Short Summary EUVRIN Working group meeting Fertilization and Irrigation

Almeria, Spain, 9 May – 11 May 2017

The meeting of the EUVRIN working group on Fertilization and Irrigation was held in the University of Almeria. Fifty-two people attended from 12 European countries (Spain, Italy, Croatia, Slovenia, France, Belgium, UK, the Netherlands, Germany, Denmark, Finland and Slovenia). The meeting was organized by the University of Almeria (UAL; Rodney Thompson and colleagues). There were five scientific sessions, each consisting of a general introduction, a series of 10 minute presentations (including 2 minutes for questions) and a twenty minute discussion. The scientific sessions were: (1) Soil moisture sensors, (2) Models and decision support systems for irrigation and fertilization management, (3) Crop nutrient status and testing, (4) Fertilizer recommendations and fertigation, and (5) Fertilization, rotation and the use of organic materials.

There were general sessions to introduce EUVRIN, provide a general introduction to the Almeria greenhouse system, discuss the future of the working group, discuss a possible COST action and for an interesting presentation by Els Berckmoes (Proefstation voor de Groenteteelt, Belgium) on the nature of and preparation of the successful H2020 project, FERTINNOWA. Additionally, there was a visit to the Las Palmerillas Research Station of the Cajamar Foundation, a pre meeting visit to the UAL Research Farm and a post meeting visit to the Experimental Centre of TECNOVA and to commercial greenhouses.

This document hereafter provides a short summary of the outcomes of the individual scientific sessions.

Soil moisture sensors

The topics presented and discussed were: the suitability of different sensors for practical measurement, sensor calibration and its implications for practical application of sensors, approaches for using sensors for irrigation scheduling and precision irrigation, using sensors for automatic irrigation, integration of sensors with remote sensing approaches, dealing with soil heterogeneity, and the effects of salinity and temperature on sensor calibration and how to deal with those effects. A major discussion point was how to encourage growers to use soil moisture sensors; some of the discussed approaches were on-farm demonstrations, increasing user-friendliness, and demonstrations of water savings.

Models and decision support systems

A variety of simulation models and decision support systems (DSS) for either irrigation or fertilization, or both, were presented. Examples were presented of static models used to prepare fixed plans for irrigation and/or fertilization for the entire crop at planting, or dynamic models capable of adapting plans on a regular basis to inputs of measured or forecast climatic data. The DSSs presented had different levels of development with respect to user interfaces, while some were still in development phase, many were stand-alone programs for use on personal computer, and one has App interfaces for use on smartphones and tablets.

A general impression was that there are common approaches in the different models and DSSs, but also that there are numerous adaptations to local conditions (climate, crops, farm types etc.). There was considerable interest in comparing models and DSSs, and to exchange information and experiences. Later sessions stressed the need for site and crop specific fertilizer recommendations. In general, the meeting stressed the need for the development of DSSs to assist with optimal crop specific nutrient management. The issue of facilitating user adoption received considerable attention.

Crop nutrient status and testing

Several presentations demonstrated that proximal optical sensors were very sensitive to crop N status in a range of vegetable species such as tomato, lettuce, melon, pepper and potato. The sensors discussed were chlorophyll meters (e.g. SPAD meter) and crop reflectance sensors (various models of Crop circle). Plant sap analysis both of petiole and leaf sap was also shown to be sensitive to crop N status. Both proximal optical sensors and sap analysis were shown to be able to detect N deficiency. For both proximal optical sensors and sap analysis, the issues of detecting excess crop N status and dealing with varietal differences were discussed. Soil and soil solution analysis were suggested to be more able to detect an excessive N supply. The combined use of plant-based measurements to detect N deficiency and soil-based measurements to detect N excess was proposed. There was discussion as to the value of this approach compared to just the use of a soil-based approach. The use of sap analysis to assess crop nutrient status for nutrients other than N was also addressed.

Fertilizer recommendations and fertigation

Fertilizer recommendations, where available, in many cases require improvement as they are often outdated or can be made more specific, for site specific conditions

such as soil type and site history, and for crop specific conditions such as expected crop yield, nutrient losses, effects on pests and diseases, and also for crop quality considerations. Given the technical possibilities for precision farming, the existing recommendation schemes can and should be improved. More European cooperation is required to improve fertilizer recommendations; data sharing and collaborative research and development activities will be beneficial to many countries. The use of models and DSS-systems (e.g. to prepare site and crop specific plans, to better estimate nitrogen mineralization) will improve fertilizer recommendations. There was discussion about the advantages of involving end-users in the process of developing DSS systems to ensure their ease of use. The German KNS-system/N-Expert was thought to be a good starting pointy for improving recommendations in many situations. New recommendations need to be well validated and easy to use. There appears to be considerable potential for collaborative work in developing and evaluating new fertilizer recommendations.

Fertilization, rotation and the use of organic materials

The effects of rotation and organic amendments in different systems throughout Europe were presented. One particularly noteworthy study was an assessment of N mineralization from soil organic matter in numerous field sites. There was a consensus that crop rotation and organic matter management are important aspects to increase the nutrient and water efficiency of crops, and that long term research is required to examine these effects. It was recognized that long term research is very difficult to organize because research funding is usually limited to maximum periods of 3-4 years. The need for long term funding to effectively study these issues will be brought up in the next SIRA document.

Additional aspects

During the meeting, Angelo Signore explained the database containing information on the members of the working group. He explained how to use the database and how any member can enter information to the database. Attention should be paid to how the users will enter the information. For more information on the data base, please contact Angelo at angelo.signore@uniba.it

The working group currently has a coordinating group existing of Rodney Thompson, Angelo Signore, Antje Fiebig, Janjo de Haan and Giorgio Gianquinto. Rodney Thompson will soon cease to be sole co-ordinator. The possibility of rotating or collegiate coordination system is under discussion.