Evaluation of precision technologies approach for the management of an experimental field in organic fruit growing

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**Abstract.** The use of geophysical measurement systems is one of the key factors in precision agriculture, given that it enables the understanding of soil mechanics and sustainable soil management. The criteria for adopting precision agriculture are slowly interesting a growing number of farms generally managed according to integrated agriculture principles. The experiences in organic farming, for which CREA has been active at national level, are still limited. With a view to starting a rational process of setting up the activities, this work focused on the characterization of an experimental field of CREA fruit breeding program.

In this work, the ordinary soil characterization, according to standard manual sampling, was compared with the application of the Top Soil Mapper system (TSM). The obtained results were used for the discrimination of homogeneous zones and for considerations on the subsequent targeted set of management operations.

The TSM is an integrated geophysical measurement system for determining different soil parameters. Using modern geophysical measurement technology and automated data analysis methods, measurements of different soil top layers can be accurately obtained with high resolution. TSM relies on the principle of electromagnetic induction for soil conductivity measurement, with a depth of exploration of above one meter. It can be used on every working run and with any mechanical equipment as a result of a contact-free sensor technology system. The sensor enables a digital presentation of compacted areas and it allows correct tillage practices. The available information can also be used in real time for variable and direct machine control (tilling, sowing) combining the two processes (application and mapping).

The test in the CREA field was carried out in a whole working day, the work rate and the data obtained were evaluated. The two system of soil characterization were analized and the reasons for this difference are evaluated in detail and reported. The main advantages of TSM are the optimization of equipment use, reduced fuel consumption and reduced machine wear. With this technology, already know in extensive crops, the increase in work rate and soil structure protection through appropriate tillage, fuel cost savings and sustainable yield optimization, could be also achieved in fruit orchard management.