

EFFECT OF SLOPE ON RUNOFF FROM A SMALL VARIABLE SLOPE BOX-PLOT

*B.E. Haggard*¹

*P.A. Moore Jr.*¹

*K.R. Brye*²

¹USDA-ARS Poultry Production and Product Safety Research Unit, Fayetteville, Arkansas, USA

²Crops, Soils and Environmental Sciences Department, University of Arkansas, Fayetteville, Arkansas, USA

ABSTRACT

Many factors affect catchment hydrologic characteristics, which also ultimately influence the production of surface runoff. This study evaluated the effect of slope on infiltration and surface runoff from a variable-slope box under artificial rainfall simulation. The variable-slope box consisted of 0.25 m deep Captina silt loam soil (fine-silty, siliceous, active, mesic Typic Fragiudult) seeded to tall fescue (*Festuca arundinacea* Schreb.); rainfall simulations were conducted on 11 slopes (0, 1, 2, 4, 6, 8, 10, 15, 20, 25, and 28%). The rainfall simulations were about 20-min long at 5-cm hr⁻¹ because initial results showed that runoff occurred after 5-min, and we wanted about 15-min of continuous runoff for this investigation. The variable-slope box demonstrated the effect of slope on infiltration rate and surface runoff production, where surface runoff volume increased with the natural logarithm of slope (%slope plus 0.1). However, the effect of slope was almost precluded by variability in surface runoff production probably resulting from variation in the antecedent soil moisture of the variable-slope box. The variations in antecedent moisture were likely related to the change in ambient air temperature occurring with time and natural rainfall during late fall. It may be that slope of the infiltrating surface has the greatest effect on surface runoff production when the soil is closer to saturation. The effect of slope on infiltration and surface runoff production needs additional investigation where antecedent soil moisture conditions would be measured spatially within the variable-slope box.

Reference: Haggard, B.E., P.A. Moore Jr., and K.R. Brye. 2005. Effect of Slope on Runoff From a Small Variable Slope Box-Plot, *Journal of Environmental Hydrology*, Vol. 13, Paper 25.

CONTACT:

Brian E. Haggard

Research Hydrologist

USDA - ARS Poultry Production and Product Safety Research Unit

203 Engineering Hall

Fayetteville, AR 72701

E-mail: haggard@uark.edu

[Return to HydroWeb Homepage](#)