

## **Fertigation management using soil sensor controls in field cropping: FLOW-AID Case Study: Reducing nitrate emission in rain-fed and soil-grown iceberg lettuce**

Balendonck, J.\*; van Tuijl, B.A.J.\*; Kempkes, F.L.K.\*; Wilms, J.\*\* and de Haan, J.J.\*\*

\*) Greenhouse Horticulture - Wageningen UR, Droevendaalsesteeg 1, 6708 PB Wageningen, the Netherlands

\*\*) Applied Plant Research - Wageningen UR, Edelhertweg 1, 8219PH Lelystad, the Netherlands

### **CHALLENGES**

Due to environmental legislation like the Water Framework Directive (WFD), there is a strong focus on controlling water and nutrient flows in the Netherlands. Growers need new techniques to optimize fertigation, especially for crops grown in soil. When grown on sandy soils, crops may soon suffer from drought. In addition, during heavy rainfall, valuable nutrients might leach into the groundwater and damage the environment.

### **APPROACH**

The use of drip irrigation and covering of soil with foil, in combination with controlled fertigation, was evaluated in an experiment. Iceberg lettuce was grown in a standard cropping system with minor adaptations. The aim was to reduce the emission of nitrate to the environment and at the same time increase crop yield while keeping the quality. An automatic sensor-activated irrigation control in combination with a decision support system was tested.

### **RESULTS**

A slightly higher (10%) crop yield was obtained in the fertigated and sensor-activated situations, while maintaining crop quality compared to grower-controlled irrigation management. Under the foil, the automated system assured a less wet environment keeping soil moisture more constant and homogeneous. This prevented leaching of water and valuable nutrients. The technical systems, including the wireless links, worked well.

### **USER BENEFITS**

The decision support system has to be adapted in such a way that it relieves the grower from checking and fine-tuning irrigation. The price of the automatic sensor-activated irrigation system is still a bottleneck for introduction in daily practice. However, growers are advised to apply water and nutrients at lower dose levels, with a closer match with crop demand. This will reduce emissions, increase yields and quality, and will save a lot of work.