

Surface Residue and Soil Roughness for Wind Erosion Protection

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Abstract

Wind erosion causes the loss of some 2.5 tons of soil per acre per year in the United States which removes valuable soil components, damages plants and pollutes the air. The best protection is provided by surface cover and random roughness. Mathematical relationships were determined for the combined effectiveness of flat plant residue and soil surface random roughness, then compared to similar equations derived from previous research. Data were obtained using a portable wind tunnel 1.0 m wide, 1.2 m high and a test section of 7.3 m long. Eroded soil was collected by a vertical slot sampler 0.75 m high which had isokinetic profiles for three tunnel velocities. The measured eroded soil was expressed as a ratio of that from an adjacent smooth, bare soil, then regressed against measured flat residue surface cover and random roughness. Predicted soil loss ratio values from the derived equation compared to the measured values with a slope of 0.96 and an r^2 of 0.51, and our equation was very similar to previously derived equations.

Keywords: wind erosion, residue, random roughness, wind tunnel, slot sampler