

# Pan-European study of the effects of neonicotinoids on pollinator populations

Syngenta Crop Protection and Bayer CropScience are jointly developing a research and demonstration project which aims to quantify the effects of commercial, field-scale application of neonicotinoid seed treatments on pollinator populations. A further aim is to demonstrate best-practice management for the conservation of honeybee and native pollinators within intensively farmed landscapes. The project will be independent, scientifically robust, visible to the public, and publicly accessible.

The project will be implemented in five key EU countries (subject to resources) (United Kingdom, Germany, France, Poland and Hungary) and will consist of two complementing approaches: *i*) a replicated multi-country field trial, *ii*) a demonstration farm network. The research project will produce robust scientific evidence to inform future regulation and policy on neonicotinoid use across the EU. The demonstration farm network aims to communicate best-practice management to conserve pollinators to non-scientific stakeholders.

## Pan-European Field-scale Experiment

The experiment will quantify the effects of the following neonicotinoid treatments applied to commercial autumn-sown oilseed rape on pollinator populations:

1. no NNI treated seeds as a control
2. NNI treated seeds
3. NNI treated seeds plus mitigation measures

These three treatments will be repeated for both the Syngenta NNI (Thiamethoxam) and Bayer NNI (Imidacloprid) products. All treatments will otherwise share the same crop agronomy and crop variety to reduce other sources of variation (note these will be country specific). The study will run for 3 years and be implemented post the NNI moratorium (Aug 2014) to reduce the risk of contamination of the control treatment with NNIs. The treatments will be applied to large, commercial areas of OSR to ensure realistic exposure of pollinators. These will be separated by a minimum distance of 10km to reduce the risk of cross contamination. The mitigation treatment (3) will examine the potential to mitigate any effects of NNIs by providing a greater range and abundance of flora resources in the landscape for crop pollinators. This will require the creation of pollen and nectar habitats on between 5-10% of land within the treated area. The precise composition of these habitats will vary between countries. The level of treatment replication within each country will be based on the results of a statistical power analysis using all available data from previous field trials including those conducted by Bayer and Syngenta. It is proposed to site all replicates within homogeneous, intensively managed simple landscapes within each country to represent the maximal exposure-risk and to reduce further variation resulting from differences in landscape structure. This will also provide a more realistic test of the mitigation measures.

The primary measured response variables will be based on EFSA guidelines and comprise population and reproductive measures of commercial honey bees (*Apis mellifera*), bumblebees (*Bombus terrestris*) and solitary bees (*Osmia rufa*). This will be supported by background measures of the diversity and abundance of pollinators from transect counts and coloured water traps, together with comprehensive assessments of crop and non-crop floral resources within each treatment. Residues of NNI will also be measured in both the pollinators and flowers of the treated and untreated crops. Finally, crop yield and quality will be monitored in all treatments.

The project will be undertaken by a consortium of independent EU research organisations led by the NERC Centre for Ecology and Hydrology, based in the UK. It is proposed to establish an independent Project Advisory Group comprising stakeholders from across the EU to review and guide all aspects of the project.

The scientific partners are preparing a methodological paper describing the rigorous design of the experiment. The paper will be used to engage with the major stakeholders on the methodology.

### **Demonstration farm network**

The demonstration farm network will be implemented in autumn 2013 and aims to engage stakeholders with best-practice management for crops, and native and commercial pollinators within the commercial farming situation. It will also provide an opportunity to test monitoring protocols for the main field experiment. It will comprise a demonstration site in each of the five EU countries with an example of the experimental treatments applied to a single field.

Colony strength and bee health of honey bees will be monitored throughout the year. Additional monitoring will provide information on the beekeeping practices and honey bee colonies statuses, environmental factors (habitats and weather), chemical factors (treatments with plant protection products in OSR, treatments to control biological agents), and biological agents Varroa mites and other parasites and pathogens).

Remote hive monitoring will provide additional data such as temperature and humidity within the hive and hive weight. High outdoor video cameras will be placed on one field per country to provide day and night images.

Native bees will be assessed with transect counts in the OSR fields.

The demo farm network will facilitate the communication to non-scientific stakeholders through a website and agriculture magazines.