Copenhagen May 1986

A GRANULATED INSECTICIDE TO CONTROL INVERTEBRATES ON AIRFIELDS

by T.A. Caithness, Wildlife Service, Internal Affairs Department, Private Bag, Wellington, New Zealand

The broad spectrum insecticide "Thiodan" has been formulated into a high density, slow release, clay-based granule for the control of invertebrates, earthworms in particular, on airfields.

Using the South Island pied oystercatcher, Haematopus ostralegus finschi as the indicator species, the "Thiodan" granule was applied to the 90 hectares of grassed areas at Nelson Airfield in three separate applications: 1983, 1984 and 1985. A marked reduction in feeding attempts and use of the airfield by oystercatchers has resulted, brought about by a huge reduction in earthworms.

A GRANULATED INSECTICIDE TO CONTROL INVERTEBRATES ON AIRFIELDS

T.A. Caithness, Wildlife Service, Internal Affairs Department, Private Bag, Wellington, New Zealand

INTRODUCTION

The large expanses of grassed areas common on airfields world-wide are usually synonomous with high densities of invertebrates and the insectivorous birds which feed on them. To combat this, insecticides have been used widely.

Most invertebrates have regular annual cycles and for only part of their life cycles are they available as food for birds. Earthworms, however, especially in temperate climates, are ever-present and have long been recognised as favoured food for the majority of insectivorous bird species.

In New Zealand, over the years, we have regularly used on airfields the broad spectrum insecticide "Thiodan" - common name Endosulfan, with earthworms being the principal target species. Rarely, though, have we recorded a significant reduction in invertebrates or in bird numbers.

The regular failure on airfields of this chemical (the most effective known for earthworms), which has proven benefits in agriculture and turf culture, can probably be attributed to the differing management of the various swards.

In agriculture, pastures are regularly ploughed up, with crops rotated before being resown in grass. The sward and soil are also often agitated by cloven-hooved animals. Here, then, the soil is kept friable and generally well drained to the stage that agricultural chemicals can penetrate and affect the target species.

In turf-culture i.e. on putting and bowling greens, the turf is managed to a highly technical degree. Greens are cored and scarified regularly to reduce root thatch and hence have good drainage. The humus layer is minimal as all clippings are removed, with the vegetation thrift being maintained by fertilizers. Greens generally have a ph in the order of 6.5 - 7.0, more or less neutral. Despite this management, good greens still support earthworms, which are then controlled. Greenkeepers apply chemicals at the optimum time and hence have few failures. Agricultural contractors, on the otherhand, generally carry out a task when weather conditions permit, regardless of recently past or forecasted climatic conditions. This could well be a further contributory factor in the failure of our efforts so far to control airfield faunas.

The principal problem, though, is that on many airfields the grassed areas may be decades old, with the only management being regular mowing to keep them neat and tidy. Characteristically then, airfield swards lack vigour and they develop a matted thatch of roots and detritis and are often poorly drained. In these circumstances, conventional agricultural chemicals applied as an

emulsion (spray) are held up on the plants or their root thatch. Ultimately, the chemicals lose their insecticidal efficiency by rainwater dilution or U.V. light before contacting the target species.

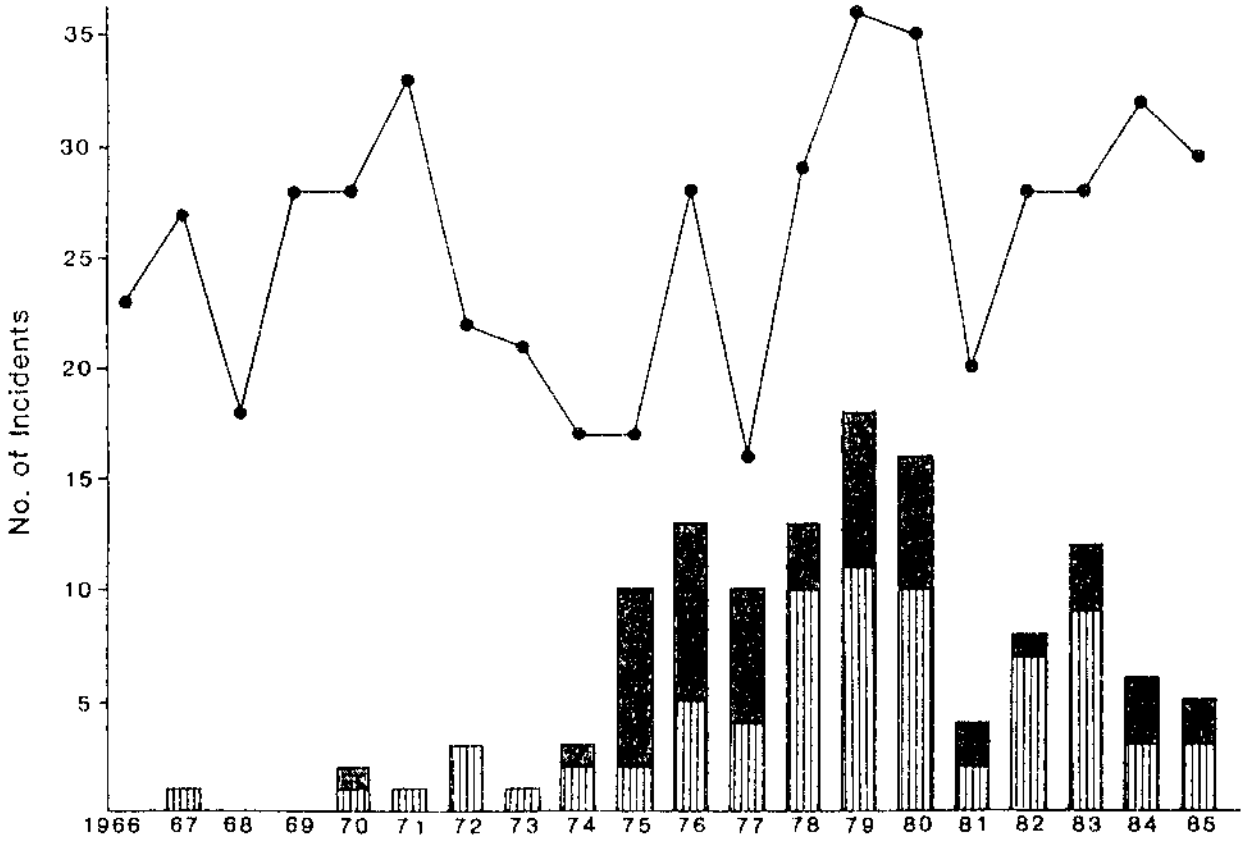
I have been working on the theory that a clay-based, slow release, high density granule, while not achieving a similar soil/plant coverage to sprays, would have the advantage of releasing the toxins more slowly and are very much less prone to degrade with climatic vagaries.

After protracted negotiations, the Fruitgrowers Chemical Company Ltd, Port Mapua, Nelson, agreed to formulate 500 kg of "Thiodan" 10% W/W granules, size range 14.30 BSS, for experimental use at Nelson Airport, a major domestic airfield. Nelson airfield receives in the order of 16,000 aircraft movements each year. These are dominated by turbo-prop passenger aircraft, aero club flights and commuter-third level operators, in that order.

Nelson was chosen for the experimental studies as it has for two decades supported large numbers of South Island pied oystercatchers, Haematopus ostralegus finschi. Here, the airfield earthworms have provided a reliable supplementary high tide food source.

Incidents with all species of birds at Nelson have averaged 26 per year and ranged from a low of 16 to a high of 36 over the last two decades (Figure 1).

Fig 1. All Bird Incidents • and Oystercatcher Strikes ▮ and Near Misses ▥ 1966-1985

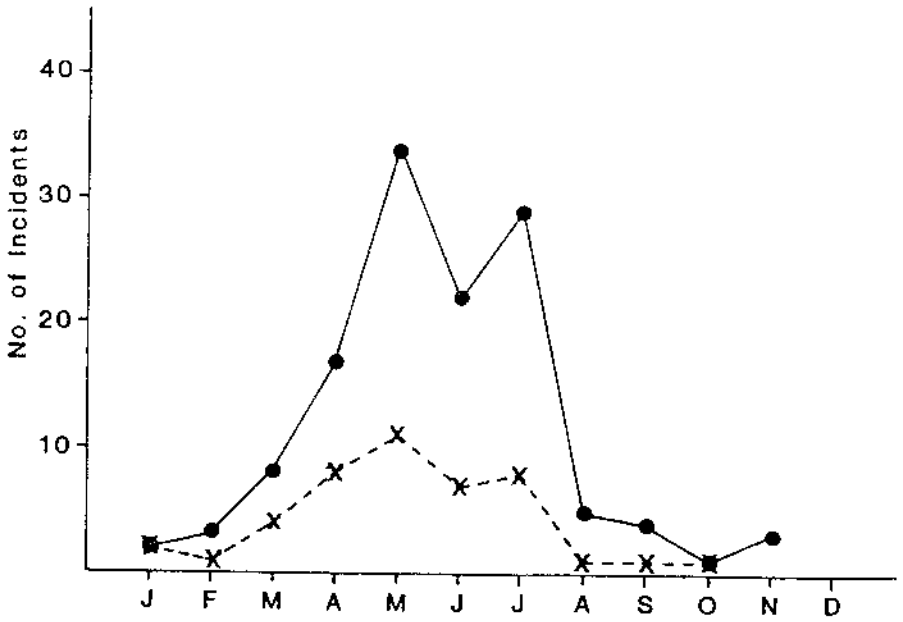


Oystercatchers were of little consequence until the mid-1970's, but have been the major on-field problem since.

The oystercatchers are largely absent throughout Spring and early Summer, being engaged with breeding duties elsewhere. The adults and their young start to return in mid-Summer and build up to a local peak by May. The data in Figure 2 shows the distribution and total number of oystercatcher incidents and the proportion (34%) of them that are strikes through the seasons.

Fig 2. Oystercatcher Incidents • and Strikes X

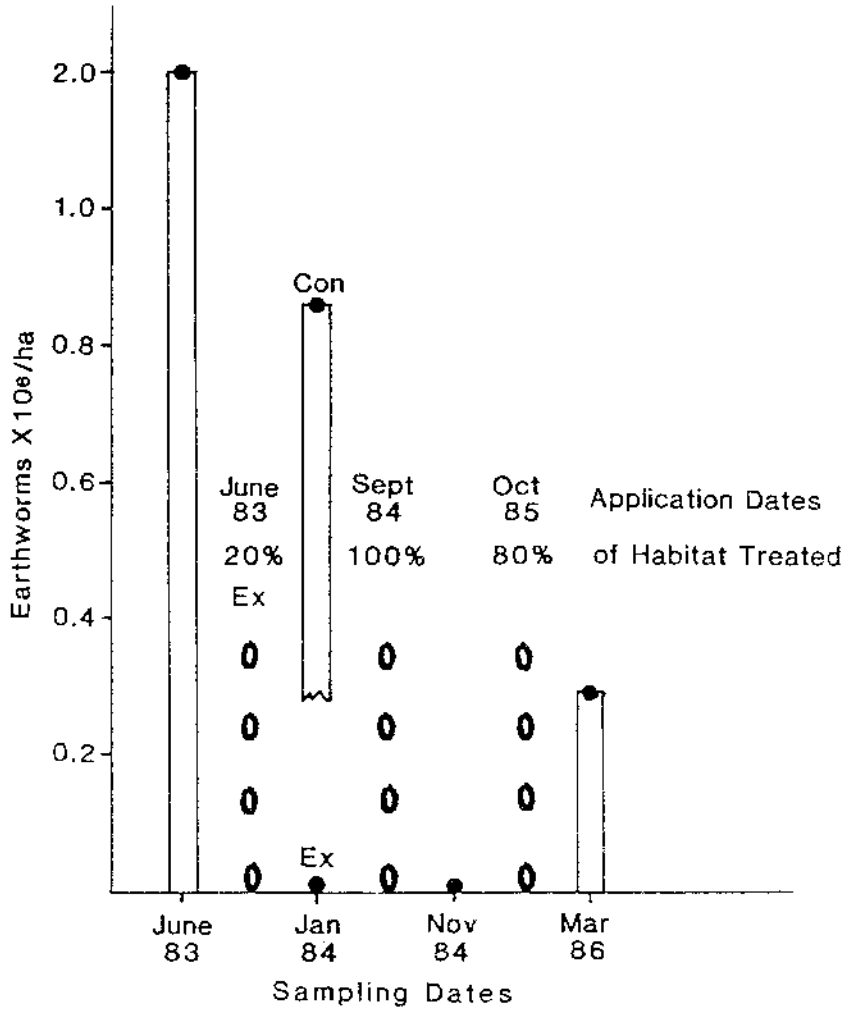
by Month for June 1965 - March 1986



METHODS

"Thiodan" granules were applied at rates varying from 15-45 kg/ha to 20% of the available habitat in June 1983 (Figure 3). In September 1984 the total habitat was treated at 10 kg/ha and in October 1985 a repeat treatment at similar rates to 80% of the area was carried out.

Fig 3. The Effect of Thiodan Granule Applications on Earthworm Numbers



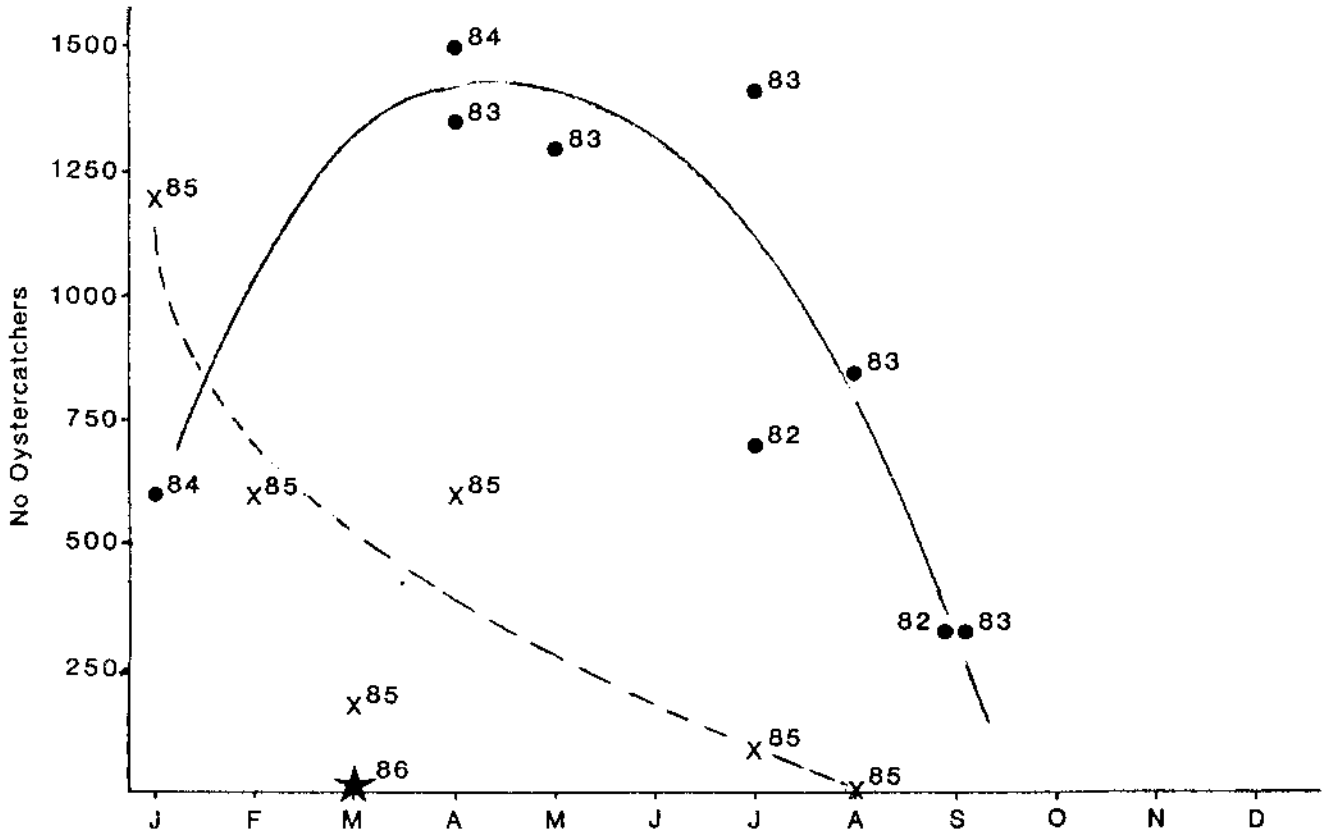
RESULTS

A pre-granule application survey of earthworm numbers in June 1983 revealed a general density of 2 million/hectare (Figure 3). Following the initial experimental treatment in June 1983, earthworm numbers were checked in January 1984. Here, worms were absent in the experimental area, but remained at 860,000/ha in the control or untreated areas. A further worm survey in November 1984 followed the full treatment in September, and showed a complete absence of mature worms, but some earthworm eggs and newly-hatched worms were present. For this reason, the granule was reapplied in mid-Spring 1985 to 80% of the airfield. A soil survey in March 1986 on part of the airfield where oystercatchers were persisting in feeding, revealed the presence of mature worms at 290,000/ha. This confirmed the high mobility of earthworms and their ability to recolonise an area rapidly if untouched populations are nearby. Here, we had not been able to treat a stand of lucerne-Alphalpha-abutting the treated area.

Despite this set-back, there is no doubt that the Thiodan granules had a profound effect on the overall presence of earthworms and an

equally profound influence on the use of the airfield by oystercatchers. Data in Figure 4 show the numbers of oystercatchers using the airfield in the 1982/84 pretreatment period compared with their numbers post-treatment. This is a highly satisfactory result.

Fig 4. Shows the Numbers of Oystercatchers Pre • and Post X Treatment with Thiodan



Following this work, the Pesticides Board of New Zealand in April 1986 has accepted in principle registration of the "Thiodan" granule which will be marketed under the novel name of "No-Strike", with the registration Number of 3610.

"No-Strike" is marketed by Hoechst New Zealand Limited, 21-39 Jellicoe Road, Panmure, CPO Box 67, Auckland 1, New Zealand. The product is formulated by Fruitgrowers Chemical Company Limited, Port Mapua, Nelson, New Zealand.

ACKNOWLEDGEMENTS

I wish to thank the Fruitgrowers Chemical Company and in particular, Jim McLaughlin and Sheldon Brice for their interest and encouragement after years of frustration in getting the "No-Strike" granule produced. I also wish to thank Air New Zealand and the Civil Aviation Division of the Ministry of Transport for their financial support which has enabled me to present this paper. Finally, thanks to Jo Anastasiadis for her field and technical assistance and for preparing the figures.