topsoil, subbituminous coal mine spoil

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