

Combining irrigation and fertilisation in open-fields agriculture

September 19 2013, by Constanze Böttcher

The term fertigation is used in agriculture to refer to the combination of irrigation and fertilisation, in one step. Now, an EU-funded project, called [OPTIFERT](#), aims at developing an automatic system that enables farmers to use both water and fertilisers in a more sustainable way in open fields. Lucia Doyle is the project coordinator and a chemical engineer and works as a project manager at the Technologie-Transfer-Zentrum (ttz) Bremerhaven, Germany, an independent provider of research service. Here, Doyle tells youris.com about the challenges of such highly integrated agricultural practice.

What are the key environmental and operational issues associated with modern agriculture?

There is a growing need of productivity increase in modern agriculture. Increased productivity is the only solution to meeting future demand and containing rising prices. Of course, this must be achieved in a sustainable way. Rising fuel and fertiliser prices, as well as the predicted scarcity of them add to the challenge. Climate change and its consequences on weather [unpredictability](#) complete the picture. We need to be able to better monitor and understand the crops' needs in real time. And we need to be able to achieve the targeted yield and at the same time use our resources efficiently and eliminate the risks to pollute the soil and [ground water](#).

What are the challenges of creating an automatic

irrigation and fertilisation system?

We have a large number of variables affecting the crops. The available level of nutrients in the soil, the [moisture level](#), the temperature, the amount of sunshine and so on. Different crops need different combinations and amounts of these factors at different stages of their growth. Understanding these and controlling them is not an easy task. We need to develop the technology for monitoring the resources and nutrients available for the plant, model what the plant needs at the different moments and precisely deliver what is needed. This is what the project is about. A multidisciplinary team of agronomists, biologists, physicists, software, electronics and chemical engineers has therefore taken part in developing the system.

What is the progress achieved to date?

So far, we have developed a software for crop growth modelling, a soil sensor for on-site simultaneous measurement of the plant nutrients nitrate, ammonium, potassium and phosphate and a fertiliser mixing and dosing unit. We have demonstrated the three prototypes in a cornfield in Brandenburg, Germany this year. During this whole season, 25 hectares have been fertigated using only our technology.

We have monitored the field during the whole season, together with a neighbouring reference site. Biomass samples taken at the end of August show a yield increase of 9% at the test site, even though we need to wait for harvesting for the final figure. The portable soil sensor has been tested in other locations as well, to perform a repeatability and reproducibility analysis.

Why has this not been achieved before?

Up to now, precision technology has been developed for horticulture, where the higher value of horticulture crops could pay for it. Fertigation is a novelty when it comes to open field crops. But it implies technical and legal constraints. For example, leak tightness in a fertiliser-dosing unit to be placed in an open field is more critical than in a greenhouse. Also, in a greenhouse, you would place the soil sensor on a table. But in the open field, we would have it in the boot of the farmer's car. The farmer will move around the car in the field. Therefore, the sensor needs to be designed in such a way that the movement does not affect the measurement.

What are the next steps?

The prototypes now need to enter a final product development and validation phase for them to be commercialised. Our research project ends in November 2013, and we are currently conducting a market survey through our website. We have SMEs participating in the consortium and it is on them to continue the commercialisation. We also have requests from other companies that are willing to distribute the system and from fertiliser companies that are interested in the development. Of course, water-soluble fertilisers that are adequate for this system also have a bigger market, so we have experienced quite a lot of interest in the project.

Provided by Youris.com

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