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Original thinking... applied

Bumblebees – Acute Contact and Oral Toxicity Tests: OECD Testing Guidelines 246 & 247

These two tests are first tier laboratory tests designed to address the potential risk to adult bumblebees posed through the two main routes of exposure to chemicals i.e. contact or oral exposure.

Bees may be exposed to chemical residues when foraging on treated crops; either sprayed with plant protection products or treated with systemic seed treatments.

Exposure may either be orally; via collection of contaminated pollen, nectar and water, or contact; by direct overspray, exposure to dust or contact with treated parts of the plants.

Both study types involve dose response tests to examine the contact or oral toxicity to adult bumblebees. Each test is usually run with a minimum of 5 dose rates per test item (usually based on the outcome of a range-finding test), with a minimum of 30 individually caged bees per treatment

In the contact toxicity test, test item dilutions are applied directly to the dorsal thorax of each test bee.

In the oral toxicity test, the test item is offered to the bees after being dissolved or suspended in 50% w/v sucrose

For each test type equivalent control and toxic reference test units are set up to ensure that the test animals and test system are functioning and meet the test validity criteria. The end point of the tests is the mortality rate after 48 hours. However, if there is a significant increase in mortality ($\geq$ 10%) between 24 and 48 hours after exposure, the

duration of the test may be extended to a maximum of 96 hours. Chemical analysis is required for dose verification and demonstration of homogeneity and stability of the test item in the dosing solutions under **OECD 19.** This analysis is undertaken using methods validated according to **SANTE/2020/12830, Rev.2**

Bee mortality is recorded on a daily basis and compared this with control values. The data are then analysed to estimate the median Lethal Dose (LD_{50}) with 95% Confidence Limits and No Observed Effect Dose (NOED), if possible, at 24 hours and 48 hours and at 72 hours and 96 hours if the test is extended.

Test guidelines and references OECD Guideline 246 for the Testing of Chemicals: Bumblebee, Acute Contact Toxicity Test.

OECD Guideline 247 for the Testing of Chemicals: Bumblebee, Acute Oral Toxicity Test.

OECD 19: Advisory Document of the Working Group on Good Laboratory Practice on the Management, Characterisation and Use of Test Items.

SANTE/2020/12830, Rev.2 14/02/2023: Guidance Document on Pesticide Analytical Methods for Risk Assessment and Post-approval Control and Monitoring purposes

FERA'S WORK IN BEE ECOTOXICOLOGY

Fera has the expertise and scientific resources to help partners test active ingredients or formulated products for their effects on bee survival, development and behaviour, enabling the development products that are safe for bees.

Fera's specialists are perfectly placed to meet data requirements and our services in bee ecotoxicology range from standard laboratory studies to bespoke higher tier studies to address specific risk assessment needs.

Fera works closely with and is co-located with the National Bee Unit, and we own 150+ colonies of honey bees managed directly by our highly skilled on site bee keeping team. These colonies are used to support our risk assessment work and R&D.

MORE ABOUT FERA

Fera is based on the York Biotech Campus

We work closely with plant protection and veterinary medicine product manufacturers to help develop effective, sustainable and safe chemical products that minimise ecosystem impacts and pollution, while maximising the beneficial effects for crops, plants and animals.

Combining the extensive expertise of our scientists with advanced resources and GLP-compliant laboratories, we provide valuable support to companies in their chemical evaluation and registration efforts.

GET IN TOUCH

For more information and to book a test, call Fera on **+44 (0)300 100 0321**, email **sales@fera.co.uk** or visit **www. fera.co.uk/chemical-regulation**