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BIRD CONTROL IN NEW ZEALAND USING ALPHA-CHLORALOSE AND DRC1339

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ABSTRACT: Horticulturists and the general public in New Zealand are experiencing increasing problems with a number of introduced bird species. This has meant that many people wish to carry out bird control operations themselves to reduce the problems these birds cause. Most of this control will have to be carried out by the growers themselves as there are very few professional bird control personnel in New Zealand. Alpha-chloralose is the only toxin the general public has access to for controlling birds. It is available in a variety of bait forms with a maximum toxic loading of 2% (weight/weight). Registered personnel can use alpha-chloralose and DRC 1339 (Starlicide) to control birds, although at this stage DRC 1339 is only available for rook control. A wide variety of unusual baits have been used to control rooks with this poison.

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INTRODUCTION

Bird damage to a range of horticulture crops including grapes and berry fruit is a major problem in New Zealand. Bird species causing the problem include starlings (*Sturnus vulgaris*), blackbirds (*Furdus merula*), sparrows (*Passer domesticus*), chaffinches (*Fringilla coelebs*), greenfinch (*Corduelis chloris*) (MacMillian 1981 and mynas (*Acridotheres tristis*). Rooks (*Corvus frugitegus*) cause problems for grain producers (Purchas 1981). In urban areas and cities birds such as sparrows, starlings, mynas, feral pigeons (*Columba livid*), and in some areas gulls (Dominican gull and *Larus dominicans*), are a public nuisance (Caithness 1968).

In New Zealand up to 90 % of grape growers suffer some bird damage annually estimated to be in excess of \$1.8 million (APDC 1987). The cost of controlling birds of \$.8 million raises costs to approximately \$2.68 million. The potential value of wine production lost as a result of damaged grapes has been estimated to be in excess of \$10 million dollars (Nelson 1990).

If the value of damage to other fruits and crops is included, birds are likely to cost the horticulture industry more than \$15 million annually in lost production.

CONTROL TECHNIQUES IN NEW ZEALAND

The two poisons used in New Zealand to control birds are Alpha-chloralose and DRC 1339. Alpha-chloralose, with a maximum toxic loading of 2%, is the only toxin legally available to the public. It is widely used in urban and rural areas in a variety of bait forms. Alpha-chloralose is commercially available incorporated in barley, wheat and peas packaged in 1.5, 4.0, and 12.0 kg packages. It is used mainly for the control of sparrows and pigeons in cropping areas, but is also used to control sparrows in piggeries, poultry sheds, factories, and buildings, as well as pigeons in cities.

Alpha-Chloralose is also available as a paste in 500 g tubes. The paste can be applied with ease to bread, fruit, and even baits like dog sausage for the control of mynas and starlings. Trained personnel can use alpha-chloralose at any strength in a variety of baits for removal of problem birds such as ducks, Canada geese, gulls, and even feral geese, or to actually kill problem birds. To successfully destroy birds the toxic loading must be

increased to 6 to 8 % or control work needs to be carried out in cool weather.

DRC 1339 is only available for rook control by registered operators in rural areas. It is applied to a variety of baits including brown beetles, bread, maize, walnuts, oats, and more recently macaroni.

BIRD CONTROL USING ALPHA-CHLORALOSE

Properties. Chloralose is a condensation product of chloral hydrate with glucose. It exists as alpha and beta isomers, but only alpha-chloralose has narcotic properties. Mode of Action. Alpha-chloralose is a narcotic which in birds induces first a state of dissociation then sleep. All the essential bodily functions are unaffected; the bird is merely stupefied. The action is a remarkable one, for the victim does not seem to pass beyond the stage of stupor, and paddling movements of the legs or nodding of the head may appear throughout the time the bird is affected.

Symptoms of Poisoning in Birds. Narcosis with alpha-chloralose will usually proceed through the following four stages (Agricultural Chemical Board 1977):

- 1) Cessation of activity—the bird fails to perch properly and staggers in a "drunken" manner if it is disturbed; its eyes remain open and it can not readily be caught.
- 2) The bird stands in hunched position, its eyes closed or flickering; it does not move if approached quietly, but will move if it is touched. Affected birds can be caught with care.
- 3) The affected bird becomes recumbent, its head droops and eyes are closed. The bird remains still, except for occasional periods of wing and tail flapping. The bird still moves when touched or handled, but can be picked up easily.
- 4) The affected bird remains motionless, even when touched, and will usually die.

Alpha-chloralose Adhesives

A standard mix of 60 g of alpha-chloralose per 3 kg of bait (2%) is sufficient to put most smaller birds to sleep. To ensure that alpha-chloralose binds to the bait of choice an adhesive must be used. The following recipes for alpha-chloralose adhesives are recommended.

- 1) Mineral Oil (technical white oil) as an adhesive. Mix the mineral oil thoroughly with the bait of choice at a rate of 16 ml per 3 kg of bait. Add the alpha chloralose slowly and mix thoroughly so that the powder adheres to the surface of the bait.
- 2) Starch as a adhesive. Slowly add and mix 40 ml of cold water to 50 g of wheaten cornflour to make a smooth paste. Add a further ISO to 200 ml of boiling water to the paste mix while stirring. A clear jelly-like mix should result. It is necessary to make up a larger cornflour mix than is necessary for 1.5 kg of bait, as it is difficult to obtain jelly-like consistency with cornflour using a smaller mix. Immediately add 30 g alpha chloralose to 150 ml of the hot cornflour mix and stir thoroughly until no lumps of alpha-chloralose are visible. Add this mix to 1.5 kg of bait and stir thoroughly until all bait is coated. Alpha-chloralose is not very soluble in cold water but can be dissolved in hot water.
- 3) Sugar as a adhesive. -Dissolve 40 ml sugar in 200 ml boiling water and add alpha-chloralose powder. (The sugar: water ratio is enough to do 2 kg of bait.)
- 4) Lard or margarine as a spreading agent. Add alpha-chloralose powder at the strength required to melted lard or margarine and allow it to cool, stirring regularly to stop the powder settling on the bottom. Margarine is easier to spread than lard.

Prefeeding

To achieve the best results when using alpha-chloralose, it is wise to condition the birds by prefeeding them with the same type of bait that is going to be used to carry the toxin (e.g., if intending to use toxic husked wheat then prefeed with husked wheat).

If using alpha-chloralose paste, margarine, or lard as the carrier, then use the same carrier in a non-toxic form on all prefeed bait. In this way the target birds are less likely to be deterred by the toxic baits.

Guidelines for Controlling Birds Attacking Crops

The following guidelines are suggested for reducing bird damage to grain, fruit or vegetable crops.

Prefeed with non-treated grain or peas before using the alpha-chloralose material. Sufficient prefeed should be used to satisfy the daily requirement of all birds present. This may mean you will need to increase the amount of prefeed over the first few days until you have gauged the amount required. This may require prefeeding for up to 10 days prior to dispensing the toxic bait, but usually two to three days should be sufficient.

Prefeed should be broadcast on the ground in the same area or adjacent to the crop where the maximum damage is occurring. If the pasture is long a strip, it should be mown and baits broadcast on this area, enabling the birds to readily sight the bait. For pigeons, a ploughed area will draw them onto the bait.

For sparrows, the best results are obtained by laying a small quantity of bait at a large number of sites (e.g., 20 points evenly spaced apart).

If prefeeding with paste, lard, or margarine, select thin sliced sandwich loaves of white bread at least one day old. Do not use old stale bread to bait birds. Spread the non toxic bird paste on the bread like butter and make into sandwiches. Cut each sandwich into approximately 10 mm squares. This will produce between 100 to 140 small baits. Do not use larger baits as birds may fly off with them. These baits should be placed on bait trays or on the top of sheds or places where birds will feed on them. If baiting blackbirds or thrushes keep the bait close to the edges of cover or shelterbelts and put out a number of small heaps of bait.

If the target species do not readily eat bread baits (e.g., starlings or mynas), then try mixing the cut bread baits with small pieces of household scraps such as cooked vegetables or meat scraps. Alternately, dog sausage or pet food can be broken into small pieces and coated with the prefeed paste or lard. If using pet food or household scraps, these should be put in bait trays out of the reach of household pets. Similarly, once target birds have finished feeding the remaining bait must be removed. Lard can be used as a medium to bind the scraps together. Cake, biscuit crumbs, stale bread, boiled rice, oatmeal, scraps of meat, and dried fruit may be mixed with lard.

Prefeed should be presented to birds either early in the morning (before or just after daylight) or in the late afternoon then keep exactly to the same routine on subsequent days. Thus prefeed at the same time each day, use the same vehicle, wear the same color clothes, and keep to the same approach and departure route. Birds will then get used to a person feeding them. Do not change any part of the approach to the operation.

Once a large percentage (90 % plus) of the target birds are eating the prefeed, it is time to consider introducing toxic bait. At the last prefeed reduce the quantity of bait to half the usual amount so that birds will be hungry. Preferably choose a cool day to introduce the toxic bait, as the colder the temperature the more effectively the alpha-chloralose will work. Do not apply more toxic bait than used during prefeeding. To protect non-target species (e.g., native birds and ducks) do not lay toxic bait in lines or heaps and avoid laying in close proximity to ponds, streams and rivers.

On the day the toxic bait is to be applied, try to ensure that nothing will disturb the birds during feeding. Thus, adjacent landholders may need to be approached beforehand and requested to keep disturbance to a minimum. Even a stray dog in the area could frighten the birds away. Once the bait has been distributed watch the area from an inconspicuous site. Do not approach the area until the birds have completed feeding or until the bait has taken effect. Once the bait has taken effect collect the sedated and sleeping birds. If the birds are to be saved, keep them in a warm, dark place. If they are to be destroyed, destroy them humanely. Ensure that all dead birds are buried to stop predators from feeding on them.

General Baiting Advice

House sparrows are the easiest birds to attract but they may also be discouraged by selective feeding if

targeting other bird species. If sparrows start to feed from feed trays mounted above the ground for other species, leave some bread scraps on the ground and use baits they do not usually eat on the tray for other species. Blackbirds, thrushes, and starlings may be baited with pieces of apple, bread and margarine/lard, cooked rice, dog sausage, and even meat scraps.

Birds at Airports

Trees, scrubs buildings, scrubs, etc., in a environment that is reasonably free from human disturbance—such as found near most airports—provide suitable roosting sites for a variety of birds, particularly starlings, pigeons, sparrows, and even swallows. In New Zealand rushes, scrub, or long grass around the edges of an airport will invariably attract other species of birds such as pukeko, spur wing plover, oyster catchers and even pheasants. In these areas some success has been achieved with a continuous baiting procedure. This requires the establishment of a number of baiting points through the area away from the general public. These areas are baited at regular intervals using a variety of baits to attract the problem bird species. When a sufficient number of the target birds are feeding on the bait, then alpha chloralose bait is introduced. After the toxic bait application the area is spelled for four to five days and then rebaited with prefeed. Prefeeding continues until sufficient target birds are once again attracted to the bait and the exercise is repeated.

Removal of Gull Roosts

Prefeed the area of concern in the late afternoon with small squares of bread and lard/margarine. Once there is a high acceptance of the prefeed, replace with toxic bread and lard/margarine. Gulls require between 4% and 8% alpha-chloralose to have an effect. Check the area at daylight the next morning to remove the dead birds. If the gulls are nesting then bread can be laid at all nest sites late in the afternoon or early evening, and the next morning the dead birds are removed off the nest with many of the chicks also being dead. All eggs and surviving chicks are destroyed at this visit.

BIRD CONTROL USING DRC 1339

Currently only a limited number of people are licensed to use DRC 1339 in New Zealand. People wishing to gain a licence to use DRC 1339 must satisfy the New Zealand Pesticides Board that they have the necessary skills, knowledge, and the needed license. The main people with licenses are Regional Government employees. The toxin is currently only used to control rooks where they are causing agriculture damage. The ideal time to control rooks is during the breeding season when they congregate in breeding rookeries.

Toxicity of DRC 1339 to the Rook

The LD50 of DRC 1339 to the rook is 3 mg/kg (Agricultural Pesticide Board 1977). For control purposes 6 mg/kg is used. The weight of an adult rook is 400 to 500 g so 3 mg of DRC 1339 per bait is necessary to make sure of a kill. DRC 1339 is more toxic to rooks and starlings than to most other bird species and mammals. There are no reports of secondary poisoning.

Mode of Action

DRC 1339 is absorbed into the bloodstream and impairs the liver and body functions. Death apparently results from uremic poisoning. Damaged kidneys are unable to excrete the body's waste products and these build up in the bloodstream to a lethal level. The first symptoms of poisoning are an increase in water consumption, followed by a sharp drop in the intake. About four hours before death, birds cease to eat or drink and become listless and inactive. They perch with feathers ruffled, as in cold weather, and appear to doze. As death nears, breathing increases slightly in rate and becomes more difficult. The birds finally comatose and die.

History of the Rook (*Corvus frueileeus*) in New Zealand

The rook is a native of Great Britain and Europe. Rooks were brought to New Zealand by early settlers and liberated by acclimatization societies in a number of different regions between 1862 and 1873. Some of the liberations were successful while others failed. Today, rooks are present in large numbers in the lower half of the North Island and in the middle of the South Island. In October 1993 there were 31,000 rooks in New Zealand and 8860 nests in rookeries.

Procedures Leading Up to the Control Operation

Rooks are observed at dawn for two days to check movements, flight paths, and feeding areas. Observations are made from a vehicle at a discreet distance. From these observations the ideal site is one where there will be little chance of disturbance and rooks won't feel threatened. Thus the site should be distant from plantations, hedges, and buildings, and be across the rooks' flight path. Short pasture, harvested or cultivated paddocks are ideal sites for the bait line. Prior to commencing the control operation all domestic stock must be shifted from the paddock where it is proposed to put the bait line.

Bait Preparation

Bread Baits. Bread 1 cm thick (toast sliced) and one to two days old is cut into 2 cm squares. The pieces of cut bread are placed in deep-frying baskets and immersed in a tub of melted lard until saturated. The baskets are then removed and allowed to drain. The saturated pieces of bread are then emptied into a tray filled with flour and rolled around until coated with flour and are free flowing. The baits are then placed into wire baskets where the excess flour and granules of dripping are sifted from them. They are then placed on the cooling tray and later into plastic buckets.

The absorption rate of lard varies considerably according to the porosity of the bread and the temperature of the dripping. Porosity varies with different brands, and with the age of the bread. As a general guide, a loaf of bread will absorb its equivalent weight in lard. Two 750 g loaves of bread will absorb 1.5 l of lard and require approximately 2 kg of flour. The temperature range of the lard should be 60 to 70° C.

Maize Baits. Soak maize in a 20 l plastic bucket by adding water until it is approximately 2.5 cm above the maize. Allow to soak for 24 hours and pour off excess

liquid before use. If there is more soaked maize than is needed it may be kept by covering the maize with water provided it is drained every 24 hours; otherwise it will begin to ferment.

Preparation of Toxic Bait

Bread. First, 2.5 grams of DRC 1339 is mixed with 1 / of lard which disguises the taste of the poison. Mixing DRC 1339 into a liquid is not easy. However, it can be achieved by placing DRC 1339 powder in a measuring jug containing a small amount of melted lard and mix thoroughly to a smooth paste. Add more hot lard, mixing all the time. Once all the lard has been added and mixed, the solution should be added to the immersion tub. Usually between 5 and 10 / is mixed at a time. Bread is prepared in the same way as for prefeed.

Before each basket of bread is immersed the mix should be thoroughly stirred to prevent the toxic material from settling on the bottom of the tub. A flat wooden stick is ideal for this. Flour in the mixing tray should be kept as clean as possible to prevent contamination on the outside of the baits by small globules of toxic dripping and flour. Flour should be discarded after each 5 / mix. When the baits have cooled they should be placed in plastic buckets and sealed with lids. It is preferable to mix the toxic bait the day before using it and then keep it in a cool place or in a freezer.

Maize. Soak maize for 24 hours (as for feed bait) then thoroughly drain of liquid. For every 1 kg of maize, mix one dessertspoon of wheaten flour with 27 ml of cold water in a 500 ml calibrated container/beaker until it becomes a smooth paste. Water should be added gradually, mixing all the time until a smooth paste is obtained. Then mix in approximately 100 to 133 ml of boiling water to the paste. The mix should become clear and jelly-like. (Boiling water must be used otherwise the desired jelly-like mix will not be obtained). Allow the cornflour mix to cool to 30 to 40° C and then add 2.5 g DRC 1339 to the mix and stir thoroughly. Then add the soaked maize to the starch mix (5 to 6 kg maize is a large enough quantity to mix in a container at one time) and mix thoroughly to ensure that all the maize is well coated with the DRC 1339 starch mix. Toxic bait must be kept frozen and only removed from freezers on the morning of the toxic baiting. Exposure of toxic bait to sunlight and air will discolor the bait and lower the toxicity of the poison.

ALTERNATIVE DRC 1339 BAITS

Walnuts

Preparation of Baits. Whole walnuts are placed into a sturdy sack, approximately 1 to 2 kg at a time, and laid flat on a hard floor. With heavy boots or a hard object break the nuts. All walnuts must be broken to prevent rooks storing whole nuts in the ground. Once broken, birds will eat the nut kernel in preference to any walnuts on trees that they will store for future use when their food supply is short.

Preparation of Toxic Bait. Bait must be free from shells and preferably in quarter kernel sized pieces. DRC 1339 poison is applied using the cornflour adhesive, at the same mixing rate as used for maize bait. The cornflour mixture should be slightly thinner to ensure that it

thoroughly covers the rough texture of the kernel. Approximately 100 ml of the cornflour poison adhesive will adequately cover the surface of 1 kg of walnuts. For hand mixing 2 kg of bait in a 10 / bucket is sufficient for one mix. Care must be taken not to break up the bait during mixing. Once thoroughly mixed, place into a heavy plastic bag and freeze during freezing agitate frequently to keep baits separated.

Grass Grub Beetles (*Costalytra zealandica* - white)

In parts of New Zealand high populations of grass grub and porina larva in pastures provide a nutritional food source for rooks. The annual mating flights of grass grub beetles takes place from early November to December and makes an ideal food for developing chicks. Rooks feed on grass grub larva, and in doing so pull up the grass and open the soil to wind erosion. On occasions, entire paddocks have to be resown thus grass grub beetles make an ideal bait source.

Collecting Beetles. Phenol formaldehyde resin Durex 12687 is a sex attractant for male grass grub beetles. Simple vane traps can be placed out on pastures with a pinch of the "cocoa like" powdered resin in a small jar. Up to 200 g of beetles per trap can be caught in a night. Each night the catch is placed in a plastic bag and frozen. Agitation the following day will ensure free flow beetles.

Preparation of Feed Bait. Simply remove required quantity from freezer the night before required.

Preparation of Toxic Bait. Remove quantity of beetles from freezer two hours before mixing. Apply the cornflour toxic mix to beetles in the same way as walnuts. Beetles must not thaw out completely or mush will result. Hard frozen beetles cause the cornflour to adhere patchily to their surface and give uneven toxic distribution.

Macaroni

When cooked macaroni resembles grass grubs (one of the rooks' main diets), it readily attracts them to bait lines.

Preparation of Bait. Take 5 kg of macaroni. Cook by boiling in water that has had cooking oil added at the rate of 40 ml per 15 / of water. The macaroni should be put in a large wire basket and boiled for no more than six to eight minutes, stirring regularly. Change the water after every second batch is cooked. Once cooked, remove from water and rinse thoroughly under cold water to prevent it from sticking together. Dry bait for several hours watching that it does not start to harden. When dried properly, it has a rubbery feel. Freeze in 2 kg lots. When bait is required, allow one day to thaw or use a microwave. Bait prepared in this way will last 12 months in a freezer.

Preparation of Toxic Bait. Thaw the required amount of macaroni. To each 1 kg apply 2.5 grams DRC 1339 combined with two tablespoons of icing sugar. Ensure that there are no lumps of DRC 1339. Mix all ingredients thoroughly in large container and ensure macaroni is well coated with the sugar DRC 1339 mix. It is recommended that only 1 kg of macaroni be mixed at a time. It is advisable to prepare the toxic bait the day before use unless you are using frozen toxic bait which can be defrosted prior to use.

Placement of Bait Lines. Careful selection of a bait line site is important. Observe the flight path that the rooks take to their feeding area. A site is selected (away from plantations, hedges, buildings or road sides) where there is little chance of the area being disturbed. An ideal site is a few metres from a fence line that crosses the flight path. Short pasture or a cultivated paddock provides an ideal bait line site. If necessary, a strip of pasture can be mowed to ensure a short grassed feed line. Remove all stock from the paddock before baiting the line. If rooks do not come down and feed on the bait line, shift the line into the paddock where the greatest number of rooks are feeding.

Feeding Bait Line. Bait should be broadcast in a swathe approximately 2 m wide along the selected line. Ensure bait is scattered so that all rooks can feed on the bait without being chased off by dominant birds. As a guideline, a 20 / bucket of bait should cover a line of approximately 30 m in length. When feeding out toxic bait, staff must wear rubber gloves and overalls.

ALTERNATIVE DRC 1339 BAITING TECHNIQUE

One Regional Government area had difficulty baiting rooks over the years, and in 1987 an alternative baiting technique was used with considerable success. Two dead sheep were placed on a rook glide path approximately 30 m apart. About one week later rooks were observed readily feeding on these carcasses. During mid to late spring a large proportion of rook's diet is Blowfly Larvae (maggots), hence the probable success of using carcasses as a baiting medium. Lay the bait between the two carcasses, at previously recommended application rates. Once rooks commence feeding on carcasses, all other food sources such as offal pits should be covered.

NON TARGET SPECIES

Bait lines are not placed close to water or another area that waterfowl, such as ducks, pukeko, etc., inhabit. If for any reason a line must be placed close to these areas to get rooks to feed on it, then the line should be moved gradually each day so that when the poisoned bait is laid it is away from the waterfowl habitat. Provided the approximate arrival time of rooks is known, non target species (e.g., waterfowl) that could be attracted to the bait can be chased away by using a scare gun or shotgun. These tactics should cease 10 to 15 minutes prior to the arrival of the rooks.

If feeding near a rubbish dump, or other areas frequented by gulls, baits other than bread bait should be considered. If a large number of non-target species are feeding on the line, close to poisoning time, the operation should be abandoned. Black backed gulls are impossible to keep off bait lines as they are attracted by observing rooks feeding. If gulls are feeding on bait lines additional bait should be applied to cater for these birds.

NEST COUNTING AND POPULATION MOVEMENTS

In New Zealand, Regional Government pest control staff count the nests in every known rookery in their districts annually. During the year, staff record the locations of new. This, together with the reports from ratepayers, means that most new rookeries are identified.

The data from the nest counts is then supplied to Pest Management Services that maintains a Rook Survey computer database that allows history and count records to be scanned since 1959. A rook database with rookery location and nest count data from 1959 to the current time is maintained by Pest Management Services. Each year, prior to the rook survey, Regional Government staff are provided with printouts of all known rookeries in New Zealand and their map reference. Staff check each rookery, count the nests, and record the map coordinates of any new rookery. This information is then returned to Pest Management Services for data entry. The counting of nests each year (mid-September to mid-October) is important as it indicates the effectiveness of previous control. In some cases where a high percentage kill is achieved the survivors abandon their rookery and join up with another rookery.

OTHER EXPERIMENTAL TOXINS

DRC 2698 (Cat)

Trial work is still continuing with DRC 2698. When applied at the same strength as DRC 1339 it kills rooks quicker than DRC 1339. As a result dead rooks are not spread over such a wide area.

Toxic Paste Fenthion

Fenthion is an organophosphate chemical that kills the bird on contact through its feet or its body. This toxin has been trialed a number of times in a grease type mixture usually at 1% concentration. When applied around rook nests by staff suspended from helicopters it killed the adult bird and chicks. However, if the chicks come in contact with the mixture first and die, the adults often abandon the nest. It is proposed to undertake trials using either DRC 1339 or DRC 2698 mixed in a paste similar to wallpaper paste. The paste will be applied around rook nests. Time of application though is crucial, as nests must be treated when there are eggs in them, not chicks. Using helicopters to lower staff into rookeries to treat nests is more cost efficient than attempting to bait birds, especially if the rookeries are small and well apart from each other.

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LITERATURE CITED

- AGRICULTURAL CHEMICALS BOARD. 1977a.
Alphachloralose for Bird Control. Ministry of
Agriculture and Fisheries Wellington 1-12.
- AGRICULTURAL CHEMICALS BOARD. 1977b.
DRC 1339 for Bird Control. Ministry of Agriculture
and Fisheries Wellington 1-8. AGRICULTURAL
PEST DESTRUCTION COUNCIL.
1987. Unpublished Report.

CAITHNESS, T. 1968. Wildlife Management. 32:
279-86. MACMILLIAN, B. W. 1981.
Food of house
sparrows and greenfinches in mixed farming district,
Hawkes Bay, New Zealand. NZ Journal Ecology.
Vol 8, 93-104.

NELSON, P. C. 1990. Bird Problems in New Zealand -
Methods of Control. Vert. Pest Conf. 14:361-364.
PURCHAS, T. P. G. 1981. Rook biology, damage
and control A Summary Farm Production & Practice,
Ministry of Agriculture and Fisheries Aglink.