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Sustainable management of agriculture activity on areas with soil vulnerability to compaction trough a developed decision support system (DSS)

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One of the main environmental effects of agriculture is the negative impacts on areas with soil vulnerability to compaction and undersurface water derived from inputs and treatment distributions. A solution may represented from the “Precision Farming”. Precision Farming refers to a management concept focusing on (near-real time) observation, measurement and responses to inter- and intra-variability in crops, fields and animals. Potential benefits may include increasing crop yields and animal performance, cost and labour reduction and optimisation of process inputs, all of which would increase profitability. At the same time, Precision Farming should increase work safety and reduce the environmental impacts of agriculture and farming practices, thus contributing to the sustainability of agricultural production. The concept has been made possible by the rapid development of ICT-based sensor technologies and procedures along with dedicated software that, in the case of arable farming, provides the link between spatially-distributed variables and appropriate farming practices such as tillage, seeding, fertilisation, herbicide and pesticide application, and harvesting.
Much progress has been made in terms of technical solutions, but major steps are still required for the introduction of this approach over the common agricultural practices.
There are currently a large number of sensors capable of collecting data for various applications (e.g. Index of vegetation vigor, soil moisture, Digital Elevation Models, meteorology, etc.). The resulting large volumes of data need to be standardised, processed and integrated using metadata analysis of spatial information, to generate useful input for decision-support systems.
In this context, a user-friendly IT applications has been developed, for organizing and processing large volumes of data from different types of remote sensing and meteorological sensors, and for integrating these data into user-friendly farm management support systems able to support the farm manager. In this applications will be possible to implement numerical models to support the farm manager on the best time to work in field and/or the best trajectory to follow with a GPS navigation system on soil vulnerability to compaction. In addition to provide “as applied map” to indicate in each part of the field the exact needed quantity of inputs and treatments.
This new working models for data management will allow to a most efficient resource usage contributing in a more sustainable agriculture both for a more economic benefits for the farmers and for reduction of environmental soil and undersurface water impacts.