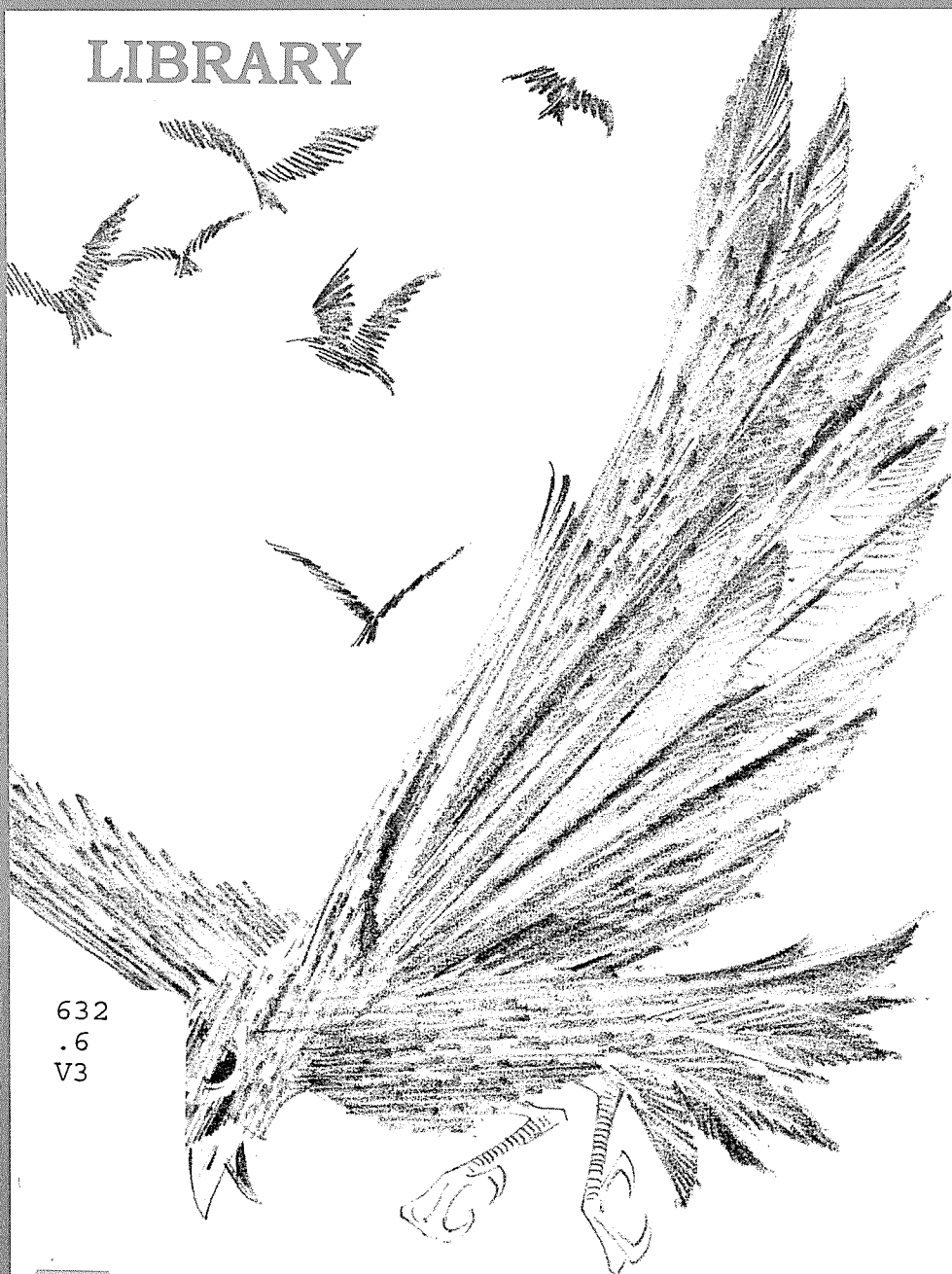


BIRD CONTROL

FOR AGRICULTURAL LANDS IN BRITISH COLUMBIA

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List of Figures

- Fig. 1 Bird damage to grapes: punctured or eaten whole
- Fig. 2 Bushes, trees, overhead wires and water may attract birds to the crop and should be removed or modified
- Fig. 3 A starling trap in action
- Fig. 4 How to build a starling trap
- Fig. 5 A revolving propane exploder
- Fig. 6 Av-Alarm system with four speakers
- Fig. 7 Three outdoor speakers broadcasting music over crop
- Fig. 8 Orchard and vineyard pistol with blank cap and shells
- Fig. 9 T-Bar trellising system
- Fig. 10 Geneva Double Curtain trellising system
- Fig. 11 Overhead trellising system
- Fig. 12 Black vinyl tar-coated nylon netting
- Fig. 13 Cooper's Hawk

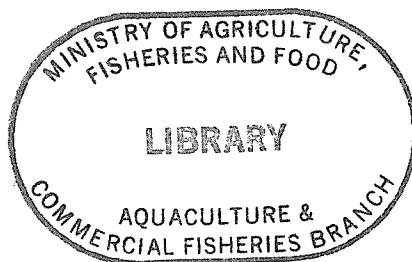


Table of Contents

INTRODUCTION	5
MATTERS TO CONSIDER FIRST	
Determining Crop Damage and Losses:	5
Determining Cost of Control:	5
Identification of Harmful Birds:	6
Legal Considerations:	6
Applying Control Methods:	6
CONTROLLING BIRD DAMAGE	
Removal or Modification of Attractions:	7
Dealing with Overnight Sleeping Areas:	7
Patrolling the Area:	7
Trapping:	7
Sounds and Sound Producing Devices:	
Automatic Exploder	10
Av-Alarm	11
Alarm and Distress Calls	11
Music	12
Portable Speakers	12
Firearms	
a. Orchard and vineyard pistol	12
b. Shotgun	12
c. .22 calibre rifle	13
Fireworks and Rockets	13
Other Sounds and Sound Producing Devices	13
Scarecrows and Other Deterrents:	
Scarecrows	13
Imitation of Bird Predators	14
Other Deterrents	14
Protective Growing Practices:	
Grape Trellising Systems	14
Harvesting	14
Netting:	14
Bird Predators:	15
Other Methods:	15
SUPPLIERS OF CONTROL DEVICES	
Dealers in British Columbia	16
Dealers Outside British Columbia	16
a. Live traps	16
b. Automatic exploders	16
c. Av-Alarm	16

d. Alarm and distress calls 16

e. Exploding shotgun shells 16

f. Fireworks 17

g. Raptor forms 17

h. Netting 17

i. Chemical coatings (Sticky Material) 17

ACKNOWLEDGEMENTS 18

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 V3 Agricultural Lands _____
 in British Columbia__

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BIRD CONTROL FOR AGRICULTURAL LANDS IN BRITISH COLUMBIA

Introduction

This booklet presents the principles and methods of bird control suitable for use on agricultural lands in British Columbia. Crop damage can be reduced or prevented through the proper use of the appropriate control methods. Be warned; bird control is not always a simple task and may require considerable time, thought and effort.

This publication has been designed for easy reference and is intended as an aid to extension workers, farmers and backyard growers.

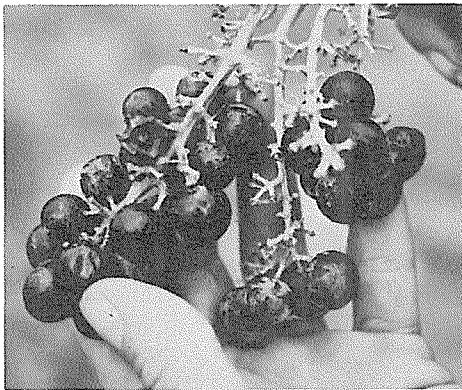


Fig. 1 Bird damage to grapes: punctured or eaten whole.

MATTERS TO CONSIDER FIRST

Determining Crop Damage and Losses:

The effect that birds are having on your crop must be determined before considering bird control methods (Figure

1). The crop must be checked frequently for damage especially during ripening. The entire producing area should be examined thoroughly as damage may occur in certain places and not in others. Areas near power lines, trees and bushes may deserve special attention because birds perching on them may enter nearby crops. Birds may prefer one type of crop or a particular variety of crop to another; thus, each should be checked individually.

An estimate of the percent loss due to damage is reliable and provides an excellent means of determining the economy of bird control. A calculation of the losses for part or all of the crop producing area should be made. This figure can easily be converted to a pounds-loss estimate which is readily expressed in dollars thereby allowing comparison with the cost of control. Remember although your crops may not be damaged every year, control measures should be considered if losses can be expected over longer periods.

Determining Cost of Control:

To determine the cost of control you must include purchase price, maintenance and labour expenses. This sum may be found to be economical when a long term of operation and the number of hectares protected are considered. Thoroughness is essential in estimating your maintenance costs. Include cost of patrols, removing trees and bushes, etc. The amount of time involved in setting up and carrying out the procedures and maintenance should be noted and converted into dollars. Remember, methods requiring a lot of

attention will not be desirable when time is at a premium, e.g., at the peak of harvest.

A final comparison of the cost of a bird control program with your loss estimate will be the key to your decision upon the desirability of such measures.

Identification of Harmful Birds:

It is very important to correctly identify the birds which are causing the damage so that effective control measures can be concentrated against them. By learning the habits of birds you will not waste time, energy and money controlling harmless birds. Books on bird identification and behaviour are available at most book stores. Two of the most useful are:

Birds of North America, by Robbins, Bruun, and Zim. Published by Golden Press, New York, 340 pages.

A Field Guide to Western Birds, by Peterson. Published by Houghton Mifflin, Boston. 366 pages.

Legal Considerations:

Attention must be given to certain laws when considering control measures. There are laws which protect most birds, cover the use of noise producing devices, regulate the discharge of firearms and refer to the use of fireworks.

Almost all birds are protected by federal or provincial acts and regulations. Migratory birds such as robins are the responsibility of the Canadian Wildlife Service, while resident birds such as pheasants come under the jurisdiction of the British Columbia Fish and Wildlife Branch. Determine the category that covers the bird with which you are dealing. Permits to destroy protected birds can be obtained from the appropriate authority but justification must be given. Your loss estimate may provide strong support for your claim. However, permits are not required to destroy the eggs, nests or

individuals of the following species:

1. European Starling
2. Crow
3. Magpie
4. English Sparrow
5. Domestic Pigeon or Rock Dove

Local by-laws and regional regulations should be examined before noise producing devices, firearms or fireworks are used. The British Columbia Fish and Wildlife Branch has booklets regarding firearm restrictions in various municipalities. Questions concerning these methods should be directed to local law enforcement agencies and municipal governments.

Applying Control Methods:

Only the control measures that are best suited to your particular situation need be considered. For example, trapping will be effective against local flocks of starlings but not against passing migratory flocks, or robins. For useful information, consult government personnel, local growers and the distributors of control devices in addition to this booklet.

If possible different control methods should be tried to determine which is best suited to the circumstances. Control measures should be used in combinations of two or more. This will provide the best protection and is strongly recommended. They should be concentrated in the areas of the crop being damaged. Controls can also be applied at locations from which birds enter your fields such as perching sites in trees, bushes or wires.

Any bird control device which remains in the same place for a number of days, is used continually or operates at regular intervals will eventually become ineffective because the birds become accustomed to it. Help prevent this tendency by using a combination of control methods and relocating the devices before they are no longer effective. Try to prevent birds from habitually entering your crop and their

overnight resting areas from which they may damage nearby crops. Control methods are more effective if they are used before these habits are formed. Attempt to determine when damage will begin and start control measures before the birds establish a pattern. Persistence in keeping birds away from the crop when damage first occurs can be rewarding.

The effectiveness of control methods used in combination has been previously mentioned and cannot be too highly emphasized. However, it must also be stressed that control measures will usually only reduce losses, not eliminate them. Your efforts must be coordinated to keep such losses at a minimum.

Suppliers of some of the bird control devices and materials described in the following pages are listed at the end of the booklet.

CONTROLLING BIRD DAMAGE

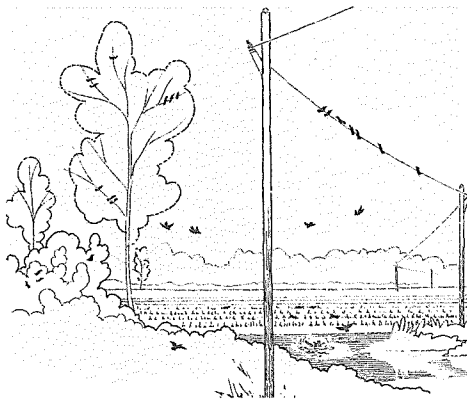


Fig. 2 Bushes, trees, overhead wires and water may attract birds to the crop and should be removed or modified

Removal or Modification of Attractions:

Crop damage can be reduced or prevented by removing or modifying

features which attract birds (Figure 2). These include falling, pruning, or topping bushes and trees used as perches; eliminating overhead wires; preventing the pooling of water which can be used for drinking or bathing (e.g. fix leaking irrigation lines); and making sure that the harvested crop is quickly covered or taken away.

Dealing With Overnight Sleeping Areas:

Starlings gather together in large numbers for the night at roosting sites, usually trees or brush. Birds from a particular roost will use a specific feeding area. Thus, damage to a crop may be prevented or reduced by eliminating the roost or forcing the birds to abandon it.

Trees may be topped, severely pruned or cut down. Birds may be trapped or harrassed until they disperse. Irritation can consist of any of the methods to be discussed. Flashing lights and water sprays may also be used. Controls can be applied either before or after the birds have entered the roost. Many days of harrassment may be required before the site is abandoned.

Patrolling the Area:

Patrols consist of a person or group regularly checking the crop and surrounding area for birds. By frightening birds they can help prevent damage and will discourage the formation of habits such as returning to feed. Patrols should be conducted each day during feeding times, usually in the early morning and afternoon. They can be carried out by any means which efficiently covers the area. Birds can be frightened by using some of the devices discussed later in the booklet.

Trapping:

Trapping starlings with a modified Australian Crow Trap (Figure 3) is an excellent method for controlling local

flocks as they are local feeders and do not readily move into a successfully trapped area. However, large flocks of fall migrants cannot be trapped effectively if they are only passing through.

One or more traps may be used. It may be economical for local growers to combine their efforts and hire a person to service them.

Traps should be operating at least two weeks before the crop ripens, and can be started early in the summer when brown juvenile starlings are first seen.

For a successful program traps must be placed in an *open area*, so the starlings can see the bait and decoys. They should be located: a) on a flyway (an airplane regularly used by birds flying from one location to another); b) at a feeding or drinking site; c) near perching sites such as trees or power lines.

If birds do not enter the trap within a week, try another site. Bait placed inside the trap will encourage birds to enter and should consist of foods which they are eating at the time. Culled apples are usually very attractive to starlings. Some bait scattered on the entrance board and around the trap may increase the number captured. Five to ten live birds should always be present in the trap. They will act as decoys and help attract other starlings as these birds are gregarious, that is, they tend to flock. Decoys may be obtained from a fully established trap but if none are available, the bait will eventually attract some.

Water and food must always be made available to captured birds. Water can be served from any convenient container eg. poultry watering cans or a split tire. Dry, crumbly dog food or poultry mixes are among the foods they will eat.

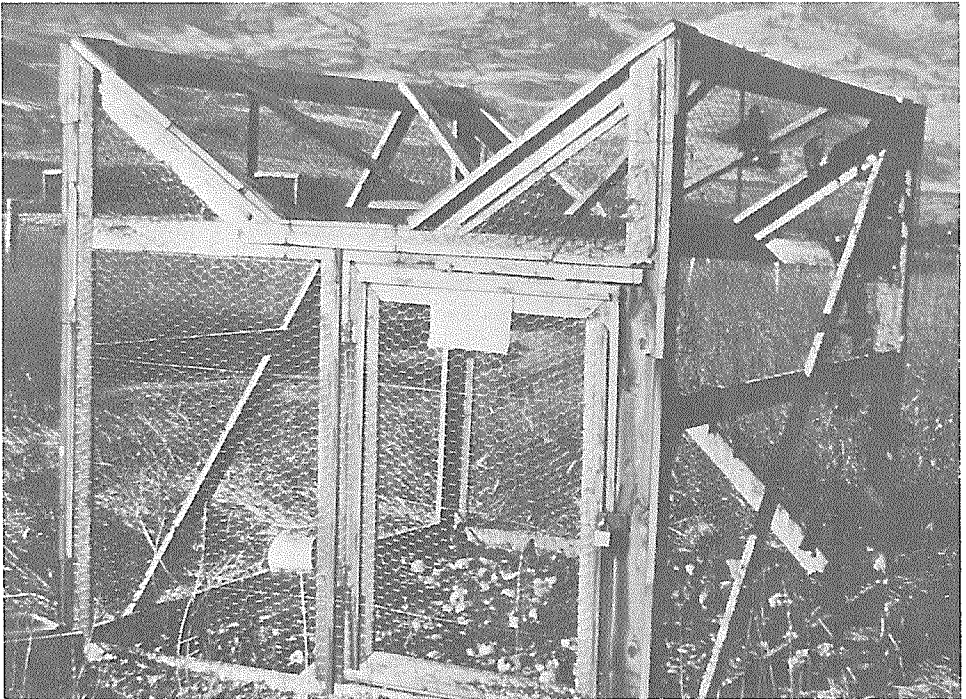


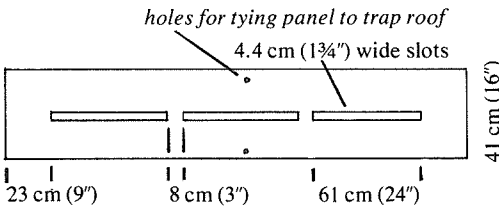
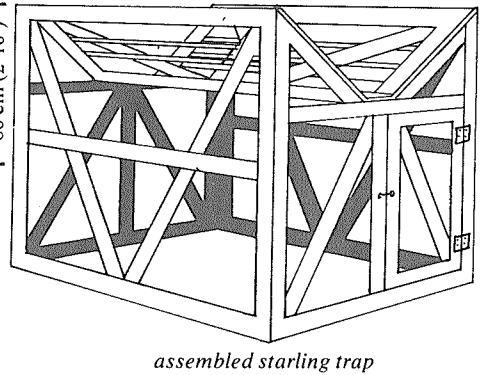
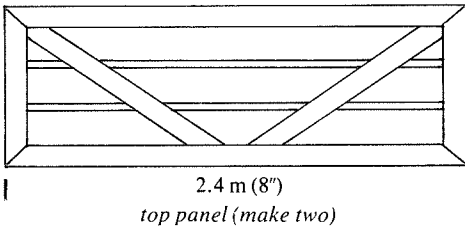
Fig. 3 A starling trap in action



Fig. 4 HOW TO BUILD A STARLING TRAP

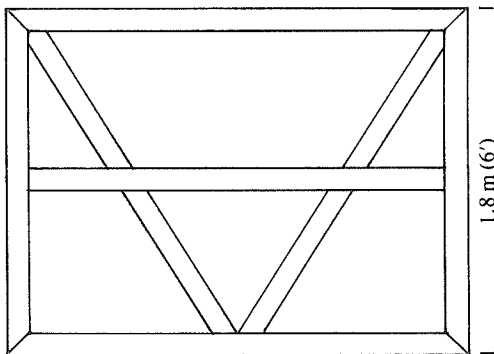
MATERIALS

- 15 pieces, 2.5 x 10 cm, 2.4 m long (1x4 8' long)
- 25 pieces, 2.5 x 10 cm, 1.8 m long (1x4 6' long)
- 4 pieces, 2.5 x 2.5 cm, 2.4 m long (1x1 8' long)
- 1 piece, 1.3 x 41 cm exterior plywood, 2.4 m long (½ x 16 8' long)
- 12 m length, 1.8 m wide, chicken wire, 2.5 cm mesh (40' x 6' wide 1" mesh)
- 2 hinges
- 1 kg staples (2 lbs)

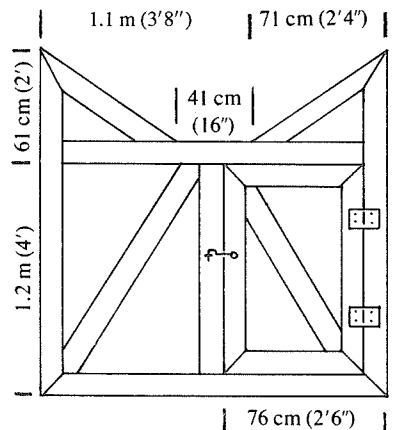


The size and location of the entrance slots on the entrance panel are very important to prevent escape of trapped starlings. The slots must be exactly 4.4 cm (1 ¾") wide and must be at least 23 cm (9") from the end of the panel. Sections may be connected with baling wire.

entrance panel (plywood)



side panel (make two)



front panel
rear panel (without door)

The traps should be serviced daily and all birds removed except those which will serve as decoys. Captured starlings can be put to death in a humane fashion by placing them in a plastic bag and subjecting them to fumes from an operating vehicle by means of a hose attached to the exhaust pipe. Dead birds should be removed from the trapping site and buried. Protected or harmless birds accidentally caught must be released. Bird predators should be set free 8 to 16 kilometres from the trap to prevent them from returning.

The wire mesh on the trap may be torn by cats or other animals attempting to capture the trapped birds. The use of heavier wire will prevent this from happening. Animals such as skunks may enter the bird trap by digging under the wall. Birds not killed by these animals can escape through the burrowed hole. Boards or wire can be buried around the trap or used as flooring to discourage such digging. Pests can be trapped alive if desired and taken to another area to be released. Livestock may damage traps by attempting to reach the bait and should be kept away by a fence. Uneven contact of the baseboards with the ground may provide escape exits for birds. Soil should be piled against the baseboards or they can be placed in a shallow trench and then covered.

For building plans of a modified Australian Crow Trap, see Figure 4. The completed sections can be joined with baling wire.

Other birds such as magpies and crows can be caught with a modified Australian Crow Trap. The only necessary change is an increase in the width of the entrance slot. Magpies need a slot width of 5.7 cm (2¼ in.), and crows, one of 8.9 cm (3½ in.). Bait for both birds include foods that they are presently eating such as fruits, berries, grains and small animal carcasses (or meat scraps). For magpies, one or two days of successful pre-baiting beside the

trap should be carried out before placing the trap over the bait. Both bird species prefer company, therefore one or two decoys left in the trap will help to attract others.

Suppliers of live traps for various bird species are listed at the end of the booklet.

Sounds and Sound Producing Devices: **Automatic Exploder**

Automatic exploders frighten birds by producing a sound approximately three times greater than a 12-gauge shotgun. Exploders are powered by either propane, butane, acetylene or calcium carbide (which produces acetylene gas). They may produce regularly or irregularly timed explosions. The sound intensity is adjustable. Some exploders revolve after each explosion thereby directing the sound in a different direction (Figure 5).

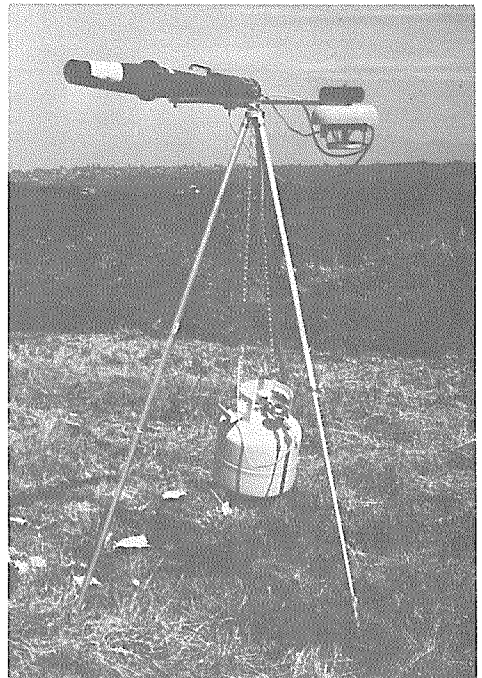


Fig. 5 A revolving propane exploder

As a general rule, one exploder may protect about four hectares. Enough exploders must be used to provide sound over the entire area to be protected. The exact size of the area protected by one exploder will depend upon winds, which can redirect the sound, and obstacles that muffle or block the sound. Exploders should be placed above the crop so that the sound will not be obstructed. They can be directed towards trees or power lines to scare perching birds. The loudness of the explosion can be increased by putting the barrel of the exploder through a hole in one end of a small steel drum which is open at the other.

Birds can be very determined to feed upon a crop and thus the effectiveness of the exploder will vary with the bird's persistence and its response to the noise.

Suppliers of automatic exploders are listed at the end of this booklet.

Av-Alarm

The Av-Alarm system produces a bird-repelling, electronic warbling sound and broadcasts it through outdoor speakers (Figure 6). This fully automatic device is battery powered and operates from one to four speakers. The sound frequency, loudness and timing can be regulated.

One speaker broadcasts over a 90 to 120 degree sector and will cover an area averaging 3.3 hectares. A sufficient number of speakers must be used to provide adequate sound coverage over the affected area. The Av-Alarm system is subject to the same limitations as an exploder and should be located with similar attention to sound coverage, wind, obstacles and perch sites (see the section on Automatic Exploders, page 10).

Note that the sound produced is very loud and may damage the hearing of persons working within 50 metres of the speaker. Ear protection must be worn.

Suppliers of Av-Alarms are listed at the end of the booklet.

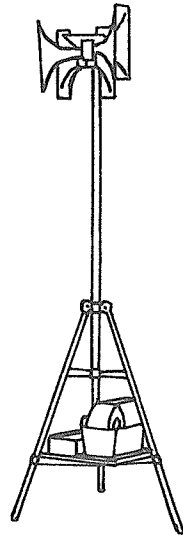


Fig. 6 Av-Alarm system with four speakers

Alarm and Distress Calls

Broadcasting of the alarm and distress calls of birds has proven successful. Recording and broadcasting equipment should be of good quality to give adequate results.

Alarm calls are used by birds to warn others of possible danger. Captured or injured birds make cries of distress. Alarm calls are more effective for bird control. It must be emphasized that birds will usually respond only to calls of their own species and sometimes only to those from the same region. Recordings are available commercially but they may not be effective in your particular locale.

Alarm calls are obtained mainly from flocking birds and are given when a predator is seen. Some birds held by a wing or leg and shaken will emit distress calls. Recordings produce best results when done outdoors and many birds of both sexes are used.

Hunting calls of predators can also repel some harmful birds: for instance, the hunting call of the marsh hawk may cause starlings to avoid a protected area.

The calls of most birds should be played for about 10 seconds every eight to ten minutes (45 to 60 second duration for species which are difficult to control), or should be played only when birds are approaching the crop. The latter method requires an operator who is watching for incoming flocks from a look-out. Continual playing results in birds soon ignoring the calls.

The same care must be taken in locating the speakers as with other sound producing devices (see section on Automatic Exploders, page 10).

Suppliers of alarm and distress call recordings are presented at the end of the booklet.

Music

Outdoor speakers (Figure 7) broadcasting radio programs or any type of recorded music have successfully kept birds from entering a crop. Field workers may find it entertaining.

These speakers are subject to the same limitations as any sound producing device and should be located with care (see section on Automatic Exploders, page 10).



Fig. 7 Three outdoor speakers broadcasting music over crop.

Portable Speakers

Portable outdoor speakers can be used when patrolling an area. They can be battery powered or connected to the electrical system of a vehicle. Loud sounds, alarm or distress calls or any suitable noise that frightens the birds can be broadcasted. This method may be more efficient than those using stationary speakers because sounds are broadcast directly at the problem birds only when necessary.

Firearms

a. Orchard and vineyard pistol

This pistol produces a loud sound using blank caps, cracker or whistler shells (Figure 8). Crackers explode about 30 metres from the operator; whistlers produce a whistling sound for about 30 metres. These are ideal for placing a loud sound among birds as they perch or fly.

Suppliers of orchard and vineyard pistols and ammunition are listed at the end of the booklet.



Fig. 8 Orchard and vineyard pistol with blank cap and shells

b. Shotgun

Blanks, exploding shotgun shells (range 135 to 180 metres) or live ammunition

can be used to scare birds from the crop, preferably before they enter. The shotgun should be directed towards the birds because the sound is most effective in a 30 degree arc from the muzzle and may frighten birds 0.8 kilometres distant. Exploding shotgun shells can also be used to place an explosion among birds that are perching or flying.

It is important to realize that simply killing birds will seldom prevent crop damage because it is difficult to shoot enough birds to be effective. Such an attempt would require much time, effort and money. The shotgun should be used to frighten birds. However, occasionally killing a bird will reinforce the fright response to the sound.

Suppliers of the exploding shotgun shells can be found at the end of the booklet.

c. .22 calibre rifle

A good scare response can be obtained either by firing many shots in rapid succession or at intervals of five to ten seconds. A .22 hollow point is the best shell to use because of the noise created as it passes through the air. As many as 40 hectares may be protected by one person, the effective range of a bullet being up to 1.2 kilometres.

Extreme caution must be used when operating a .22 rifle to ensure that no harm comes to people or property.

Once again the rifle should be used mainly to frighten birds when large numbers are present, and not to kill them. Killing an occasional bird will help reinforce the scaring response.

Fireworks and Rockets

Fireworks have been used successfully to frighten pest birds. The risk of fire and the damaging explosive power of some fireworks reduces their desirability. Also, municipal regulations must be checked

before these materials can be used.

Timed explosions may be obtained by means of a rope firecracker. This consists of a piece of rope with firecrackers tied at intervals. The rope is lit and as it smolders, explosions occur over a time period determined by the type of rope and the length of interval.

Rockets are available that will explode at various distances from the operator. This is another method of placing an explosion among distant birds.

Roman Candles with their combined explosion and flash of light are often used to clear starling roosts.

Suppliers of fireworks are listed at the end of the booklet.

Other Sounds and Sound Producing Devices

Air horns and sirens produce loud sounds that birds will avoid. Playing a radio at loud volume, chattering windmills, bells, whistles, shouts, clapping hands, drums and barking dogs all have their effects. Suspended cans containing pebbles can be sounded manually or by the wind and may be placed in perches or over the crop.

Scarecrows and Other Deterrents:

Scarecrows

Scarecrows do not have to be fancy to scare birds; many different forms have been used successfully. They should have moving parts such as loose clothing, streamers of coloured plastic, metal reflectors, or other objects which will move in the wind and attract attention. The scarecrow itself will move in an air disturbance if placed on a flexible, angled three metre pole. Figures should be easily visible to the birds and will be very noticeable if made from brightly coloured material. They should be moved frequently to prevent birds from becoming accustomed to seeing them in the same

spot. Use as many as is necessary to keep the area clear of birds.

Suspending a dead bird of the same species as the pest may be effective, and is often used to frighten away crows.

Imitation of Bird Predators

Plastic or paper imitations of hawks and owls in a perching or flying position are available; see end of booklet for suppliers. The replicas should be lifelike and re-located frequently. Model hawks may be suspended 15 metres below a large balloon floating at 60 metres. The effectiveness of these objects will vary with the situation.

Other Deterrents

Any bright moving object may frighten birds. Streamers of flagging tape, coloured cloth strips, reflecting strips, whirlers, balloons and shiny plates all can be effective if highly visible. They can be suspended by strings or attached to plants in numbers adequate for control.

Protective Growing Practices:

Grape Trellising Systems

Bird damage to grapes can be reduced by the use of trellising systems which make the grapes difficult for the birds to see or approach. Only vigorous varieties of grapes should be used with the following systems: T-Bar (Figure 9); Geneva Double Curtain (Figure 10); and Overhead (Figure 11).

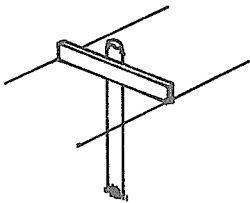


Fig. 9 T-Bar trellising system

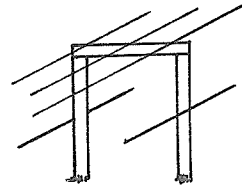


Fig. 10 Geneva Double Curtain trellising system

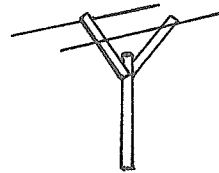


Fig. 11 Overhead trellising system

Harvesting

Ripe crops are most attractive to birds and should be harvested as quickly as possible to reduce the possibility of damage. Some crops should be harvested early in order to avoid harm.

Netting:

Netting can be used to prevent birds from gaining access to the whole crop or the part of the crop subject to damage (Figure 12). Netting comes in various types such as polypropylene, nylon, plastic, string and paper fibre. Synthetic netting can be re-used and may last up to five years.

It should extend to ground level and be secured, and the mesh size should be small, from 1.9 to 2.5 cm. A framework supporting the netting may be necessary.

Suppliers of protective netting can be found at the end of the booklet.

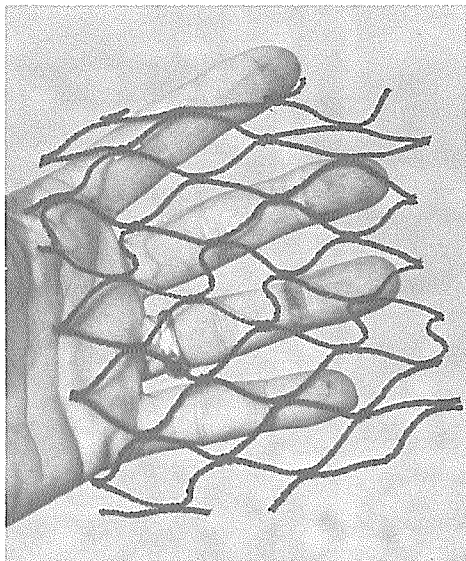


Fig. 12 Black vinyl tar-coated nylon netting

- (a) sticky material applied to branches or other perches will stop perching.
 - (b) black string hanging on trees or plants, birds flee when the “invisible menace” is contacted
 - (c) cats present in the crop
 - (d) a radio-controlled airplane to frighten flocks
- for nesting birds;
- (e) nesting box traps which capture birds looking for a nesting site
 - (f) a screen or shield placed over nesting holes and nesting entrances
 - (g) the destruction of nests, eggs and young

Suppliers of chemical coatings (sticky material) are listed at the end of the booklet.

Bird Predators:

Birds such as hawks which prey on pest birds should be encouraged to stay in the area and not be killed or frightened. The presence of one of these birds may cause pest birds to avoid the area (Figure 13).

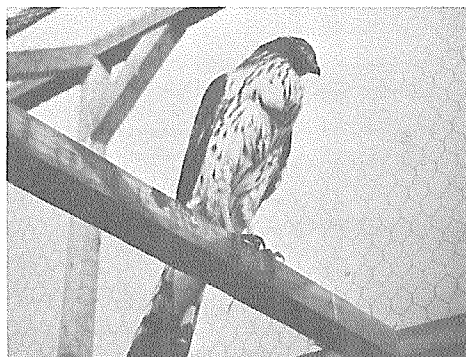


Fig. 13 Cooper's Hawk

Other Methods:

The following examples have proven successful:

SUPPLIERS OF CONTROL DEVICES

The following devices and materials are sold for the reduction and prevention of bird damage to crops, and/or to clear roosts. This list is for information only, is not complete and is based on information received in 1977. Listing does not imply endorsement of either the product or its method of control.

Dealers in British Columbia

Bartlett, L.R. Limited	1898 Dartmouth Road Penticton V2A 4B9 Phone: 492-2700 (Zon liquid petroleum exploder)
Raides, W. Eden	P.O. Box 71 Okanagan Mission VOH 1S0 Phone: 764-4257 (Av-Alarm, revolving propane exploder, vineyard and orchard pistol and ammunition)
Raikes, G. Basil, sub-agent,	1516 Hamilton Street New Westminster V3M 2N6 Phone: 521-0482 (Av-Alarm, revolving propane exploder, vineyard and orchard pistol and ammunition)
Traut, Mrs. L.	R.R. #4, Chute Lake Rd. Kelowna V1Y 7R3 Phone: 764-7657 (Netting)

Dealers Outside British Columbia

a. Live traps

Allcock Manufacturing Co.	North Water Street Ossining, New York 10562
Glenhaven Farm	Cayton, Illinois 62324 (sparrows, starlings, flickers, woodpeckers, jays)

Sensitronix

2210 West 34th Street
Houston, Texas 77018
(pigeons, sparrows, starlings)

b. Automatic exploders

*Key: A – compressed acetylene gas
C – calcium carbide
LP – liquid petroleum
REV – revolving model*

Alexander-Tagg Industires, Inc.	395 Jacksonville Road Warminster, Pa. 18974 (A, REV)
B.M. Lawrence & Company	351 California Street San Francisco, California 94104 (A, C, LP)
Hub States Corporation	2000 North Illinois St. Indianapolis, Indiana 46202 (A, C)
Reed-Joseph International Co.	230 South Main Street Greenville, Miss. 38701 (A, C, LP)
Reliance Machine Works	RFD #1, Box 309 Seaford, Del. 19973 (A)
Smith Roles, Inc.	Box 1238 Minot, N.D. 58701 (A, LP)

c. Av-Alarm

Av-Alarm Corporation	P.O. Box 2488 2734 Industrial Pkwy. Santa Maria, California 93454
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d. Alarm and distress calls

Wightman Electronics, Inc.	P.O. Box 989 Easton, Md. 21601 (a portable record player, has starling distress call and other animal records)
Wildlife Technology	P.O. Box 1061 Hollister, California 95023

e. Exploding shotgun shells

B.M. Lawrence & Co.	351 California Street San Francisco, California 94104
Colt Firearms Division	150 Huyshope Avenue Hartford, Conn. 06102
Penguin Industries, Inc.	Box 97 Parkesburg, Pa. 19365
Stoneco, Inc.	Box 187 Dacono, Colo. 80514

W.V. Clow Seed Company 1107 Abbot Street
Salinas, California 93901
(bomb in special pistol)

Western Fireworks
Company 2542 S.E. 13th Avenue
Canby, Oregon 97013

f. Fireworks

Alpha Enterprise, Inc. P.O. Box 12242, 12514
Gulf Freeway
Houston, Texas
(Skar-a-way cartridge
ropes)

J.E. Fricke Company 40 North Front Street
Philadelphia, Pa. 19106
(fuse rope only)

Stoneco, Inc. Box 187
Denver, Colo. 80514

Western Fireworks
Company 2542 S.E. 13th Avenue
Canby, Oregon 97013

g. Raptor forms

General Molding
Corporation 165 Cherokee Street
St. Louis, Mo. 63118

Wightman Electronics, Inc. P.O. Box 989
Easton, Md. 21601

h. Netting

Almac Plasters of
Maryland, Inc. 6311 Erdman Avenue
Baltimore, Md 21205
(vineyard netting specialists)

Animal Repellents, Inc. P.O. Box 168
Griffin, Ga. 30223
(acrylic fibre webbing)

Apex Mills, Inc. 8 Freer Street
Lynbrook, New York
11563
(semi-rigid nylon, 1 in.
mesh; widths, 4½, 9, 18
ft.; lengths, 21 to 1,000
ft.)

Conwed Corp., Plastics
Division 770-29th Avenue S.E.
Minneapolis, Minn.
55414
(polypropylene, black
and natural, recommended
¾ in. mesh, 7 or 14 ft. roll
widths, variable length
rolls, Other meshes are
available on request)

E.I. DuPont de Nemours &
Co. Inc. "Vexar" Sales
Station B, Drawer L
Buffalo, New York 14207
("Vexar" plastic netting
4½ and 9 ft. roll widths,
variable length rolls)

Fablok Mills, Inc. 140 Spring Street
Murray Hill, N.J. 07974

White Lamb Finlay Limited 150 Bay Street
Toronto, Ontario
M5J 1J7

i. Chemical coatings (sticky material)

*Key: A – aerosol
C – cartridge for caulking gun
P – paste
S – spray (for trees, etc.)
T – tube*

Animal Repellents, Inc. P.O. Box 168
Griffin, Ga. 30223
(T)

Archem Corporation 1514-11th Street
Portsmouth, Ohio
45662 (P)

A.Z. Bogert Company 1000 East Mermaid
Lane, Philadelphia, Pa.
19118
(C, P)

Baum's Castorine Co., Inc. 200 Matthew Street
Rome, New York
13441 (P)

Hub States Corporation 2000 North Illinois St.
Indianapolis, Indiana
46202 (A, C)

Huge Company, Inc. Box 9502
St. Louis, Mo. 63161
(C, P)

National B.C. Sales, Inc. Box 1
Skokie, Ill. 60076
(A, C, P, S)

Tanglefoot Company 314 Straight Avenue
S.W., Grand Rapids,
Mich. 49502 (A, C, T)

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Boudreau, G.W.

How to win the war with pest birds.
Wildlife Technology, Hollister,
California. 174 pp. 1975.

Vaudry, A.L.

Cereal crop depredation by ducks
and its control in the
Canadian Prairies.
Pest Management Papers, Number 3,
Simon Fraser University, Burnaby
British Columbia. 91 pp. 1975.

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CONVERSION FACTORS FOR METRIC SYSTEM

Imperial units	Approximate conversion factor	Results in:	
LINEAR			
inch	× 25	millimetre	(mm)
foot	× 30	centimetre	(cm)
yard	× 0.9	metre	(m)
mile	× 1.6	kilometre	(km)
AREA			
square inch	× 6.5	square centimetre	(cm ²)
square foot	× 0.09	square metre	(m ²)
acre	× 0.40	hectare	(ha)
VOLUME			
cubic inch	× 16	cubic centimetre	(cm ³)
cubic foot	× 28	cubic decimetre	(dm ³)
cubic yard	× 0.8	cubic metre	(m ³)
fluid ounce	× 28	millilitre	(mL)
pint	× 0.57	litre	(L)
quart	× 1.1	litre	(L)
gallon	× 4.5	litre	(L)
bushel	× 0.36	hectolitre	(hL)
WEIGHT			
ounce	× 28	gram	(g)
pound	× 0.45	kilogram	(kg)
short ton (2000 lb)	× 0.9	tonne	(t)
TEMPERATURE			
degree fahrenheit	°F-32 × 0.56 (or °F-32 × 5/9)	degree Celsius	(°C)
PRESSURE			
pounds per square inch	× 6.9	kilopascal	(kPa)
POWER			
horsepower	× 746 × 0.75	watt kilowatt	(W) (kW)
SPEED			
feet per second	× 0.30	metres per second	(m/s)
miles per hour	× 1.6	kilometres per hour	(km/h)
AGRICULTURE			
bushels per acre	× 0.90	hectolitres per hectare	(hL/ha)
gallons per acre	× 11.23	litres per hectare	(L/ha)
quarts per acre	× 2.8	litres per hectare	(L/ha)
pints per acre	× 1.4	litres per hectare	(L/ha)
fluid ounces per acre	× 70	millilitres per hectare	(mL/ha)
tons per acre	× 2.24	tonnes per hectare	(t/ha)
pounds per acre	× 1.12	kilograms per hectare	(kg/ha)
ounces per acre	× 70	grams per hectare	(g/ha)
plants per acre	× 2.47	plants per hectare	(plants/ha)

Examples: 2 miles × 1.6 = 3.2 km; 15 bu/ac × 0.90 = 13.5 hL/ha

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