

## **PhD Studentship: Development of the multi-N foliar-applied fertiliser for improving Nitrogen use efficiency in crops**

**Key academic contact:** Professor Chungui Lu, School of Animal, Rural and Environmental Sciences (ARES).

The studentship is funded by Nottingham Trent University and Micromix Plant Health Ltd (MPH). Supervision will be led by Professor Chungui Lu, School of Animal Rural and Environmental Sciences (NTU Brackenhurst Campus). The student will be primarily based at the Brackenhurst campus of Nottingham Trent University.

### **The project:**

Nitrogen (N) pollution from fertilisers is a global problem. Foliar application and absorption of nitrogen has been explored for many years, with research showing that various plant species can rapidly absorb N (and other elements) through the leaf. However, one issue with foliar application is that it can scorch the leaves. Furthermore, research is not clear about the mechanism of the foliar use efficacy because little is known about the complicity of plant processes governing nutrients uptake (absorption, remobilisation) and utilization. The understanding of the dynamic interactions between physical, chemical, environmental and crop-physiological processes, along with metabolic processes, could help in identifying effective fertilizer nutrient composition and in developing next-generation foliar fertilizers.

The project is a collaboration between Micromix Plant Health Ltd (MPH) and Nottingham Trent University. The main aim of this project is to develop foliar-applied N fertiliser formula that can reduce or replace soil-applied N fertiliser for cultivation of wheat and maize, without scorching leaves, retaining or bettering the quality & yield of each crop, whilst reducing the overall amount of nitrogen - essentially increasing the N use efficiency. We therefore will aim to:

1. Investigate the interactive effects of foliar fertilization on N absorption and nitrogen use efficiency.
2. Evaluate the best timing and concentration for applying multi-N foliar at different developmental stages in both wheat and maize.
3. Determine the effect of the muti-N foliar on crop quality.
4. Explore new improved selections (nitrogen-fixing bacteria) and nutrient remobilisation.

To achieve this we will collect and integrate all data from field trials and glasshouse trial for further analysis, which will be used in three ways. The first is to focus on crop yield analyses such as grain yields, biomass etc to determine which treatment has a higher N use efficiency. The second approach is to focus on the N mechanism analyse which includes plant physiological data (N contents, photosynthesis, enzymes etc.). The third way will involve the use of imaging analysis for root architecture.

### **Person specification:**

A first class or upper second class UK BSc (Hons) degree (or international equivalent) and a Master's degree in disciplines relating to plant science or plant physiology is essential.

Applicants having a background in both plant nutrition and crop physiology are particularly encouraged to apply. The student must be ready to start on 5<sup>th</sup> January 2018.

### **The School of ARES:**

Nottingham Trent University has an outstanding reputation for our commitment to research that shapes lives and society. The School of Animal, Rural and Environmental

Sciences is located at the NTU Brackenhurst Campus. It has a growing postgraduate community which benefits from the support of the NTU Doctoral School in addition to the subject specialist expertise within the School.

Further information regarding research within the School can be found at:

<https://www.ntu.ac.uk/research/research-at-ntu/academic-schools/research-at-the-school-of-animal-rural-and-environmental-sciences>

For informal enquiries about the studentship, please contact Professor Chungui Lu at [Chungui.Lu@ntu.ac.uk](mailto:Chungui.Lu@ntu.ac.uk)