4.9 Methodological aspects of semi-field tunnel studies with bumblebees

Maria Teresa Almanza, David Gladbach, Alexander Nikolakis

Bayer CropScience AG- Alfred-Nobel-Str. 50 - 40789 Monheim am Rhein - Germany

Abstract

Regulations to assess the risk of plant protection products to bee pollinators currently undergo a rapid development in Europe and North America. One of the upcoming key changes is the inclusion of additional non-*Apis* bee-species in the risk assessment, striving for a comprehensive protection of pollination services provided by managed and wild bees. It accounts for the potential difference in sensitivity that bee species may have to plant protection products through differences in their body size, their life cycle and foraging behavior. The European EFSA guidance (2013) proposes a tiered approach comprised of a Tier I screening risk assessment also for bumblebees that is intended to initially filter substances which pose a low risk. Similarly, the North American approach resulting from the SETAC Pellston workshop (2011) recommends to refine the exposure assessment with tunnel studies if the screening-level (Tier 1) indicated a potential risk to bees. However, threshold values of Hazard Quotient (HQ) for bumblebees as envisaged by EFSA are highly conservative and will trigger further evaluation at higher Tier levels for a series of even non-toxic substances.

In an attempt to derive the endpoints requested by the EFSA Guidance Document under semi-field confined conditions, the methodology as it is established for honeybees under the guideline EPPO 170 (2010), was transferred to bumblebees. However, subsequently it became obvious that species-specific differences (behavior, phenology, etc.) would limit the suitability of this approach. Therefore there is an urgent need to establish validated methods to evaluate appropriate and bumblebee specific endpoints under semi-field conditions.

In the presented series of pilot studies colonies of the bumblebee *Bombus terrestris* were confined on a flowering highly attractive crop (*Phacelia tanacetifolia*). In order to assess the suitability of chosen endpoints and methods, a treatment group, exposed to a foliar application of a known bee-toxic standard product was compared to a control group without treatment. Mortality and foraging activity were assessed following similar method as for honeybees. Assessments of colony and brood development were adapted to differences of the nest structure in comparison to a honeybee hive, while aiming to keep the disturbance to the colony within reasonable bounds.

Here we present first experimental approaches to establish a methodology for semi-field tunnel studies with bumblebees highlighting the potential technical difficulties, and the variation of some end-points to contribute for the evaluation of potential feasible methodologies to implement semi-field tunnel studies with *B. terrestris.*