Best Ecology Presentation at Environ 2021

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Characterising pesticide residues in pollen and nectar of crops and wild plants from agricultural fields in Ireland

Most pesticides applied in Ireland, in terms of volume, are Plant Protection Products (PPPs), including herbicides, fungicides and insecticides. When systemic PPPs are applied via spraying or as seed treatment, they get dispersed in soil and water and can be translocated through the plant tissues, contaminating nectar and pollen of both crops, and nearby growing wild plant species. Pollen and nectar are the main food source for bee pollinators and this oral exposure, along with direct contact through spraying, is of concern for their health and for the delivery of pollination services.

To determine potential levels of exposure, there is a need to assess the presence and quantify the concentrations of these PPPs found in pollen and nectar, both within and beyond the target plants. This information would contribute to setting a more defined European legal framework for active ingredients that pose a risk to beneficial insects.

For my research, which is part of the PROTECTS project (https://protects.ucd.ie), the most extensively used systemic PPPs in Ireland were selected targeted for analysis. Oilseed rape was chosen as model crop species since it is the most cultivated and pollinator attractive arable crop in Ireland (Fig.1).

Figure 1. A solitary bee (*Andrena* sp.) foraging on the flowers of oilseed rape crop.

Since brambles are so abundant and a valuable food source for bee pollinators in field edges during the summer months, they were chosen as model wild plant species (Fig.2).

Figure 2. A solitary bee (*Megachile* sp.) foraging on brambles growing in the margins of the oilseed rape crop.

For a representative sample, several fields in the south east of Ireland were included and a minimum of 1000 flowers were collected from each model plant in every site, to extract the required amounts of pollen and nectar for chemical analysis (~ 100 mg and ~ 100 µl respectively) (Fig.3).

Figure 3. Oilseed rape and bramble flower collection.

The frequency of detection and the concentration of the target PPPs in nectar and pollen samples from each site are determined by the appropriate validated Liquid Chromatography - Mass Spectrometry (LC-MS) method, to estimate the PPP exposure risk for nectar and pollen feeding pollinators.