



CASE STUDY

Radio Frequency IDentification tagging - field experiment

Many studies conducted under laboratory conditions have clearly demonstrated that insecticides have the potential to affect the ability of honey bees to return to the hive through effects on learning and memory, knockdown or flight. However, one of the problems encountered when considering such lab studies is the relevance of these experiments to what happens under actual field conditions. Over the last few years there has been interest in using the developing Radio Frequency Identification (RFID) as a tool for assessing flight and foraging behaviour of bees.

This technology involves fixing small transponders to free flying bees and monitoring their activity by fixing readers to the front of the hive. The majority of these studies have involved artificial feeding of the bees either by feeding the bees directly or by giving them access to dosed feed from artificial feeders rather than under natural conditions of exposure i.e. open foraging on treated crops.

We were approached by customer who wanted to look at such a real life scenario. Using our wide ranging practical experience of handling bees and experience with the emerging technology Fera designed a large scale RFID tagging and monitoring study to determine the effects of foraging of honey bees (*Apis mellifera* L.) on oilseed rape grown from seed pesticide treated honeybee on homing behaviour. A total of 12 honeybee colonies were allocated to each treatment group, 4 located at the field edge and 4 each at approximately 500m and 1000m from the field. As part of the study tagged a staggering total of nearly 10,000 newly-emerged bees (approximately 300 bees per colony)— no mean feat in itself approximately 300) with Mic3 RFID transponders. These bees were then introduced to the test colonies. RFID readers fitted to the entrances of the test colonies were used to monitor the activity of the tagged bees for exposure phase (equivalent to the flowering period which was approximately 5 weeks). These activity data were analysed to assess any impact on flight activity of bees foraging on the treated compared to untreated crops.

A full description of the study can be seen in the paper Thompson, H., Coulson, M., Ruddle, N., Wilkins, S. and Harkin, S. (2016), Thiamethoxam: Assessing flight activity of honeybees foraging on treated oilseed rape using radio frequency identification technology. *Environ Toxicol Chem*, 35: 385–393. doi:10.1002/etc.3183.

This field study remains one of the largest scale tagging open field studies to have been carried out on bees and as well as helping to understand the possible effects of the test

item on the foraging behaviour and life-span of the bees this study gave a fantastic insight

into how such data may be used to look at the behaviour of bees for future work.

'Pollinators can suffer from non-chemical threat including susceptibility to their own pests and diseases'.

Over the last 30 years, Fera have amassed a wealth of expertise in developing and assessing the therapeutic benefits of various products designed to improve honey bee health. Our team of researchers and bee ecotoxicologists have been responsible for generating data that has led to the registration of many of the current health products available to beekeepers today. Our active membership on international panels and current project portfolio will allow us to continue to expand our expertise in this important area, ensuring we remain at the forefront of therapeutic development to help protect our important pollinators.

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