

INFILTRATION CONTROL AT THE SOIL SURFACE: A NEW REVEGETATION TECHNIQUE¹

by

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Abstract: Degraded land is commonly smooth and sealed at the soil surface with infiltration rates one to two orders of magnitude less than comparable non-degraded land. Consequently, runoff, erosion and downslope flash flooding and sedimentation are greatly accelerated. This paper traces the course of infiltration control research conducted by the senior author and several coworkers beginning in 1960 and continuing to the present time. Research was directed to the development of principles and practices for controlling infiltration at the soil surface to accelerate revegetation of degraded land areas. Infiltrometer studies, conducted under a variety of climatic, vegetal and edaphic conditions led to the development of the Air-Earth Interface (AEI) Concept which states that the microroughness and macroporosity of the soil surface control the rates of water infiltration into an initially dry soil with the rough open surface having very high rates and with the smooth closed surface having very low rates. Thus infiltration control at the soil surface becomes a problem of efficiently manipulating the roughness and openness of the AEI. This problem led to the development of a series of land imprinting devices which increase AEI roughness and openness by impressing V-shaped depressions in the soil surface through downward acting forces. The AEI Concept for wide-range control of infiltration gradually evolved into the AEI Model for reversing land desertification or degradation through the AEI processes of imprintation and revegetation. This model has already guided the restoration of perennial grasses on 20,000 hectares of overgrazed rangeland in southern Arizona alone. Currently imprinters are being designed with attachments to permit inoculating and seeding while imprinting. In summary the imprinting technique for controlling water infiltration at the soil surface is expected to find widespread application in the restoration of degraded land, worldwide.

Additional Key Words: land imprinting, desertification, degradation, land restoration, reclamation, ecological restoration.

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