Arthropod species occurring in European crops - a database to support environmental risk assessment of genetically engineered crops

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Genetically engineered (GE) plants are subject to risk analysis before they can be placed on the market. This includes an environmental risk assessment, covering several areas of environmental concern, one of which is the possible risk to valued non-target (NT) organisms including beneficial and protected arthropods.

NT species to be tested are selected case-by-case, based on their ecological relevance, the likelihood of exposure to and the toxicity of the GE plant products, and their testability. The arthropod fauna may vary for different crop plants and between geographic regions along climate gradients, changing landscape features, soil properties, and farm management practices. Knowledge of the receiving environment of a new GE plant is thus valuable in order to generate appropriate risk hypotheses and consequently relevant data to support the environmental risk assessment.

For the EU, the European Food Safety Authority (EFSA) has the role to evaluate the risk assessment provided by applicants and to give scientific advice to risk managers. The aim of the presented project, administered by EFSA, was to provide a detailed overview of the composition of the arthropod fauna and the abundance of species found in different crops and different geographic regions across Europe.

In a systematic literature search, suitable publications on arthropods counted or collected in European maize, oilseed rape, potato, beet, soybean, cotton, and rice fields were identified. Information on species attributes and collection records has been stored in a SQL-queryable database. This database contains ~3000 species from 2400 collections that were extracted from 1000 publications. Most information is available for predators and herbivores, followed by parasitoids, decomposers, and pollinators. Within the group of predators, beetles (carabids, ladybirds and rove beetles) and spiders were clearly the taxa collected with highest intensity (2550 and 1000 records, respectively), followed by predatory bugs, flies, and lacewings (100-170 records each). While most information is available for ground- and plant-dwelling species, only little data on species level has been published for soil-living arthropods. Maize is the crop for which most records (~5400) and species (~1650) have been identified.

The species composition of different crops and geographic regions in Europe will be presented. Furthermore, examples will be given how the database can facilitate the identification of ecologically and agronomically relevant species for NT environmental risk assessment.

Keywords: Arthropod database, Europe, environmental risk assessment, EFSA