THE EFFECTIVENESS OF A SULFLURAMID CONCENTRATE MIXED WITH CANNED SARDINE CAT-FOOD FOR CONTROL OF WASPS

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ABSTRACT

A bait freshly-prepared by mixing a sulfluramid concentrate with canned sardine cat-food was compared with previously-frozen Finitron Wasp Bait for efficacy against wasps. The effectiveness of the two baits was determined by counting wasps collecting bait and wasps leaving or entering nests within 150 m of bait stations before and after poison-baiting. Both baits reduced wasp numbers in nests by >85% within 3 weeks. Wasp numbers in nests were reduced more rapidly and to a lower level by the bait made from the sulfluramid concentrate than by Finitron Wasp Bait. No decision about the commercial availability of the sulfluramid concentrate has yet been made.

Keywords: Hymenoptera, Vespidae, insect control, baits, sulfluramid

INTRODUCTION

Two introduced species of wasp, the common wasp (Vespula vulgaris (L.)) and the German wasp (V. germanica(F.)) (Hymenoptera: Vespidae) are a serious problem in New Zealand (Moller et al. 1987). They spoil peoples’ enjoyment of the outdoors by scavenging for food at picnic sites and stinging people who inadvertently disturb their nests. They also reduce the profitability of industries such as beekeeping, horticulture, forestry and tourism, and upset the ecological balance by predation on native invertebrates and by competition for food with native invertebrates and native birds.

Finitron Wasp Bait (Elliott Chemicals Ltd, Auckland, New Zealand), a ready-to-use bait containing 0.5% sulfluramid in sardine cat-food, was developed for the control of these wasps in areas where nests cannot be readily found (Spurr 1993). This bait was registered with the Pesticides Board in January 1994 (Experimental Use Permit (Limited Sales) No. 4332/2) and used by the public in 1994 and 1995 (Spurr 1994a; Spurr and Elliott 1995). One drawback for both the commercial seller and the public purchaser is that the bait must be kept frozen before use. This creates problems for storage and transport.

An alternative to a frozen bait is a freshly prepared bait. Sulfluramid has a long shelf life (at least 1 year) without being frozen, so potential users could purchase the sulfluramid and canned sardine cat-food separately, store them if necessary, and only mix the two together immediately before use. In this paper, we compare the efficacy of a freshly-prepared bait made from a sulfluramid concentrate mixed into sardine cat-food with that of previously-frozen Finitron Wasp Bait.

METHODS

A 20% concentrate of sulfluramid in a protein polymer powder (supplied by Griffin Corporation, U.S.A.) was mixed with canned sardine cat-food (Wondercat, Pataya Food Industries Ltd, Samutsakorn, Thailand), at the ratio of 10.25 g of sulfluramid concentrate to 400 g of cat-food, in a cake mixer for 30 s. The brand of cat-food, concentration of sulfluramid, and mixing time were the same as for Finitron Wasp Bait.
The efficacies of the freshly-prepared mixture and previously-frozen Finitron Wasp Bait were compared in a field trial in gorse (*Ulex europeaus*) and manuka (*Leptospermum scoparium*) scrub and tussock (*Chionochloa macra*) grassland adjacent to plantations of *Pinus radiata* and remnants of mountain beech (*Nothofagus solandri* var. *cliffortioides*) in Mt Thomas Forest, Canterbury. The beech trees were heavily infested with the beech scale (*Ultracoelostoma* spp.). Honeydew produced by the scale insects is an important food resource for wasps, which were abundant in the area. About 98% of the wasp nests found belonged to common wasps.

Bait stations, made from empty cat-food cans turned on their side and tied to 1.2 m wooden stakes, were placed 10 m apart in two areas 3 km apart. The area receiving bait containing the sulfluramid concentrate had 20 bait stations and 34 known wasp nests within 150 m of the bait stations (1.7 nests/bait station). The area receiving Finitron Wasp Bait had 30 bait stations and 46 known wasp nests within 150 m of the bait stations (1.5 nests/bait station). Non-toxic sardine cat-food was placed in all bait stations for 2 days (6–7 March 1995) to attract wasps to the bait stations and to enable the number of wasps collecting bait to be determined (see below). Toxict bait was then placed in bait stations and replenished as necessary for 2 days (8–9 March) in the sulfluramid concentrate area and 3 days (8–10 March) in the Finitron area. Wasps collected all the bait offered (12.8 kg of bait made from sulfluramid concentrate and 18.2 kg of Finitron Wasp Bait). Non-toxic sardine cat-food was placed in all bait stations again on 16, 22, and 30 March (8, 14, and 22 days after first poison-baiting).

The number of wasps collecting bait from the bait stations at any one instant (mean of three counts made at 15–30 minute intervals) and the wasp traffic (number of wasps/minute) leaving or entering nests within 150 m of bait stations (single count) were counted between 0900 and 1600 hours on each of the days that baits were placed in the bait stations. The percentage reduction in wasp numbers collecting bait and in wasp traffic at nests in each poison area was calculated from:

\[
\frac{(\text{pre-poison number} - \text{post-poison number})}{\text{pre-poison number}} \times 100.
\]

Because wasp numbers were expected to be declining naturally at the time of poisoning (Spurr 1994b), a non-poison area containing 22 wasp nests was selected about 300 m away from the concentrate poison area, for comparison of population trends. This distance was considered sufficient to prevent poison-baiting affecting wasp numbers in the non-poison area (Spurr 1993). However, poison-baiting in the sulfluramid concentrate area unexpectedly reduced wasp numbers at nests in the non-poison area (compared to wasp numbers at nests further away from the poison areas), negating its use as a control. A second non-poison area, also containing 22 wasp nests, was then selected 600 m away. Pre-poison measurements had not been made in this area, but the wasp traffic at nests was counted on 30 March, 22 days after poison-baiting, for comparison with wasp traffic in the poison areas. It is assumed that in the absence of poison-baiting, wasp traffic at nests in the poison areas would have been similar to that in the non-poison area at the same time. The corrected percentage reduction in wasp traffic at nests in each poison area on 30 March was then calculated from:

\[
\frac{(\text{post-poison number in non-poison area} - \text{post-poison number in poison area})}{\text{post-poison number in non-poison area}} \times 100.
\]

A comparison of poison-baiting by bait type was determined from an analysis of variance of the raw data after ln (x+1) transformation (Wilkinson 1990). Counts were back-transformed for graphing. Least significant differences were calculated from the formula given by Andrews *et al.* (1980).

**RESULTS**

Counts of wasps on baits in bait stations increased from day 1 to day 2 in the pre-poison period and peaked on the first day of poison-baiting (Fig. 1). On 16 March, 8 days after poison-baiting, wasp numbers on baits declined from this peak by 94% in the sulfluramid concentrate area and by 87% in the Finitron area, without correcting for natural decline. The difference in decline between the two areas was not significant (F = 2.46, d.f. = 1.48, P = 0.12). On 22 March, 14 days after poison-baiting, wasp...
FIGURE 1: Mean number of wasps per bait in the areas poisoned with sulfluramid concentrate/sardine cat-food mixture (●) and standard Finitron Wasp Bait (○), Mt Thomas Forest, March 1995. Vertical lines represent least significant differences between means (some vertical lines too small to show). Baits on 6, 7, 16, 22, and 30 March were non-toxic; baits on 8 and 9 March were toxic.

FIGURE 2: Mean number of wasps entering or leaving nests in the areas poisoned with sulfluramid concentrate/sardine cat-food mixture (●) and standard Finitron Wasp Bait (○) and in a non-poison area (■), Mt Thomas Forest, March 1995. Vertical lines represent least significant differences between means (some vertical lines too small to show).
numbers on baits in the two areas had declined by 98% and 97%, respectively, and on 30 March, 22 days after poison-baiting, by 94% and 93%, respectively. These differences between the two areas were also not significant.

Counts of the number of wasps/minute entering or leaving nests within 150 m of bait stations on 16 March, 8 days after poison-baiting, had declined by 77% in the sulfluramid concentrate area and by 53% in the Finitron area, without correcting for natural decline (Fig. 2). The decline was significantly greater in the sulfluramid concentrate area than in the Finitron area ($F = 9.21$, d.f. = 1,78, $P = 0.003$). On 22 March, 14 days after poison-baiting, wasp numbers in the two areas had declined by 97% and 84%, respectively (without correcting for natural decline), and the decline was again greater in the sulfluramid concentrate area than in the Finitron area ($F = 6.97$, d.f. = 1,78, $P = 0.01$). Assuming the non-poison area had a similar number of wasps as the two poison areas before poison-baiting, the reduction in wasp traffic at nests (corrected for natural decline) on 30 March, 22 days after first poison-baiting, was 98% in the sulfluramid concentrate area and 88% in the Finitron area (Fig. 2). The corrected reduction in the two areas was significantly different ($F = 4.75$, d.f. = 1,78, $P = 0.03$). The difference can be attributed to two large nests in the Finitron area (12 m and 15 m from bait stations) in which wasp traffic on 30 March was not significantly lower than in the non-poison area.

**DISCUSSION**

Both the standard Finitron Wasp Bait and the bait made from the sulfluramid concentrate mixed with canned sardine cat-food significantly reduced wasp densities in this trial. The result for Finitron Wasp Bait was similar to that obtained in previous trials (Spurr 1993; Spurr and Elliott 1995). The bait made from the sulfluramid concentrate appeared to reduce wasp numbers at nests more rapidly and to a lower level than did Finitron Wasp Bait. However, this result was influenced by two out of 46 nests in the Finitron area in which wasp numbers were not reduced by poison-baiting. High survival of wasps at occasional nests in poisoned areas has been noted before, and is presumably related to the wasp food preferences and flight paths in relation to the bait stations (Spurr 1991a, 1991b, 1993). Although few wasps survived in nests in the sulfluramid concentrate area in this trial, factors affecting the efficacy of the concentrate need confirming in more trials.

The 20% sulfluramid concentrate is easily mixed into the sardine cat-food and should be suitable for use by the public. The public has had previous experience with mixing toxins into baits. A 25% mirex concentrate (Agchem Distributers Ltd, Nelson, New Zealand) was available in the 1970s for mixing with fish or meat bait for wasp control (Perrott 1975), but it was withdrawn from the market because mirex is a persistent organochlorine. The 20% sulfluramid concentrate could be used in the same way as the 25% mirex concentrate. However, no decision about the commercial availability of the sulfluramid concentrate has yet been made.

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**REFERENCES**


