

4.2 ATTRACTIVENESS OF RE-HYDRATED BAIT

4.2.1 Water added

The attractiveness of rehydrated freeze-dried and oven-dried baits with the same additives as above (4.1.1) was tested at Duckpond Stream on 11 February 1998. A canned sardine treatment was added as a control, in addition to non-rehydrated oven- and freeze-dried controls. At 10 localities, a petri dish of each treatment was placed on the forest floor about 2 m apart and 25 ml of water added to all dehydrated baits. The number of wasps seen visiting baits was recorded via instantaneous counts every 30 minutes for 6 hours from 1030 hrs. ANOVA was used to compare the total number of wasps counted on each replicate between dehydration methods and bait additives. Count data were square-root transformed before analysis.

4.2.2 Hydration in the field

Petri dishes of non-toxic oven- and freeze-dried sardines (prepared as above), with and without the additives Alcosorb, sorbitol, and Guar gum, were placed on the ground within 2 m of each other at 10 sites at Lake Rotoiti. A malfunction in the freeze drier while baits for this trial were being prepared resulted in a batch of sorbitol baits being produced that were of unique consistency (visually of intermediate consistency between oven- and freeze-dried baits). These baits were added to the trial (making up half the sorbitol replicates). Sorbitol-A are the baits produced from normal operation of the freeze-drier, sorbitol-B are those baits resulting from the malfunction of the freeze drier. Baits were placed out on 8 April 1998. The plots were revisited on 12 occasions over the following 2 weeks, and the number of wasps feeding on each bait recorded over a 1-minute observation period. A record was also made if petri dishes were empty or had been disturbed. Baits were collected on 21 April, and the proportion of bait removed estimated visually. The mean number of wasps on baits was graphed for the whole observation period. Count data were square-root transformed before analysis.

Rainfall records from St Arnaud (about 1 km away) were used as an estimate of rainfall at the study sites over the sampling period.

4.3 SIMULATED AERIAL BAITING OPERATION

As a consequence of results obtained from the tests outlined above, pellets were not considered sufficiently attractive to use in a poisoning trial. Instead the most attractive freeze dried formulation was used to test if dehydrated baits had potential. About 25 g of sardine cat food bait containing 1% sorbitol and 0.1% fipronil were placed in petri dishes and freeze-dried. Samples of the toxic baits were sent to the Landcare Research Toxicology Laboratory to determine the fipronil concentration after freeze-drying. Six sites were selected near Mt Misery on the edge of Lake Rotoroa. At three of the sites, the dried baits were removed from the petri dishes and placed out on 27 January 2000. Bait was placed on a 50 × 20 m grid over 4 ha at each site. The bait spacing was chosen to represent high bait densities compared with tests that successfully controlled wasp colonies within similar sized blocks in the same areas using sulfluramid and compound

1080 (50 × 30 m spacing; Beggs et al. 1998), and with fipronil baits in the Rotoiti Nature Recovery Project (50 × 50 m and 100 × 50 m spacings; Harris & Etheridge in press). The baits were placed under mesh cages (as used by Beggs et al. 1998) to prevent large non-target species feeding on them. Fifteen wasp colonies were located within each site and the number of wasps entering and leaving the nest (the traffic rate) counted the day before poisoning, and 22 days after baits were placed out. The traffic rate is an index of colony size (Malham et al. 1991). A subsample of 20 baits were re-visited to check if bait had gone.

No treatment occurred at the other three sites. Seven nests were located and the traffic rate of colonies was recorded on the same day as the treatment sites. Treatment sites were at least 500 m apart and >1 km from the nearest non-treatment site. ANOVA was used to determine treatments effects. Traffic rates before each poisoning were analysed as a covariate. Count data was square-root transformed before analysis.

Rainfall records from St Arnaud (the nearest meteorological station at about 20 km away) were used as an estimate of rainfall at the study sites over the treatment period.

4.4 NON-TARGET SPECIES

4.4.1 Invertebrates

For the attractiveness trial (4.2.1 above), any non-target species seen on baits when recording instantaneous counts of wasps were recorded. On 10 April 1998, after baits in the hydration experiment (4.2.2 above) had been in the field for 2 days, all non-target organisms seen on baits were recorded. On 8 April, freeze-dried baits containing sorbitol, Alcosorb, or no additive (11 replicates of each treatment; 5 of which had water added) were placed out during the day and monitored on 10 occasions between 1730 hrs and 2015 hrs to record non-target invertebrates visiting baits after dark. Where possible, these species were caught to allow further identification.

On 20 April 1999 at Duckpond Stream, 12 replicates of three bait types (freeze-dried and pellet bait formulations A & B), either dry or hydrated, were placed out and visited on two occasions after dark between 1830 hrs and 1930 hrs. On four other occasions, on 21 and 22 April, these baits were visited during daylight hours to record species on baits.

4.4.2 Vertebrates

Time lapse night-vision video equipment was used to record visitation to baits during the nights of 21/22 and 22/23 April 1999. Three bait types (freeze-dried and pellet bait formulations A & B), either dry or hydrated, were placed within focus of the camera. Recordings made over the 2 nights were played back to identify any vertebrates visiting baits.

4.4.3 Kaka

A previous long-running automated kaka feedout near St Arnaud was reactivated for several months in the summer of 1999 and 2000. Sugar water and hazelnuts

were available in the early evening for visiting kaka. Many of the birds that visit the feedout are used to human presence and able to be hand fed. Observations were made of bird behaviour when presented by hand with either non-toxic bait formulations or nuts. In addition, the hazelnuts in the hopper of the automated feeder were replaced with pellets and freeze-dried baits.

5. Results

5.1 PELLETISATION OF BAIT S

5.1.1 Effect of additives and drying method on hydration

Oven and freeze-dried baits lost similar amounts of water during processing (60.5%, $p > 0.05$). Only a small proportion of water lost was reabsorbed. Freeze-dried baits reabsorbed significantly more moisture than oven-dried baits (Figure 2; $F = 20.4$, d.f. = 1, $p < 0.001$). Bait additives significantly affected absorption ($F = 20.4$, d.f. = 1, $p < 0.001$), with the addition of Alcosorb and sorbitol to freeze-dried bait resulting in the greatest water absorption (Figure 2). At ambient room conditions, the Alcosorb freeze-dried baits regained about 1.5 g (6.2%) of the 24.2 g lost during dehydration.

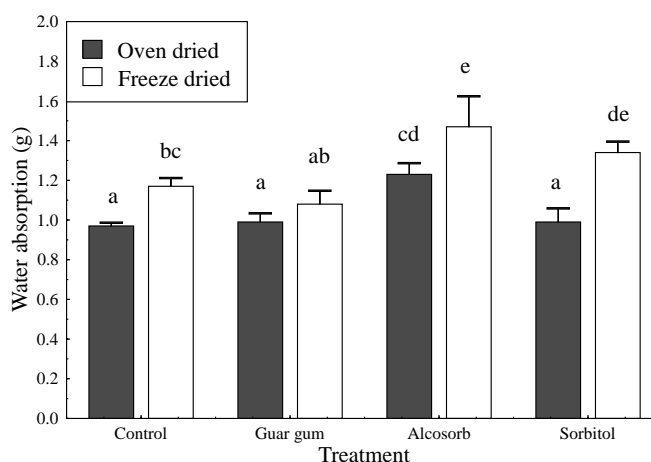


Figure 2. Water absorption of oven-dried and freeze-dried sardine baits after 120 hours exposure to ambient temperature and humidity. Mean + SE. Bars with the same letter above are not significantly different at the 95% level (Fisher's Least Significant Difference Test).

5.1.2 Pelletisation methods

Formulations that would be suitable for commercial production and would withstand aerial application were able to be produced. The pellets were difficult to formulate compared with grain-based pellets. The result was a very hard pellet of finely ground sardines, which looks not unlike a piece of chalk (Figure 3).

5.1.3 Water Absorption of pellets

All pellet formulations (Appendix 1), except the Alcosorb treatment, reached maximal absorption after 6 days (Figure 4). The weight gain was highest for the Alcosorb, followed by the Palabind treatments. Maximal weight gain of all

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