

Nitrate-sensor prototype development and testing

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Nitrogen fertilizer is comfortably the biggest input cost in many crops and the most important component in agricultural fertilizers. To ensure the correct amount of fertiliser is applied, the nitrogen concentration of the soils needs to be measured. The traditional approach for measuring in-soil nitrate content is to take a soil sample and analyse it in the lab. Typically, this means that only one reading from a single location is taken per farm each year, yet nitrogen content of soil changes over time. This means that the wrong amount of fertiliser is often added to soils, leading to field run-off and water pollution. At an estimated cost to the EU of €70-320bn per year, there is therefore an increasing need for more precise in-soil monitoring.

In response to this, Dr Tony Miller (JIC) has devised the N-sensor, an in-field nitrate sensor designed to provide farmers with continuous measurements which can enable a highly efficient application of nitrogen fertiliser. There is no comparable product on the market which can provide this constant flow of information. Consequently, this project – in collaboration with Plant Biosciences Limited – seeks to build on the N-sensor's already extensive testing by developing a more robust, longer-lived and more reliable prototype for commercial use. According to a report conducted by Harper Adams University, the commercialisation of N-sensors is likely to develop into an opportunity with an annual sales value of several hundred million pounds globally.

By outlining a route to market for the N-sensor, this project will not only benefit the agricultural industry but also the public at large. Farmers will lower their fertilisation costs through better targeted use of nitrogen and increase yield by optimising fertiliser use. This will in turn limit over-fertilization and have a positive environmental impact, as the leaching of nitrate into water courses is reduced.