

NITROGEN SENSORS

OPTIMISING CROP GROWTH

AND FERTILISER APPLICATION



John Innes Centre

Unlocking Nature's Diversity



THE CHALLENGE

Nitrogen is an essential nutrient for crop growth, it is applied to crops to enhance their yield. If applied in excess and/or during extreme rainfall, nitrogen runs off into freshwater habitats such as rivers, causing pollution and impacting biodiversity.

Reducing the amount of fertiliser applied, by matching supply to the demands of the crop is important for more sustainable agriculture. This type of 'precision agriculture' requires us to understand how much nitrogen is available to crops within the soil.

As part of our research, we have developed soil sensors to monitor nitrogen content at different depths of the soil. To inform farmers and agronomists how much nitrogen is available to crops.

By understanding this we can enable optimal nitrogen application for crop growth, encouraging healthy soils and supporting healthy watercourses.

50%

OF ALL APPLIED
NITROGEN
FERTILISER IS LOST

*How can the plenty
sense nitrogen
sensors help?*



PLENTY SENSE?

Working with farmers, agronomists and agribusinesses the John Innes Centre developed sensors, suitable for a range of crops. Using this technology, Plenty Sense Ltd are developing and producing nitrogen sensors, for the market in 2025, where they will be used to provide a nutrient sensing service to farmers.

- The sensors are suitable for different crops including cereals, potatoes and onions, and can accurately detect nitrogen at different crop root depths.
- By measuring nitrogen at a range of soil depths, sensors indicate when nitrogen applications have been washed too deep for crops to access.
- Some nitrogen fertilisers such as urea turn-over quickly in the soil, the sensors allow farmers and agronomists to understand when the available nitrogen has become depleted.
- Different crop irrigation systems influence how quickly fertilisers are washed out of the soils. These sensors can be used to understand this and allow farmers to assess whether more expensive drip irrigation systems are economically viable.

ONGOING RESEARCH

Some of the molecules used for the detection of crop nutrients are produced by soil microbes. As part of our ongoing research, we are screening natural products for better sensor molecules with improved selectivity.

The Harnessing Biosynthesis for Sustainable Food and Health Research Programme will harness the under-exploited biosynthetic capabilities of plants and microbes to make valuable new molecules, enable improvement to the nutritional quality of food, develop more sustainable agricultural practices and provide new therapeutics and antibodies.

FERTILISER
REPRESENTS

30%
OF A FARMER'S
INPUT COSTS

Fertilisers are expensive. Nitrogen sensors can optimise the amount of nitrogen applied to a crop, reducing the input costs for farmers, while maximising yields and income.

SCAN FOR
MORE INFO



Biotechnology and
Biological Sciences
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