Testing The Effect Of The Rill Channel Slope On The Correction Factor Of Surface Velocity

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**Abstract.** Flow velocity is one of the most important hydrodynamic variables for both channelized (rill and gully) and interrill erosive phenomena. The dye tracer technique to measure surface flow velocity Vs is based on the measurement of the travel time of a tracer needed to cover a known distance. The measured Vs must be corrected to obtain the mean flow velocity V using a correction factor v = V/Vs which is generally empirically deduced and can vary in different flow conditions. Experiments were performed by a fixed bed flume simulating a rill channel located at the experimental area of the Department of Agriculture, Food and Forest Sciences of the University of Palermo. The sloping flume was 5 m long, 0.078 m wide, and 0.04 m high. Two different bed roughness conditions (smooth flume, and flume covered by sieved soil characterized by a median diameter of 0.014 mm) were tested.

The measurements were carried out for four slope values (s = 9, 11, 13, and 15%) and different discharges. For each slope-discharge combination, 20 measurements of Vs were carried out using a Methylene blue solution as a dye-tracer. The tracer injection section was placed 4.3 m upstream from the end of the flume. The travel time of the leading edge of the dye cloud was measured by a chronometer.



Figure 1. View of the flume during the experimental runs.

The results of the present investigation were compared with those previously obtained using the same experimental setup, bed roughness conditions, and channel slope values ranging from 0.1% to 8.7%. The investigation aimed to test the effect of the channel slope on the correction factor v for a wide s experimental range.