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Insecticide Suggestions To Control Insect Pests Of Field Crops In 1975

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Insecticide Suggestions To Control Insect Pests Of Field Crops In 1975

Do not use after 1975

Aldrin, DDT, dieldrin, endrin, heptachlor, lindane, and TDE (DDD) are classified as restricted use pesticides in Minnesota. Dealers must be licensed to sell these products. Licenses are available from the Minnesota Department of Agriculture. Formulations containing these pesticides can be used only for purposes specified by the Department of Agriculture. Aldrin and dieldrin registrations have been suspended by the U.S. Environmental Protection Agency.

To help prevent illegal residues in livestock products it is suggested that the restricted use pesticides not to be used for any purpose, except seed treatment, on dairy farms. If these pesticides are used as soil treatments on corn the crop should be harvested for grain only and dairy cattle or meat animals being finished for slaughter should not be allowed to graze in treated fields. Dairywomen, poultry producers and feeders should also be sure that purchased hay or other feed does not contain illegal residues.

If fields have received a soil treatment with a restricted use pesticide annually for 5 or more years, at least two years without treatment should elapse before planting soybeans or alfalfa.

Illegal residues may also occur in root crops (potatoes, sugar beets, carrots, etc.) grown in fields pre-

viously treated with these chemicals.

Carbaryl (Sevin), ULV malathion and parathion are very toxic to bees. Crops in bloom should not be treated and applications should not be made near bee yards or when bees are present in the field to be treated.

Demeton (Systox), disulfoton (Di-Syston), mevinphos (Phosdrin), methyl parathion, parathion, phorate (Thimet), and phosphamidon (Dimecron) are highly toxic chemicals and should be used only by persons acquainted with the necessary precautions for their safe use. The granular formulations are less hazardous to the operator than are the liquids. Avoid inhalation of dusts or vapors and contact with the skin. Follow directions on the labels for the use of protective clothing and other safety measures.

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Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8 and June 30, 1914, in cooperation with the U. S. Department of Agriculture. Roland H. Abraham, Director of Agricultural Extension Service, University of Minnesota, St. Paul, Minnesota 55101. We offer our programs and facilities to all people without regard to race, creed, color, sex, or national origin.

Crop	Insect	Insecticide	Dosage	Limitations, remarks (Days before harvest)	
Alfalfa	Alfalfa weevil	azinphosmethyl (Guthion)	½ — ¾ lb.	21 days, one application per cutting	
		carbofuran (Furadan)	¼ — ½ lb.	7 days ¼ lb., 14 days ½ lb.	
		methyl parathion	¼ lb.	15 days	
		Imidan	1 lb.	7 days, one application per cutting	
		diazinon plus methoxychlor	½ lb. + 1 lb.	10 days — available as a ready-to-use mixture	
		malathion plus methoxychlor	¾ lb. + ¾ lb.	10 days — available as a ready-to-use mixture	
		Supracide	½ lb.	10 days	
	Cut first crop early to avoid most losses. Treat when over 30% of plant tips show feeding. Treat stubble if there are more than 8 larvae per sq. ft. or when regrowth has 50% of the terminals with feeding or if larvae are delaying regrowth.				
	Aphids, leafhoppers	diazinon	½ lb.	7 days	
		dimethoate (Cygon, De-Fend, Rebe-late, Dimex 267)	¼ — ½ lb.	10 days	
malathion		1 lb.	No time limitations		
parathion		¼ lb.	15 days		
Control aphids when thick enough to cause wilting, usually during drought. Spotted alfalfa aphids may severely damage new seedlings.					
Alfalfa, clover	Armyworm, cutworms	carbaryl (Sevin)	1½ lb.	No time limitations, spray or bait	
		malathion	1 lb. (or ULV)	No time limitation:	
		trichlorfon (Dylox)	1 lb. spray or bait	7 days — 1 lb. 14 days — bait	
	Treat when over 5 per sq. ft.				
	Leafhoppers	azinphosmethyl	¼ to ½ lb.	14 days	
		carbaryl	1 lb.	No time limitations	
		diazinon	½ lb.	7 days	
		methoxychlor	1 lb.	7 days	
		malathion	1 lb.	No time limitations	
	Apply when regrowth after first cutting is 8 to 12 inches and leafhoppers are over 2 per net sweep.				
Grasshoppers	azinphosmethyl	½ to ¾ lb.	21 days		
	carbaryl	1 to 1½ lb.	No limitations		
	diazinon	½ lb.	7 days		
	malathion	1½ lb. or ½ lb. technical as ULV by air	5 days, ULV No time limitations		
Control when there are over 8 grasshoppers per sq. yd. in the field or treat margins after cutting at more than 20 per sq. yd.					
Spittlebug	methoxychlor	1 lb.	7 days		
Apply on first crop when spittle masses average more than one per stem.					
Plant bugs	malathion + methoxychlor	¾ lb. + ¾ lb.	7 days		
	trichlorfon	1 lb.	7 days		
	diazinon + methoxychlor	½ lb. + 1 lb.	7 days		
	Control seldom needed except on seed crop. Cut early to avoid injury.				
Alfalfa, clover (for seed only)	Plant bugs	endosulfan (Thiodan)	1 lb.	Do not harvest for forage or graze.	
		toxaphene	2 lb.	Do not treat crop in bloom.	

Crop	Insect	Insecticide	Dosage	Limitations, remarks (Days before harvest)	
Corn, field	Aphids	malathion	1 lb.	5 days	
		methyl parathion	4 oz.	12 days } Aerial application only	
		parathion	4 oz.		
		phorate (Thimet)	1 lb.	Granules applied in the whorl just before tasselling.	
		disulfoton (Di Syston)	1 lb.	Granules 40 days	
		disulfoton	½ lb.	Spray 28 days.	
		Chemical control of cornleaf aphids is seldom economically justified. If 10% of the plants have over 500 aphids per plant prior to tasselling during drought stress treatment may pay.			
	Armyworm	carbaryl (Sevin)	1½ to 2 lb.	No limitations	
		malathion	1 to 1½ lb.	5 days	
		toxaphene	2 lb.	Do not feed stalks, leaves, or husks. No limitation for grain.	
trichlorfon		1 lb.	No limitations		
	Treat when over 10% of the plants are infested. Higher rates for large worms.				
Corn	Corn rootworm larvae	carbofuran (Furadan)	1 lb.	Planting time application of granules in 7-inch band over the row. Do not place in direct contact with the seed. Band of granules should be covered lightly. Some liquid formulations are registered but are suggested for trial use only. Cultivation time applications of materials registered for such use may be made after rootworm eggs hatch in June. Apply at base of stalks and cover with soil. Rates given are for 40-inch row spacing or for 13,200 ft. of row.	
		Counter	1 lb.		
		Dasanit	1 lb.		
		Dyfonate	1 lb.		
		Mocap	1 lb.		
		phorate (Thimet)	1 lb.		
	Treat corn following corn or following sorghum-sudan crosses.				
Corn rootworm adults	carbaryl	1 lb.	No time limitations. ULV or dilute		
	diazinon	1 lb.	No time limitations		
	malathion	1 lb.	5 days		
	malathion ULV	4 to 8 oz. as technical by air	5 days		
	EPN	¼ — ½ lb.	14 days		
	Treat when beetles reach 10 per plant when pollen and fresh silks are present.				
Cutworms	aldrin*	2 lb.	} Apply broadcast and disk in before planting.		
	chlordane	4 lb.			
	heptachlor*	2 lb.			
	diazinon	1 to 2 lb.	Apply in 7-inch band as for rootworms at planting time.		

* Restricted use pesticides, check legal status before use.

Crop	Insect	Insecticide	Dosage	Limitations, remarks (Days before harvest)	
Corn	Cutworms, webworms	carbaryl	1 to 2 lb.	Post emergence spray to cover approximately 12-inch band at base of plants in at least 15 gal. total spray per acre. Limitations same as for armyworm. Carbaryl bait is more effective than sprays for cutworms.	
		trichlorfon (Dylox)	1 lb.		
		toxaphene	2 lb.		
	Apply when over 10% of the plants are infested.				
	European corn borer	carbaryl	1½ lb.	Spray or granules, no time limitations.	
		carbofuran	1 lb.	Granules. No more than 2 applications.	
		diazinon	1 lb.	Granules. No time limitations.	
		Dyfonate	1 lb.	Granules. 45 days.	
		EPN	½ lb.	As spray or granules, 14 days.	
		phorate	1 lb.	As granules.	
	Grasshoppers	toxaphene	2 lb.	As granules. Use on corn for grain only.	
		Treat when 50% of whorl leaves show shot-holing for first brood.			
		carbaryl	1½ lb.	No time limitations.	
		diazinon	½ lb.	No time limitations.	
	Seed-corn maggot, seed-corn beetle, wireworms	malathion	1 lb. or ½ lb. technical as ULV	5 days	
toxaphene		1½ lb.	For grain only, no time limitations.		
Treat field margins early when grasshoppers are small.					
Wireworms, white grubs, webworms, Seed-corn maggots, seed-corn beetles Seed-corn maggots, beetles, wireworm Wireworm	heptachlor*, lindane*, or diazinon	1 oz. per bu.	Seed treatment only. Will not control heavy wireworm infestations.		
	chlordan	4 lb.	Broadcast application disked in before planting. A row treatment at half the indicated rate applied at planting time may be used.		
	heptachlor*	2 lb.			
	Dasanit	1 lb.	Band in row at planting time as for rootworm.		
	Dyfonate	1 lb.			
	phorate	1 lb.	As for rootworm.		
	diazinon	4 lb. }			
	Dyfonate	4 lb. }			
	Small grains	Aphids	malathion	1 lb.	No limitations. 15 days 30 days. For wheat only. Do not graze. Treatment most economical before heading with over 100 aphids per ft. of row.
			methyl parathion	4 oz.	
parathion			4 oz.		
disulfoton			¼ to ¾ lb.		
Armyworm, cutworms		malathion	1½ lb.	7 days	
		toxaphene	2 lb.	Use for grain only.	
		Treat when number of worms exceeds 5 per sq. ft.			
Grasshoppers		malathion	1 lb. or ½ lb. as technical by air	7 days	

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Crop	Insect	Insecticide	Dosage	Limitations, remarks (Days before harvest)
Small grains	Grasshopper	toxaphene	1½ lb.	Use for grain only. Treat when over 8 per sq. yd. in field or over 30 in margins.
	Wireworms	heptachlor* or lindane*	1 oz. per bu.	Seed treatment only.
Barley	Thrips	parathion or methyl parathion by air	6 oz.	15 days. Apply just at heading when there are 4 or more adult thrips per plant.
Flax	Cutworms, crickets	chlordane trichlorfon	1 to 1½ lb. 1 lb.	Do not apply after blossoms appear. 21 days
Soybeans	Bean leaf beetle, flea beetles, blister beetles	carbaryl (Sevin)	1 lb.	No limitations. Treat when defoliation exceeds 25% during pod fill or seedling stage or when pod feeding is extensive.
	Cutworms, Armyworms	carbaryl toxaphene	1½ lb. 1½ lb.	No limitations. 21 days. Do not feed treated plants.
	Grasshoppers	carbaryl malathion	1½ lb. ½ lb. technical as ULV by air	No limitations. 7 days
	Green cloverworm	toxaphene carbaryl malathion	1½ lb. 1 lb. 1 lb.	21 days. Do not feed treated plants. No limitations. 7 days
Sugar beets	Leafhoppers	malathion	1 lb.	7 days
	Webworm	carbaryl (Sevin) endosulfan (Thiodan) parathion trichlorfon (Dylox)	1½ lb. 1 lb. 4 to 8 oz. 1 lb.	14 days, tops. Do not feed tops. 15 days 14 days, beets 28 days, tops
	Cutworms	carbaryl trichlorfon	2 lb. spray 1 to 2 lb. bait 1 lb.	14 days, tops. Bait formulation preferred. 14 days, beets 28 days, tops
	Root maggots	aldicarb (Temik) Dasanit diazinon disulfoton (Di-Syston) Dyfonate phorate (Thimet)	1½ lb. 1 to 2 lb. 2 lb. 1 lb. 1 lb. 1 lb.	Row treatment at seeding time. Place granules above seed in 5 to 7 inch band or as furrow treatment above seed. Some products may also be sidedressed at time of fly emergence. Check labels.
Potatoes	Wireworms	lindane*	1 oz. per bu.	Seed treatment only.
	Aphids, fleabeetles, leafhoppers	aldicarb (Temik) disulfoton (Di-Syston) phorate (Thimet)	2 to 3 lbs. 2 to 3 lbs. 2 to 3 lbs.	Row treatment at planting time only. Row treatment in fertilizer bands at planting time. 75 days. Higher rate for heavy soils. Row treatment in fertilizer bands at planting time only. Higher rate for heavy soils.

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Crop	Insect	Insecticide	Dosage	Limitations, remarks (Days before harvest)	
Potatoes	Aphids	methomyl (Lannate, Nudrin)	0.9 lb.	14 days	
		Monitor	¾-1 lb.	14 days	
	Cutworms	carbaryl (Sevin)	2 lb.	No limitations	
		Colorado potato beetle	aldicarb	2 to 3 lb.	Row treatment in seed furrow at planting time.
			aziphosmethyl (Guthion)	½ lb.	7 days
		Azodrin	¼ to ½ lb.	7 days	
		carbaryl	1 lb.	No limitations	
		diazinon	¼ to ½ lb.	35 days	
		endosulfan	½ to 1 lb.	No limitations	
		Monitor	¾ lb.	14 days	
		Flea beetles	aldicarb	2 to 3 lb.	Row treatment in seed furrow at planting time.
			aziphosmethyl	½ lb.	7 days
	Azodrin		½ lb.	7 days	
	carbaryl		1 lb.	No limitations	
	diazinon		¼ to ½ lb.	35 days	
	endosulfan		½ to 1 lb.	No limitations	
	Monitor		¾ lb.	14 days	
	Leafhoppers	phosphamidon	¼ lb.	7 days	
		aldicarb	2 to 3 lb.	Row treatment in seed furrow at planting time.	
		Azodrin	¼ to ½ lb.	7 days	
carbaryl		1 lb.	No limitations.		
diazinon		½ lb.	35 days		
dimethoate		½ lb.	No limitations		
endosulfan		½ to 1 lb.	No limitations		
malathion		¾ lb.	No limitations		
methomyl		0.9 lb.	14 days		
Monitor		¾ lb.	14 days		
oxydemetonmethyl		½ lb.	7 days		
Wireworms		chlordane	4 lb.	Broadcast before planting. Disk in.	
		Dyfonate	4 lb.	Broadcast before planting. Disk in.	
	phorate	2 to 3 lb.	Band treatment at planting.		
	chlordane	4 lb.	Broadcast before planting.		
White grubs, cutworms	chlordane	4 lb.	Broadcast before planting.		
Sorghum	Greenbugs	ethyl parathion	½ lb.	12 days, aerial application. Methyl para- thion may cause plant injury.	
		dimethoate	¼ to ½ lb.	28 days	
		disulfoton	½ to 1 lb.	7 days (grain)	
		malathion	1 lb.	7 days	
		phorate	½ to 1 lb.	28 days	
Sunflowers	Sunflower moth larvae	endosulfan (Thiodan)	1 lb.	Not more than 3 applications. Do not feed treated plants. No limitations on use of seeds.	
		methyl parathion	1 lb.	No more than 3 applications. 5 day inter- vals 30 days before harvest.	

Crop	Insect	Insecticide	Dosage	Limitations, remarks (Days before harvest)	
Sweetclover	Sweetclover weevil	carbaryl diazinon malathion	1½ lb. 1 lb. 1 lb.	} For plowdown. Treat seedlings when defoliation reaches 50%.	
Mustard, rape seed	Fleabeetles	carbaryl (Sevin)	1 to 1½ lb.		14 days
	Diamond back moth larvae	carbaryl malathion	1 to 1½ lb. 1½ lb.	14 days 7 days	
Wild rice (in paddies)	Wild rice worm	malathion carbaryl	1 to 1½ lb. 1½ lb.	14 days after eggs appear in florets. Additional applications as needed. 7 days.	
Bluegrass (for seed)	Plant bugs (Capsus)	diazinon	½ lb.	No limitations	
		malathion	¾ lb.	No limitations	
Treat as heads emerge when Capsus bugs are detected or at first sign of silver top.					
Bluegrass, Timothy (for seed)	Meadow plant bug	malathion	¾ lb.	No limitations	
	Armyworm	Treat at early heading stage when there is an average of two bugs per net sweep.			
		carbaryl	1½ lb.	No limitations	
		malathion	1 lb.	No limitations	
Treat when there are 5 worms per sq. ft.					
Corn, sweet	Earworm	carbaryl	1½ lb.	No limitations before harvest. Highly toxic to bees. Do not apply as dust to pollinating corn. Avoid treating while bees are in the field.	
		diazinon	1½ lb.	2 days	
		endosulfan (Thiodan)	1½ lb.	Not on corn for processing. Not more than 5 applications. No not feed treated forage.	
			methomyl (Lannate, Nudrin)	¼ to ½ lb.	3 days, forage. May cause injury to some varieties.
	Corn rootworm larvae	Dasanit Dyfonate Mocap phorate	}	See under field corn	
	Corn rootworm adults	carbaryl		1 lb.	No time limitations, see bee precautions under earworm.
		diazinon	½ - 1 lb.	2 days	
malathion		1 lb. or 4 oz. technical as ULV	5 days		
Cutworms, armyworms	EPN	¼ lb.	14 days		
	carbaryl	1½ to 2 lb.	No limitations. Bait is generally more effective than spray for cutworms.		
	toxaphene	2 lb.	Do not feed or ensile treated plants.		
European corn borer	trichlorfon	1 lb.	28 days		
	carbaryl	1 to 2 lb.	No time limitations; see bee precautions under earworm.		

Crop	Insect	Insecticide	Dosage	Limitations, remarks (Days before harvest)	
Corn, sweet	European corn borer	diazinon	1 to 2 lb.	10 days for forage	
		Dyfonate	1 lb.	45 days	
		EPN	¼ lb. granular ¼ lb. spray	14 days	
	Wireworms	Gardona	1 lb.	5 days, forage	
		heptachlor*, lindane*, diazinon	1 oz. per bu.	Seed treatment only.	
		diazinon Dyfonate phorate	1 to 2 lb. 1 lb. 1 lb.	} Band on the row at planting.	
Peas	Aphids	demeton (Systox)	¼ lb.		21 days
		diazinon	½ lb.		1 day feeding of vines, 4 days hay.
		dimethoate (Cygon, De-Fend, Rebelate, Dimex 267)	3 oz.	Do not feed or graze vines if mobile viner is used. 21 days if stationary viner is used.	
		disulfoton	1 lb.	As granules broadcast at planting. 50 days	
		malathion	1 lb.	3 days. 7 days for forage.	
	Loopers	mevinphos (Phosdrin)	0.2 lb.	1 day	
		naled (Dibrom)	1 to 2 lb.	4 days	
		parathion	¼ lb.	10 days	
		carbaryl	1½ to 2 lbs.	No time limitations.	
		methomyl	½ to 1 lb.	1 day	
Beans, dry, edible	Aphids	parathion	½ lb.	15 days	
		mevinphos	4 oz.	1 day	
		diazinon	½ lb.	7 days. No more than one application.	
		disulfoton	1 to 2 lb.	Soil treatment banded on the row. Do not place with seed.	
		dimethoate	½ lb.	NTL. Do not feed forage.	
		endosulfan	¾ lb.	No more than 3 applications. Do not treat Lima beans. Do not feed forage.	
	Bean Leaf Beetle	malathion	1 lb.	1 day	
		phorate	2 lb.	Soil treatment banded on row at planting. Do not place with seed. 60 days, forage.	
	Green Clover-worm	carbaryl	1 lb.	NTL	
		methoxychlor	1 lb.	1 day	
Leafhoppers	carbaryl	1 lb.	NTL		
	malathion	1 lb.	1 day		
	carbaryl	1 lb.	NTL		
	dimethoate	¼ lb.	Do not feed forage.		
	disulfoton	See Aphids			
	endosulfan	See Aphids			
Seed corn maggot, wireworm	malathion	1 lb.	1 day		
	methoxychlor	1 lb.	1 day		
	phorate	See Aphids			
		diazinon	1 to 2 oz. per bu. as seed treatment.		

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Stored Grain Insects

Grain in Minnesota is generally safe from infestation by stored grain insects before harvest. The only exception may be where grain is cut and swathed adjacent to storage bins being treated with an insecticide in preparation for the new crop. Stored-grain insects will migrate from treated bins, at least temporarily.

Accumulations of post-harvest grain or grain products is a primary target for insect infestations especially if it is stored with or adjacent to last year's crop or in storage facilities also used for livestock or where livestock feed is housed.

Inspect grain at 30-day intervals, especially during the summer and autumn months, to determine if treatment is needed. Check for insects by taking the grain temperature and by looking for the insects themselves. To take the grain temperature, fasten a thermometer to a stick and sink it into the grain 2 feet below the surface. If insects are active, the temperature will be above 65° F. and may range as high as 100° F. To inspect for insects, insert a grain probe in the center of the bin 2 feet below the grain surface. Sift the grain samples through a 10 to 12 mesh to the inch screen to separate-out insects.

Prevention

Spraying Facilities:

Thoroughly clean combines, trucks, wagon beds, elevators, and bins. Spray the surfaces of the equipment that will be in contact with the grain with one of the following insecticides 2 to 6 weeks before harvest:

Pesticide formulation	Amount of Pesticide Formulation Per 2 Gallons of Water
methoxychlor 50% W.P.	12 oz.
or	
methoxychlor 25% E.C.	1 qt.
or	
pyrethrins 6% E.C. com- bined with piperonyl butoxide 60%	1½ pts.
or	
malathion — premium grade	½ pt.
(Cythion) 57% E.C.	
oz. = ounce	W.P. = wettable powder
qt. = quart	E.C. = emulsifiable concentrate
pt. = pint	

Spray to the point of run-off using 1 gallon of total formulation (one of the insecticides listed above) per 500 sq. ft. of surface. Allow treated surfaces to dry before contacting grain. Also spray, if possible, the outside walls of the bins to a height of 6 feet and the ground to a distance of 6 feet out from the foundation of each bin.

If it is not possible to remove the old grain, then it should be checked carefully for stored-grain insects and, if needed, treated with recommended residual insecticides or fumigants before adding new grain.

Grain stored with less than 12% moisture, below 70° F. and with a low amount of dockage or cracked grain is relatively safe from significant damage by stored-grain insects.

Grain Protectants:

Insect infestations are prevented or reduced by treating small grains and shelled corn as it is moved into storage.

malathion	1 pt. premium-grade E.C. per 2 to 5 gal. water per 1,000 bu.
malathion	1% premium-grade of wheat flour dust, 60 lb. per 1,000 bu.
synergized pyrethrins	1 qt. of pyrethrins 6% combined with piperonyl butoxide 60% E.C. in 3 to 5 gal. of water per 1,000 bu. Spray onto the grain stream as it goes into storage.

Surface Grain Treatments:

malathion	½ to 1 pint premium-grade E.C. in 2 gal. water per 1,000 sq. ft. of grain surface area.
malathion	1% premium-grade of wheat flour dust, 30 lb. per 1,000 sq. ft.
synergized pyrethrins	8 oz. of pyrethrins 6% combined with piperonyl butoxide 60% E.C. in 1 to 2 gal. of water per 1,000 sq. ft. of grain surface.

Apply the spray evenly over the surface immediately after the grain is loaded into storage and leveled off. Repeat if necessary.

The Indian-meal moth is generally found in the top 6 to 12 inches of stored shelled corn and is becoming a similar pest in stored soybeans, especially in areas just south of Minnesota. At the same time there is evidence from some areas that this moth is developing resistance to malathion. If malathion is ineffective, apply synergized pyrethrins, fumigants, or a refined mineral oil. The mineral oil must be unsulfonated, technically white, 100-200 seconds viscosity, and free of objectionable odors. Two quarts of the mineral oil should be applied per 100 square feet of corn surface.

A new preventative treatment for Indian-meal moths is to suspend 1 dichlorvos (Vapona) "No-Pest Strip" per 1,000 cubic ft. of space over the binned grain. The dichlorvos is effective against adult moths only. These "Vapona" strips must be in place before moths begin to emerge in early spring. This treatment is usually effective for 3 months.

Control

Fumigation: Fumigants are applied to binned grain to stop established insect infestations. Best fumigation results are obtainable using the following guidelines:

1. Level the grain. Remove or breakup any crust in the grain.
2. Seal all cracks making the bin as air-tight as possible.
3. Fumigate on a still day preferably when the **grain** temperature is above 70° F. Wind causes rapid leakage of the gas and results are poor.
4. Methods of applying fumigants vary with the type of fumigant, commodity and storage facility. Most farm storages will use the gravity penetration method. Apply the correct amount of fumigant as a coarse spray evenly over the surface of the grain. Cover the grain with a tarpaulin if there is a large air-space above the grain.
5. The operator should stay out of the bin. Apply the fumigant from outside of the bin. Do not breathe vapor or fumes. Use a recommended gas mask with canister, and always work in pairs.
6. Keep the bin closed for at least 72 hours. Do not enter the bin during or after fumigation until gases have been thoroughly removed by aeration.
7. When under fumigation, the storage bins should be locked and identified with "DANGER — KEEP OUT" signs to prevent entry and avoid accidents.

Some of the recommended fumigant dosages are tabulated below:

Fumigant	Dosage (gal. per 1,000 bu.)			
	Small grain		Shelled corn	
	Wooden bins	Metal bins	Wooden bins	Metal bins
Carbon tetrachloride-carbon disulfide, 80-20	4	2	6	3
Carbon tetrachloride-ethylene dibromide, 95-5	4	2	8	4
Carbon tetrachloride-ethylene dichloride, 3-1	6	3	8	4
Carbon tetrachloride-ethylene dichloride-ethylene dibromide, 60-35-5	4	2	8	4

Use other liquid fumigant mixtures as labeled.

Aluminum phosphide (Phostoxin). Tablets may be added to grain as it is binned, or probed into binned grain.

Type of storage	Grain temperature	Dosage (per 1,000 bu.)	
		Tablets	Pellets
Concrete or steel elevator tanks	54-59° F.	150	500
	60-68° F.	90	300
	over 68° F.	60	200
Round steel bins ("Butler" type)	54-59° F.	180	600
	60-68° F.	120	400
	over 68° F.	90	300

For average wooden farm bins use 180 tablets per 1,000 bu.

Read and follow all precautions listed on the labels for each different fumigant. Repeat fumigants may be necessary. Information about other fumigants is available from the Department of Entomology, Fisheries and Wildlife, University of Minnesota.



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