

New developments in ecotoxicology for the risk assessment of single and multiple stressors in insect pollinators: from the laboratory to the real world

Agnes Rortais, David Spurgeon, Guy Smagghe

May 9, 8:35 - 10:15, Hall 300

Insect pollinators may be exposed to various stressors (chemical, biological, environmental) which affect their health and, in turn, pollination services which are important components of sustainable agriculture and food security. Given both the various spatio-temporal scales in which pollinators may forage and the multiple possible combinations of stressors and factors that they may encounter, assessing the impacts of combinations of environmental pressures at the population and landscape level is complex and challenging. There are also still important research gaps on stressor effects at all levels of biological organisation for different insect pollinators (from molecular to population) which render the task even more difficult. When assessing risks from pesticides to pollinators, bees are used as surrogate species for insect pollinators and a tiered approach is followed going from the most conservative to the most realistic conditions (i.e. from individuals in laboratory to colonies in (semi)fields). However, while standardised tests for pollinators other than honeybees are missing, field testing for honeybees present important limitations (e.g. too short in duration to detect chronic effects, too small in sampling size to detect significant effects with high statistical power, too small in plot size to reflect the real foraging conditions, lack of methods to study sub-lethal effects, etc.). To improve such tests, alternative approaches and methods such as modelling and simulation studies need to be explored. Indeed, modelling could resolve many of the limitations inherent to the field testing, ie to allow the study of combinations of interactions (eg chemical mixtures, pesticides with biological agents, etc.), the extrapolation from individual to populations, between species, and the testing at various spatial and temporal scales. This session aims to highlight new developments for the risk assessment of single and multiple stressors in insect pollinators. Laboratory studies dealing with the integration of mixture toxicity data and Dynamic Energy Budget models will be included in the light of the new OECD testing guidance on honeybees. Recent modelling developments at the colony level and the landscape level will also be a focus with the description of mechanistic exposure-effect models, population models and landscape models to support the risk assessment of multiple stressors in insect pollinators under different stressors including chemicals, beekeeping practices (for managed bees), climate change, invasive species and pathogens.