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Assessing runoff generation in relation to soil surface characteristics variability

Application to small plots cropped with conservation tillage techniques

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Soil Surface Characteristics [SSC] (i.e. soil structure, soil water status and microrelief) constitute useful indicators to estimate runoff generation. Nevertheless, most available data of SSC on cultivated soils concern conventional practices, including ploughing. That leads to relatively homogeneous SSC. Conservation tillage [CT] leads to more heterogeneous SSC, and by this way connectivities: a key factor for pounding and runoff.

The non soil-inversion and the presence of crop residues (mulch) at surface constitute one way to limit runoff on arable lands. As these practices are various, depending on natural and agronomical factors, there is a need of indicators based on SSC observations to predict runoff amounts. This poster presents the framework of such an indicator.

This indicator is split in two parts: first is well known and deals with the assessment of the infiltration/runoff partition. However, the second part which assesses the fraction of runoff reaching the outlet is frequently neglected.

Two spatial patterns were used to stand for runoff connectivity and transfer at small scale (from 1 to 20 m^2). One is the pattern created by tillage, made up with three features (seed bed, seed line and wheel track) which was investigated through small

plots SSC surveys. The other is the pattern created by the alternation of mulch and bare patches which was investigated by rainfall simulations.

This approach is applied to small plots of loamy soil affected by erosion. SSC surveys on a sample of plots managed with a range of different CT techniques, reveal that mulch and crust cover varied amongst features created by tillage. Seed lines and wheel tracks present a lower mulch cover and a higher crust extent. Thus, preferential runoff pathways may exist in some CT practices. Concerning mulch pattern, no effect was observed on runoff amounts under simulated rainfall.