INNOVATIVE CROPPING AND FARMING SYSTEMS FOR HIGH QUALITY FOOD PRODUCTION SYSTEMS

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Abstract: Cover crops are known to provide a large number of ecosystem services such as nitrate catch crop and green manure effect. However, the impact of cover crops on water balance is little studied. References reported an increase of evapotranspiration through an increase of cover transpiration that could decrease water drainage. Nevertheless, according to the cover crops management the volume of this modification. There is no consensus on available water for the next cash crop and on the changes in soil water profile which could be explained by the temporal distribution of the rainfall in interaction with cover crop growth rate and date of destruction.

We set up an experiment to measure the impacts of cover crops and their management on soil water dynamics during the fallow period between two main cash crops. Ethiopian mustard and crimson clover were sown on July 31 as a mixture cover. A bare soil serves as control. We tested two dates of destruction, in November for a short growing period and in April for a long cover crop growth period. For cover crops destroyed in November, we used two types of residues management, i.e. 1) one part of cover crop was destroyed by crushing and left in mulch and ii) the other part was destroyed by ploughing. These four modalities were replicated in four blocks in a split-plot design. We measured soil water profiles by gravimetric measurements once a month until 1.2 meter depth by layers of 0.2 meter. Experiments will finish in April 2018.

At the present time, we have compared the effect of cover crops versus bare soil on water content in soil profiles. At initial state, both soil water content were equivalent. Therefore, it allows evaluating effect of cover crops on soil water content during the experiment period. Five weeks after sowing, we could see less water in the first part of soil between surface and 0.5 m depth, indicating the water uptake by cover crop, even if the difference was not significant. Three months after sowing we observed a significant lower water content in soil under the cover crop species to control weed was evaluated at the stage 2-4 leaves of maize. The shoot dry matter yield of maize was measured at harvest at the end of August.

In three out of eight cases, the chosen weeding strategy was very efficient in terms of weed control at the stage 2-4 leaves of maize. In the remaining five cases, the weeding strategy did not succeed in preventing weed infestation at the beginning of maize development. A mean weed cover higher than 15% was observed when no total herbicide and/or soil treatment in strip-plot experiments including different weeding strategies according to integrated weed management rules. In case of a predictable impasse for weed control, an alternative management option was chosen 1) at the end of winter: total herbicide application instead of no herbicide application, 2) at the beginning of May before maize sowing: minimum soil tillage instead of no tillage. The ability of cover crop species to control weed was evaluated at the stage 2-4 leaves of maize. The shoot dry matter yield of maize was measured at harvest at the end of August.

Keywords: Cover crops destruction; mulch; plowing