QUANTIFYING DIVERSITY IN MINE RECLAMATION[1]

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Abstract. Diversity is required of surface coal-mine revegetation. Seven measures of diversity were used to evaluate six field characteristics and planting practices at a northern Great Plains coal mine. Stepwise multiple regression revealed that the number of species seeded related positively to species diversity measures, but only one new species was measured in fields for each three or four additional species planted. Livestock grazing, field age, and precipitation related negatively to most diversity measures. Growth-form diversity often responded contrary to other diversity measures. In a linear model, reclamation practices had minor effects and fields had similar diversities, suggesting that diversity is largely a consequence of shared field characteristics and reclamation practices. Chief among these are uniform soils, gentle topography, and heavy seedings of adapted cultivars, which result in plant communities dominated by stress-tolerant competitors. Reclaimed fields are as diverse as seminatural community types, and reclaimed pastures are comparable to more complex native communities. Where revegetation quickly fills habitats, more diverse vegetation is unlikely to develop passively within the 10-year bond period. Successfully revegetated fields appear to resist arriving species, while some pioneer and planted species are unable to perpetuate. Grazing and nearby native propagules are unlikely to increase diversity in this time frame. Explanations are explored.

Additional Key Words: diversity, coal revegetation, initial floristics, community saturation

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