Semiochemical-based alternative concepts for the management of wireworms

Supervisory team:
Rothamsted supervisor: Dr Jozsef Vuts (Rothamsted Research)
Academic supervisor: Dr Pete Maxfield (University of the West of England)
Non-academic CASE Supervisor: Dr Benedikt Kurtz (Syngenta)

Other partners: Dr John C. Caulfield (Rothamsted Research), Dr Ben de Lacey Costello (University of the West of England)

Host institution: Rothamsted Research

CASE Partner: Syngenta

Project description:

Wireworms are major pests of cereal crops and root vegetables in Europe and also in North America. Seed treatments and other contact insecticides are used to protect crops from larval feeding damage. However, current chemical options are challenged in Europe and it is very questionable when and if at all a new soil insecticide could be registered for wireworm management. Semiochemicals (naturally occurring development- and behaviour-modifying chemicals) act in a non-toxic mode of action and can provide an environmentally benign alternative for soil pest management. Similar to aboveground insects, soil-dwelling arthropods are also attracted to or repelled by semiochemicals that occur in the gas phase and diffuse in soil pores. Whereas CO2 is a generic attractant, rhizosphere-derived semiochemicals provide more specific, mid-range host location cues for soil pests.

The main aim of this Syngenta CASE PhD project will be to conduct underlying research for the development of wireworm semiochemical-based management strategies. The student will be based at Rothamsted Research (80%) and at the University of the West of England (20%) and will be trained in a wide range of chemical ecological and analytical chemistry techniques, including semiochemical extraction techniques, analytical chemistry (GC, GC-MS, SIFT-MS, GC-EAG, HPLC, LC-MS) and bioassay (soil olfactometry, soil mesocosm) methods.

The resulting semichemical blends, applied as slow-release formulations for example, will create the basis for the development of push-pull pest management systems for wireworms, circumventing the issues innate of insecticides. The work leading to such novel approaches will significantly impact UK and international plant and insect science and chemical ecological communities by providing a better understanding of rhizosphere chemical ecology processes, and it will also create a model for crop protection practice against soil pests in general towards other more sustainable solutions, such as breeding of crop plants with desirable pest resistance traits.

The successful candidate will have, or soon expect to obtain, an upper second- or first-class undergraduate degree in biology or chemistry. A Masters-level degree and substantive laboratory experience is desirable, but not essential.