

Effect of surface cover on infiltration into a self-mulching soil

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Raindrops can alter the structure of soil surfaces and directly influence the water infiltration rate (Burwell et al. 1966). The permanence of this effect in self-mulching soils was investigated using simulated rainfall on disturbed samples of the Craigmore series black earth (Thompson and Beckmann 1959).

Air-dry soil was packed in 100 mm diameter cylinders. Uniform surfaces were formed by pouring 50 g of 5 mm diameter aggregates over the packed samples. Samples were either bare or covered with a single layer of cheese-cloth suspended about 5 cm above them. The cheese-cloth absorbed most of the raindrop energy, but spread the wetting area of each drop, and did not reduce the rate at which the water reached the soil surface.

Simulated rain was applied in 3 cycles at 75 mm per hour for 50 minutes, separated by 75 hours drying at 40°C. The quantity of water which infiltrated into the samples was determined after each rainfall event and the results are presented in Table I.

TABLE I. Infiltration (as % of rainfall) into bare and covered samples of a self-mulching black earth.

First rainfall cycle		Second rainfall cycle	
Treatment	Total Infiltration	Treatment	Total Infiltration
Bare	59	Bare	26
		Covered	86
Covered	95	Bare	31
		Covered	98

Infiltration was lower into the bare samples in both rainfall cycles, indicating a major effect of cover which maintained surface structure and prevented sealing. Rainfall pretreatment further reduced infiltration during the second rainfall cycle in all except the covered - covered samples. The self-mulching nature of the soil did not remove the effect of the surface seals during the drying cycle. Wetting even with cover predisposed the surface to breakdown when subsequently exposed to rainfall energy.

Surface sealing is thus an important limitation to infiltration into the Craigmore black earth, however the effect can be largely overcome by the use of the surface cover.

Burwell, R.E., Almaras, R.R., and Sloneker, L.L. (1966). J. Soil Water Conserv. 31: 61.

Thompson, C.H., and Beckmann, G.G. (1959). Soils Ld. Use Ser. CSIRO Aust. No.38