

1080 AND BEES

FACTSHEET RD10

This factsheet explores the effects of sodium fluoroacetate (1080) toxin on honey bees (*Apis mellifera*).

OSPRI's TBfree programme uses 1080 in cereal pellet baits to control possum populations in rural and forested areas. The baits and the toxin are soluble in water and biodegrade in soil and natural waterways. There have been concerns about the short-term effects on the safety of bees or products produced by bees that range into an area where baits have been distributed. However, a recent study concluded that, under the conditions of their study, the risk of contamination to bees and their products appeared to be negligible.

BEES BROWSING BAITS

Cereal baits have now replaced the early types of bait used to deliver vertebrate toxic agents (VTAs, including 1080) to possums. The early baits included 'jam' or paste baits, which were moist, contained fruit pulp and sugar, and attractive to honey bees (Goodwin & Ten Houten 1991). This bait type was withdrawn from use in 1995. It was replaced with a paste formulation containing thickeners and 'bee-safe' sugar at lower concentrations. However paste baits are seldom used these days – just a fraction of the 1990s quantities.

Cereal pellet bait formulations are used most commonly for possum control but carrot baits are also used. Carrot and pellet baits are not highly attractive to bees (Palmer-Jones 1958). While cereal pellet baits contain sugar, their dry, compressed texture makes it difficult for bees to ingest this type of bait (in the way they take nectar as food).

COULD EXPOSURE TO BAIT KILL BEES OR CONTAMINATE HIVES?

Field studies by Plant & Food Research, commissioned by OSPRI, investigated the effect of 1080 cereal bait or dust on bees. Bees were trained to visit 1080 pellets by coating the bait with sugar syrup containing peppermint oil. The research showed that the bees rapidly lost interest in visiting the uncoated, dry 1080 pellets currently used for possum control (Howlett et al. 2012). This suggests that foraging workers from healthy, unstressed hives are unlikely to be attracted to cereal pellets baits and unlikely to carry 1080 back to their hives.

The potential for foraging bees to encounter dust from 1080 pellet bait was investigated by placing six hives within the boundary of an aerial baiting operation (Howlett et al. 2012). Samples of bees, pollen and nectar were taken from the hives approximately 15 hours after the aerial application of bait, and again at approximately two weeks afterwards. Laboratory analysis showed there were no detectable concentrations of 1080 in any of these samples.

Surveys of bee and flower numbers in the area were undertaken before the baiting operation; then repeated at one, five and 15 days after the aerial application of bait. The surveys identified gorse and tamingi as the main source of forage for bees in the area at the time, and bees were observed actively foraging in all surveys following bait application. Gorse and tamingi flowers were sampled within 16 hours of aerial bait application. Microscope examination showed no evidence of dust particles that could have come from 1080 bait on flowers, and laboratory analysis did not detect residual 1080 in tamingi flower nectar.

In each hive, brood (bee larvae) development was monitored before and after the aerial application of bait and found to be normal throughout. One hive of the six collapsed with symptoms of starvation and was sampled approximately six days after aerial bait application – no detectable 1080 was present in bees or products from this hive and was therefore not a likely explanation for the hive collapse.

MINIMISING THE RISKS OF EXPOSURE

Applications of any toxic bait (not just 1080 bait) for pest animal management should take into consideration the availability of food for bees, and likely foraging activity of bees in the area, e.g. generally bees are less actively foraging in winter. In situations where bees are active but there are few flowering plants for them to feed on, bait should be monitored for bee activity.

Bees are more likely to encounter cereal pellet bait when a quantity of pellets is presented in one location (e.g. a bait station), rather than where individual pellets are broadcast over a wide area. It is also possible that, in very dry conditions, bees could be attracted to damp cereal pellets (e.g. in a plastic bait station or bait bag). For these reasons, bait stations have greater potential to be a source of exposure of VTAs to bees than aerially applied pellet bait.

The green dye used in cereal pellet bait may indicate whether bees have been foraging on bait and depositing it in the hive. If a green coloration is observed in some cells, or if it was suspected that bees from a particular apiary had been foraging on toxic bait, this should be reported to the Ministry of Primary Industries who would determine whether to test the hive for residual toxic agents.

LINKS TO RELATED TOPICS

The [Trees for Bees](http://www.treesforbeesnz.org/home) website provides information about suitable plantings to ensure that bees have access to flowering forage plants for as much of the year as possible <http://www.treesforbeesnz.org/home>

References

Goodwin RM, Ten Houten A (1991) *Poisoning of honey bees (Apis mellifera) by sodium fluoroacetate (1080) in baits*. New Zealand journal of zoology 18, 45-51.

Howlett BG, Evans LJ, McBrydie HM, Goodwin RM (2012) The effect of 1080 cereal bait or dust on bees, hives and bee products. Report SPTS No. 6589, prepared by Plant and Food Research, 31 pages.

Palmer-Jones T (1958) *Laboratory methods for measuring the toxicity of pesticides to honey bees*. New Zealand journal of agricultural research 1, 290-300.

This Factsheet was prepared by Penny Fisher, Landcare Research. For a printable copy, or more information, please visit ospri.co.nz