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5.2 ATTRACTIVENESS OF RE-HYDRATED BAITS

5.2.1 Water added

Wasp densities were low in 1997/98, which meant few wasps were attracted to the baits. Therefore, only small amounts of bait were consumed. Hydrated freeze-dried baits were more attractive to wasp foragers than hydrated oven-dried baits ($F = 5.6$, d.f. = 1, $p = 0.02$). Bait additives significantly increased bait attractiveness ($F = 20.6$, d.f. = 3, $p < 0.001$). Baits containing sorbitol were the most attractive to wasp foragers (Figure 6). Canned sardines were no more attractive than hydrated freeze-dried baits without additives ($p > 0.05$), and considerably less attractive than freeze-dried baits containing sorbitol (Figure 6).

2.2.2 Hydration in the field

Differences between treatments were analysed for the first 3 days only, after which many of the bait containers were empty. Wasp numbers on baits varied significantly between bait types over the first 3 days (Figure 7; $F = 32.7$, d.f. = 3, $p < 0.001$). The bait with sorbitol that had been produced during the freeze-drier malfunction (sorbitol-B) proved to be by far the most attractive (> 10 × more wasps recorded on this bait type compared with the next most attractive bait). Most baits of that type were gone within 3–4 days of being placed out (Figure 8). None of the additives significantly increased the attractiveness of baits that were normally freeze-dried. The freeze-dried baits remained sufficiently attractive for some wasp foragers to be recorded on baits up to 12 days after they had been placed out (Figure 9). About 2.5 mm of rain fell 2 days before baits went out, and the next recorded fall was 10.2 mm on the evening of 14 April (day 6). Rainfall was not essential for baits to become palatable, as wasps were feeding on baits before this date. A further 4.2 mm fell between 14 April and 21 April, when baits were removed. Remaining bait smelt rancid. At least seven baits (8%) were probably disturbed by vertebrates (the disc of bait was outside the petri dish). All the sorbitol-B bait disappeared over the sampling period, compared with an estimated 28% for sorbitol-A, and 49% for the control.

5.3 SIMULATED AERIAL BAITING OPERATION

The fipronil concentration of baits after freeze-drying had increased to 0.5% from the 0.1% in the bait initially.

Traffic rate varied markedly between colonies, with both the treatment and non-treatment sites having a lower traffic rate at the second count (Figure 10). There was no evidence of a significant reduction in traffic rate due to the treatment ($F = 2.5$, d.f. = 1, $p = 0.21$). Several nests had died over the period, but similar numbers died in treatment and non-treatment sites. Most of the bait had gone from treatment sites after 3 weeks and any that remained was mouldy and would not be fed on by wasps. Periods of heavy rain, which would have fully hydrated baits, occurred just before and just after the baits were placed out (Figure 11).

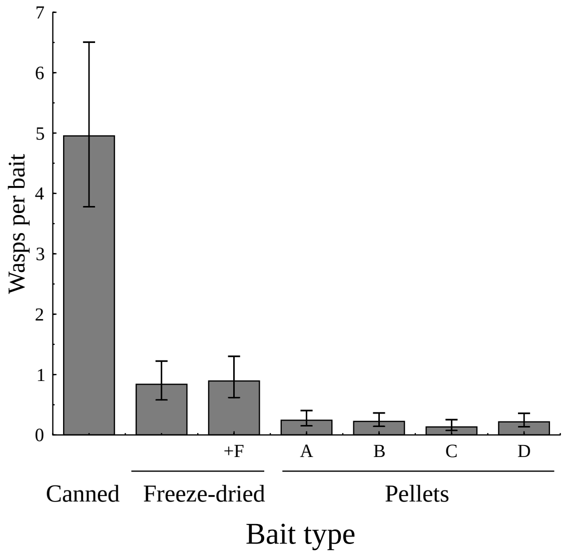

Figure 5. Comparison of attractiveness of canned, rehydrated freeze-dried, and rehydrated pelletised sardine baits. Non-rehydrated baits were not feed on so data are not presented. Mean ± SE. See Appendix 1 for formulations.

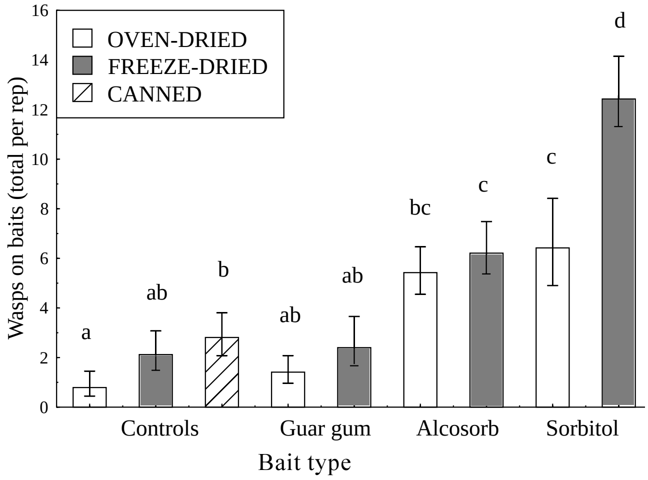

Figure 6. Wasp activity on rehydrated freeze- and oven-dried baits. Mean ± SE (back-transformed data are presented for ease of interpretation). Bars with the same letter above are not significantly different at the 95% level (Fisher's Least Significant Difference Test).

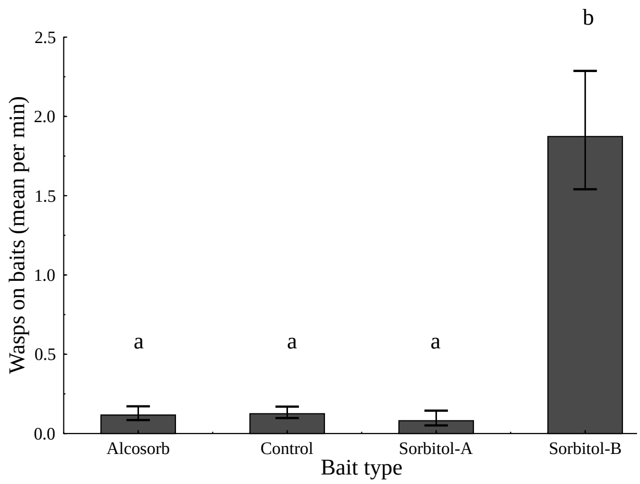

Figure 7. Wasp activity on freeze-dried baits over the first 3 days of exposure. Mean ± SE (back-transformed data are presented for ease of interpretation). Bars with the same letter above are not significantly different at the 95% level (Fisher's Least Significant Difference Test).

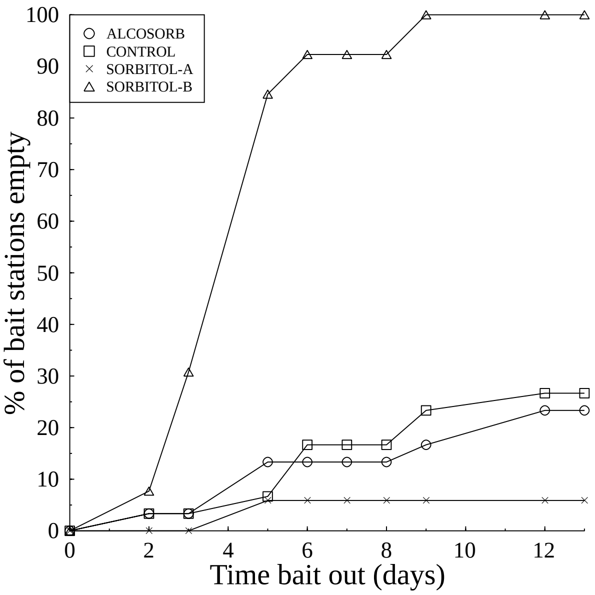

Figure 8. Comparison of the rate of disappearance of bait prepared by freeze-drying.

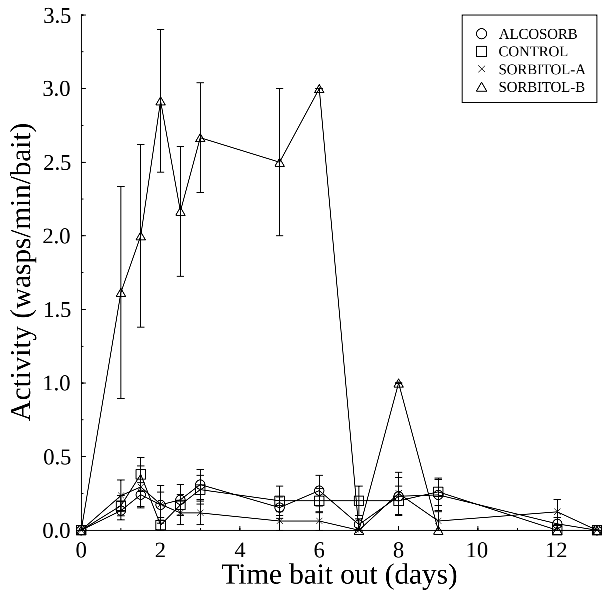

Figure 9. Attractiveness of freeze-dried baits placed in the field without manual rehydration, and monitored over 13 days. Mean ± SE of baits remaining. From day 6 only one sorbitol-B bait remained.

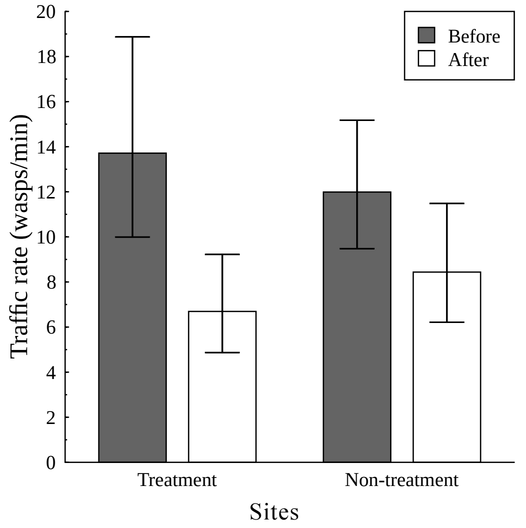

Figure 10. Traffic rate of wasp colonies before and after exposure to toxic freeze-dried baits compared with non-treatment sites. Mean ± SE (back-transformed data are presented for ease of interpretation).

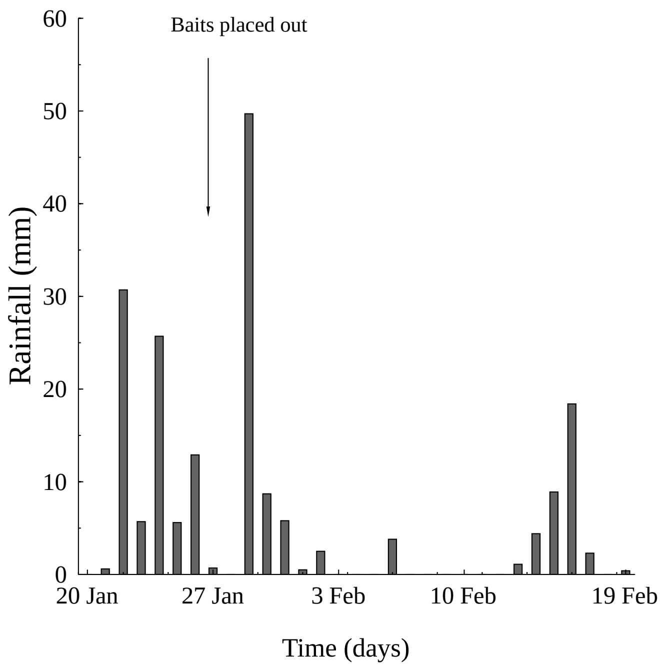

Figure 11. Rainfall recorded at St Arnaud before and during the period that freeze-dried toxic wasp baits were in the field at Lake Rotoroa.

5.4 NON-TARGET SPECIES

5.4.1 Invertebrates

Non-target invertebrate species were observed feeding on both dry and rehydrated baits, but more species were seen on hydrated baits. Freeze-dried baits were more attractive than pellets (Table 1). Three species of native ant and a scarab beetle were the most common species on baits at night, with ground weta and cockroaches also common. Blowflies were the most common species seen on baits during the day, unless the baits had been out overnight, then ants were the most common species found. A more detailed list of species seen on baits is provided in Appendix 2.

TABLE 1. NON-TARGET INVERTEBRATE SPECIES RECORDED ON SARDINE BAITS. SC = CANNED SARDINES, F = FREEZE-DRIED SARDINE BAITS, P = PELLETS. WET = WATER ADDED TO BAITS TO HYDRATE. DRY = NO WATER ADDED.

		DAYLIGHT							DUSK/DARK					
		LAKE ROTOITI 11/2/98		LAKE ROTOITI 10/4/98	DUCKPOND STREAM 2123/4/99				LAKE ROTOITI 8/4/98 17302013		DUCKPOND STREAM 20/4/99 18301930			
BAIT TYPE		F-WET	SC	F-DRY (2 DAYS OLD)	F-DRY	F-WET	P-DRY	P-WET	F-DRY	F-WET	F-DRY	F-WET	P-DRY	P-WET
OBSERVATIONS		960	120	90	84	84	168	168	186	156	24	24	48	48
% OCCURANCE TARGETS ON BAITS	None	94.3	85	80	96.4	97.6	98.2	99.4	48.4	35.3	83.3	70.8	91.7	72.9
	Ant(s)	0.4	0	16.7	-	-	-	-	48.9	50	4.2	29.2	2.1	6.3
	Fly	5	14.2	2.2	3.6	2.4	0.6	-	0.5	-	-	-	-	-
	Beetle	0.1	0	1.1	-	-	1.2	0.6	0.5	0.6	12.5	-	2.1	12.5
	Weta	-	-	-	-	-	-	-	0.5	1.2	-	8.3	-	2.1
	Earwig	-	-	-	-	-	-	-	-	6.4	-	-	4.2	2.1
	Cockroach	-	-	-	-	-	-	-	2.2	-	-	-	2.1	-
	Centipede	-	-	-	-	-	-	-	-	-	-	-	2.1	-
	Honeybee	-	0.8	-	-	-	-	-	-	-	-	-	-	-
	Spider	0.2	-	-	-	-	-	-	-	-	-	-	-	-
	Springtail	-	-	-	-	-	-	-	-	-	-	-	-	2.1
	Psocid	-	-	-	-	-	-	-	-	-	-	-	-	2.1

5.4.2 Vertebrates

Birds were not seen visiting any baits. At night, using night-vision filming, 11 separate events of vertebrates visiting baits were observed. Mice (*Mus musculus*) were filmed feeding on dry pellets, wet pellets, or freeze-dried baits on nine occasions. In the other two instances, a possum (*Trichosurus vulpecula*) sniffed baits, but was not seen to feed.

5.4.3 Kaka

Attracting birds to the feedout proved difficult. In both 1999 and 2000, the beech trees produced seed that provided ample natural food for the kaka. On 26 January 2000, the feedout was observed from 1630 hrs, and at about 1800 hrs a flock of 8 kaka came into the feeder. About four of the birds visiting the feedout fed at the sugar water and visited the hopper. None showed any interest in the wasp bait. Four birds were able to be hand fed and readily accepted any offered hazelnuts. When offered wasp baits, they did not show any interest. One bird pecked a finger holding a wasp bait, but it not touch the bait.

6. Conclusions

6.1 TECHNICAL FEASIBILITY OF AERIAL APPLICATION

Pellet formulations were made that would be suitable for aerial drops using existing application technologies. The pellets were unattractive to wasps when dry, but after water absorption, wasps were recorded feeding on them. The attractiveness of the pellet formulations was very low compared with canned and freeze-dried sardine baits. Given the relative attractiveness, wasps are only likely to take these pellet formulations if protein is in short supply in the habitat and consequently baits of low attractiveness may be collected, which can occur in beech forest in years of high wasp abundance. However, it is highly likely that further development of the pellet formulation would improve its attractiveness. Of the small number of additives tested, sorbitol was the most promising in freeze-dried baits for increasing both attractiveness and water absorption.

Freeze-dried baits were of a much looser structure than pellets, and easier for wasps to feed on. Wasps foraged on them after minimal moisture addition (see Section 5.2.2), and continued to feed on them over 12 days during a period of low rainfall. Activity on one bait formulation (sorbitol-B) was sufficient for nearly all bait to be consumed within several days. Dried baits were monitored over 12 days in summer 1999 at Lake Rotoiti. Although wasp numbers were low, wasps appeared to be readily collecting baits, and wasp poisoning using canned sardines within the Rotoiti Nature Recovery Project was highly successful (Harris & Etheridge in press).

There was no clear explanation why sorbitol-B baits were so much more attractive. Wasps are very selective in food preferences, especially if protein is not in short supply. Some aspect of the bait smell or texture made these baits highly attractive and palatable relative to other baits. Whatever the reason for the attraction, it is encouraging that high numbers were recorded on a dry bait, without the need for rain to hydrate them. This suggests that further comparisons of freeze-dried formulations would result in improved bait attractiveness.

No significant reduction in wasp activity resulted from the use of toxic freeze dried baits at the bait station density tested (20 × 50 m). In light of the lack of a significant treatment effect, much of the bait was likely to have been removed by non-target species such as ants. Periods of heavy rain, which would have fully hydrated baits, occurred just before and just after the baits were placed out. It is likely that the rain also affected wasp foraging activity, and may have flooded several nests, accounting for the deaths of several colonies. Bait densities could be further increased to try and effect wasp colonies, but would result in greater effects on non-target species.

Summer 2000 was a difficult year to poison wasps. Wasp densities in 2000 were similar to 1999 in the Rotoiti Nature Recovery Project and at Mt Misery, but wasps appeared less interested in protein (R.J. Harris pers. obs.). Although control targets were achieved within the Rotoiti Nature Recovery Project, numbers of wasps foraging on baits were lower than in 1999. Also, reductions in traffic rates were less rapid and dramatic. In 1999, all nests within the treated block were dead within several days, but in 2000, many nests survived. In addition, rainfall over much of February 2000 was high, and this would have affected the relative attractiveness of freeze-dried baits (see below). Other trials indicated a high degree of variability in the protein preferences of wasps in 2000.

Toxic baits initially contained 0.1% fipronil. After freeze-drying, the concentration of the toxin had increased 5-fold. Unless the bait reabsorbs all the water removed during dehydration, the concentration of the fipronil in the baits will be higher than 0.1%. This could have further reduced the attractiveness and/or palatability of the baits to wasps compared with the non-toxic freeze-dried baits. Further trials are needed to determine an appropriate initial concentration of fipronil in freeze-dried baits to avoid any bait repellency, while still retaining sufficient toxin to achieve effective control.

The visitation rate of wasps to any protein bait varies markedly with the number of wasps at the site, the relative interest shown by wasps in protein baits compared with sweet baits, the weather before the trial, the time of the year, and the bait formulation used. When wasp numbers are high, and protein is in demand, foragers will take large quantities of bait (including less palatable ones), but often the demand for protein is low. Even the best protein bait will, on occasions, fail to attract many foragers.

With attractiveness being highly variable, the timing of baiting can be crucial. Rain reduces the availability of carbohydrates and therefore reduces demand for protein (Harris et al. 1991). This makes scaled-up ground-based operations difficult because coordination of many individuals is required. Less people would be required for aerial bait drops. To decide on the ideal time for a baiting operation, both the weather and the interest by wasps in non-toxic baits need to be monitored for ground- or aerial-based operations.

In these trials, we found rehydrated freeze-dried sardine baits were as attractive as canned sardines, and Spurr (1997) showed rehydrated freeze-dried toxic baits containing sulfluramid to be as effective as canned sardines in beech forest in Canterbury. In other trials, conducted as part of other research, various canned and fresh meat baits were markedly more attractive than freeze-dried baits (Harris 2000). Sites used by Harris (2000) had relatively low wasp numbers, and wasps showed little interest in re-hydrated baits.

The difficulty with using a dehydrated bait is obtaining full hydration and hence greater wasp attractiveness. Once baits become moist, they will begin to go rancid and become unattractive. This identifies a fundamental difficulty with the use of a dried-bait approach to wasp control: rain is useful for increasing bait attractiveness, but it also reduces the wasps' demand for protein. When demand returns after a dry spell, bait may have already become rancid. Another problem is that if bait is aerially dropped, it would be available to non-target species for longer than in ground-based operations, where the bait is collected in again after several days.

6.2 NON-TARGET SPECIES

Two main concerns with aerial baiting relate to non-target species: bait is present in the environment for extended periods, giving ample time for non-target species to feed on it; and there is less control over where bait ends up, so waterways could be contaminated.

The reduction in attractiveness to wasps that occurs at each step of the process toward pelletisation is of concern. The lower the visitation rate by wasps, the greater the amount of bait needed to get adequate control, and the more toxic bait left in the environment to affect non-target species.

Fipronil is a highly effective non-specific insecticide, so it is likely that most invertebrates feeding on baits will be killed. A range of invertebrates were recorded on baits soon after they were put out in the field, well before baits would have been sufficiently hydrated to have high wasp visitation. Ants were by far the most common species seen on baits on the ground, and significant ant mortality could result from an aerial operation. Ants are only recorded in the diet of wasps during periods of mating swarms, and beetles, another family seen often feeding on baits, are also rare in the diet of wasps (Harris 1991; Harris & Oliver 1993). Therefore, the poisoning would affect species additional to those already directly affected by wasp predation. However, both groups may be affected by non-direct effects (e.g. competition for food, release from predation).

The location of the bait will influence its effect on non-target species. Ants are less commonly found bait when bait stations are used on trees than when bait is placed on dishes on the forest floor (R.J. Harris pers. obs.). Some of the other species recorded on baits on the ground will visit bait stations on trees, but with the current ground-based operations, bait is removed after several days to minimise this.

Even when there is much wasp activity on baits and successful control, a proportion of bait will be left in stations because fipronil will kill all foragers before bait removal is complete. Using less bait in each bait station would reduce leftovers. However, if there is high forager activity at a particular bait station, all the bait may be removed before foraging has ceased. Poisoning within the site of the Rotoiti Nature Recovery Project in 1999 resulted in > 99% of wasp colony activity ceasing within the treated site by the next day. We estimated 60% of the volume of bait placed out in the field remained in stations when it was collected after 5 days, and only 4% of stations had all bait removed (Harris & Etheridge in press). In February 2000, even less bait was consumed and no stations were near being emptied by wasp foraging (J.S. Rees pers. obs.).

Aerially dropped bait could fall into waterways and affect aquatic species. A single 40 g bait of 0.1% fipronil would contain 40 ug of the active ingredient. Therefore, several baits would be likely to kill all aquatic invertebrates in a small pool of water, but large numbers would be needed for fish to be at risk (acute oral LC50 (technical) for Daphnia = 20 μg/L; for rainbow trout = 248 μg/L; Material Safety Data Sheet, Rhone-Poulenc Rural Australia Pty Ltd). However, water contamination issues are no different from those facing current aerial application techniques for vertebrates (e.g. 1080-based baits for possum control). Careful bait placement which includes leaving riparian strips clear reduces chances of waterway contamination.

Birds differ greatly in their susceptibility to fipronil (LD50 > 2150 mg/kg for mallard duck and 11.3 mg/kg for bobwhite quail; Material Safety Data Sheet, Rhone-Poulenc Rural Australia Pty Ltd). Kaka are unlikely to take baits so there is minimal risk of poisoning them. Robin were seen pecking at sardine bait during poison bait operations in the Rotoiti Nature Recovery Project, but they do not continue to feed after an initial taste, and there was no evidence of mortality in tagged populations (D. Butler unpubl. data). If aerial baits reached the forest floor, weka and perhaps kiwi could eat them. If their sensitivity to fipronil was similar to a bobwhite quail or mallard duck, then an individual bird (assuming approximately 2 kg in weight) would need to consume about 22.6 g or 4.3 kg of bait respectively to obtain a lethal dose.

Vertebrate pest species (mice and possum) were recorded feeding on baits and some deaths of rodents could be expected. An average-sized rat (Norway rat, *Rattus norvegicus*, 200–485 g (Walker1965)) would need to consume 19–47 g of bait to obtain a lethal dose (acute oral LC50 (technical) for rats 97 mg/kg; Material Safety Data Sheet, Rhone-Poulenc Rural Australia Pty Ltd). Bait consumption by rodents and possums would also reduce the amount of bait available for wasps.

The best way to make aerial baiting low risk to non-target species is to use a wasp-specific killing agent. No such killing agent is currently known that is suitable for use in baits. We are currently evaluating the potential of pathogens (particularly fungi) and genetically modified organisms as wasp control tools. There is little likelihood that any candidate, if one exists at all, would be available for field trial within the next 5 years.

6.3 AN ALTERNATIVE STRATEGY

Given the low attractiveness of dehydrated baits and difficulties involved with rehydration, is there an alternative? One possibility, if a delivery system could be devised, is an aerial application of hydrated fresh or canned protein bait. The advantages of this approach are that the bait would be fully hydrated and immediately attractive to foraging wasps. As a consequence, less bait would be available for non-target species. Also, due to its soft texture, more bait is likely to come to rest on the leaves and branches of trees, where it is available for wasps foraging within the forest canopy. Wasps do appear to forage more in the canopy than at ground level, especially on cooler days (R.J. Harris pers. obs.), so this would be an extra advantage over ground-based operations, which are restricted to bait stations near ground level.

The disadvantage of hydrated bait compared with a pellet-based bait is that specific application technologies will need to be developed for wasps and these might prove expensive unless minor modifications could be made to existing aerial application equipment (e.g. a monsoon bucket). It may be possible for an operator to simply apply bait manually from a helicopter and thus target it precisely without the need for special equipment, if this was cost effective. Also, if bait were too fragmented by being aerially dropped it would make collection difficult for foraging wasps. There would still be increased risks to non-target species compared with ground-based operations. The relative advantages of hydrated and dehydrated aerial baiting are summarised in Table 2. Both methods require further research before they could be adopted (Table 3).

TABLE 2. COMPARISONS OF RELATIVE ADVANTAGES OF AERIAL-BASED BAITING WITH EITHER HYDRATED OR PELLETISED BAIT FORMULATIONS.

PELLETISED FORMULATIONS	HYDRATED BAIT FORMULATION
• Application technology already in use • Bait remains in discrete package during distribution, reducing amount of bait unavailable to foragers • Bait easily stored	• Bait likely to be more attractive to wasps • Reduced lag between application and wasp attraction to bait • Greater proportion of bait remaining in canopy where foraging activity greatest • Smaller window of ideal weather required

TABLE 3. FURTHER RESEARCH REQUIRED TO DEVELOP AN AERIAL BAITING.

PELLETISED FORMULATION	HYDRATED BAIT FORMULATION
• Improve pellet attractiveness (to at least as attractive as freeze-dried baits). Need to compare a range of formulation methods and bait bases • Determine the ideal toxin concentration for dehydrated bait • Assess impacts on non-target invertebrates • Efficacy trial for best option • Cost-benefit comparison	• Develop an appropriate application technique (ideally minor modifications to existing technology) • Determine best bait for aerial application • Determine effect of aerial drop on bait dispersal and availability to foraging wasps • Assess impact on non-target invertebrates • Efficacy trial for best option • Cost-benefit comparison

6.4 IMPROVEMENTS TO GROUND-BASED OPERATIONS

The recent success with the use of fipronil for wasp control as part of the Rotoiti Nature Recovery Project (Harris & Etheridge in press), and the potential to further increase bait station spacing, will affect the relative merits of ground versus aerial applications. Ground-based operations are labour intensive, but the use of canned bait means that much less bait need be applied compared with an aerial application of a less attractive bait (if a suitable dehydrated pellet bait were developed), and direct placement of the baits reduces take by non-target species.

To date, ground-based operations within the Rotoiti Nature Recovery Area use a single poison application with canned sardines containing 0.1% fipronil. Bait station spacings of 100 × 50 m, without any prefeeding, are recommended, and were shown to be capable of reducing wasps below the EDT (Harris & Etheridge in press). Two applications of poison were used in the 100 × 50 m grid spacing in 2000 to achieve the targeted level of control, but the first used an experimental recanned bait formulation that proved less attractive than canned sardines (Harris 2000). A single poison application over 300 ha took 4 people about 6–8 hours using previously established bait stations. Changing the bait stations to 200 × 30 m spacings would further reduce the time to apply bait to the area, without reducing the density of baits per hectare. The fipronil bait is currently used under an experimental use permit and it is hoped that it fully be fully registered and more widely available by the end of 2001.

Two changes to the current practice would allow significant reductions in effort and scaling up of ground based control. First, bait would not be placed in bait stations. Compass bearings could be followed, with lines 200 m apart, and bait placed approximately every 30 m. Where possible, baits should be placed off ground (e.g. on branches) to minimise non-target take. Second, excess bait would not be recovered. We recommend that the effect of this method on key non-target species (ants and weta) be assessed before these modifications were adopted.

These modifications would more than triple the area that could be treated for the same effort as the current method. Therefore, 4 people could treat about 900 ha in 6–8 hours (longer if the vegetation and terrain impeded walking). This translates to 28–37 ha/person hour once on-site.

The advantages and disadvantages of aerial baiting compared with ground-based operations are summarised in Table 4.

TABLE 4. LIKELY ADVANTAGES AND DISADVANTAGES OF AERIAL BAITING OVER GROUND-BASED OPERATIONS (AFTER FORMULATION ISSUES ADDRESSED—SEE TABLE 2).

ADVANTAGES OF AERIAL BAITING	DISADVANTAGES OF AERIAL BAITING
• Reduced labour input, so less coordination needed • Larger areas could be treated • Lower cost/ha once operational	• Greater non-target impacts (especially if bait stations used for ground-dased operations) • More bait needed/ha (especially if pellets used) • Potentially lower reductions in wasp numbers unless aerially applied baits equally palatable • Greater use of non-renewable resources (i.e. aviation fuel)

7. Recommendations

We conclude that some form of aerial baiting is feasible based on the trials conducted as part of this contract, and on other research into control of wasps, but that further research and development is required (see Table 3) before it could be adopted as a control strategy. Before investing in further development of baits for aerial application we recommend that the Department of Conservation:

- consider the maximum area of beech forest within which wasp control would be attempted, and evaluate the relative benefits and costs of aerial- and ground-based control operations.
- support research to determine the feasibility of scaling up ground-based operations to areas > 1000 ha.
- determine the impact of toxic fipronil bait on populations of key non-target species (e.g. ants, weta) to assess the risk of leaving toxic baits in situ (whether aerially dropped or from ground-based operations).
- determine if any existing aerial application equipment could be used for a hydrated bait formulation before further pursuing a pellet-based bait formulation.

8. Acknowledgements

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Appendix 1

BAIT FORMULATIONS

A. CONTENTS OF FORMULATIONS USED TO PRODUCE PELLETS SUITABLE FOR AERIAL APPLICATION

CONTENTS	A	B	C	D	E	F
Dehydrated sardines	55%	65%	69%	69%	55%	55%
Flour	20%	20%	20%	20%	20%	18%
Sugar	20%	10%	10%	10%	25%	25%
Green dry	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%
Palabind (binding agent)	5%	5%	-	-	-	-
Maxibind (binding agent)	-	-	1%	-	0.1%	0.1%
Cial 40 (binding agent)	-	-	-	1%	-	-
Alcosorb	-	-	-	-	-	2%

B. CONTENTS OF FREEZE-DRIED BAITS USED IN TEST TO COMPARE ATTRACTIVENESS AND WATER ABSORPTION OF FREEZE-DRIED BAITS AND TO COMPARE PELLET BAITS

Contents	Control	1	2	3	4
Dehydrated sardines	99.95%	98.95%	98.95%	98.95%	78.95%
Green dry	0.05%	0.05%	0.05%	0.05%	0.05%
Flour	-	-	-	-	20%
Alcosorb	-	1%	-	-	-
sorbitol	-	-	1%	-	-
Guar gum	-	-	-	1%	-

Appendix 2

NON-TARGET INVERTEBRATES RECORDED ON WASP BAITS

CLASS	ORDER	FAMILY	SPECIES	COMMON NAME	OCCURRENCE*
Insecta	Collembola			Springtails	O
	Blattodea		?*Celatoblatta* sp.	Cockroaches	C
	Dermaptera		*Parisolabis* sp.	Earwigs	C
	Orthoptera		*Zealandosandrus* sp.	Weta	C
	Psocoptera			Book lice	O
	Coleoptera	Leiodidae	Sp. 1		O
			Sp. 2		O
		Scarabaeidae	Sp. 1		C
		Staphylinidae	Sp. 1		O
		Colydiidae	Sp. 1		O
	Diptera	?Muscidae			C
		Calliphoridae		Blowflies	C
	Hymenoptera	Apidae	*Apis mellifera*	Honeybees	R
		Formicidae	*Prolasius advena* (Fr. Smith)	Ants	VC
			Huberia striata (Fr. Smith)		C
			Huberia brouni Forel		C
			Monomorium antarticum (Fr. Smith)		O
Arachnida	Acarina			Mites	O
Chilopoda				Centipides	O

R = Rare (recorded only once on a bait—no evidence of feeding), O = occasional (recorded more than once but on only a few baits), C = common (regularly seen on baits), VC = very common (species most often seen on bait).