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Evaluating the effect of different vegetative filter strip designs on sediment movement in an agricultural watershed using LISEM, Iowa, USA

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Although restoration of native vegetation in vulnerable areas would decrease soil loss, this approach is not feasible in communities that base their income on agriculture. However, an alternative exists: strategically placing a small percentage of vegetative filter strips (VFS) within agriculture fields for erosion control. Factors influencing their effectiveness are shallow conditions, vegetation type, filter strip width, slope, soil type, and rainfall characteristics. Generally, the first few meters of the strip are where most sediments deposit. For slopes higher than 10%, effectiveness decreases with increasing slope gradient. Usually, high rainfall intensity and sediment load in overland flow decrease vegetative filter strips' effectiveness.

Nowadays, Iowa (USA), experiences increasingly stronger rainstorms; climate change is expected to increase rainfall erosive forces between 16 to 58%. Thus, there is a need to obtain new insights about strip design and its influence on sediment dynamics.

Therefore, the objective of this study is to analyze strip design (width) impact on soil and water movement. To do so, different strip widths (no strips, 1.5, 3, 5, 7.5 and 10 meters wide) were analyzed under four rainfall intensities (increments of 10, 25, 50 and 75%)

The event-based, hydrological and soil erosion model LISEM was used to simulate different scenarios. The model has been calibrated with data from 3-ha 'Interim 1' watershed, which is part of Walnut Creek (Iowa, USA). During a single event with sediment load, on July 18th 2010, intensities reached up to 80 mm/h. Two different land covers exist: (i) perennial vegetation, which has prairie vegetation covering patches and strips; and (ii) row crop agriculture where corn and soybeans are the main two crops in the area.

Based on the different combination of widths and intensities, 24 scenarios were generated. At the moment, the model is on the final part of the calibration; scenario results will be presented on the poster.