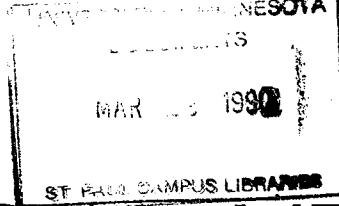


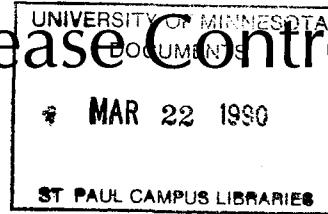
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COMMERCIAL VEGETABLE Weed, Insect, and Disease Control Guide: Sweet Corn



W. D. Hutchison, F. L. Pflieger, Leonard B. Hertz, and J. D. Pokorny

Pesticide suggestions in this guide are based on current state and federal registrations and tolerances set by the Environmental Protection Agency (EPA). *Directions given in this guide and on current container labels should be read, understood, and followed carefully in order to control pests and diseases effectively without causing excessive residues to remain on the crops.* The following information is up to date at the time of this printing. Information regarding any changes during the 1990 season will be made available to all commercial growers.

Suggestions for sampling and action thresholds are sometimes based on local studies, but are often derived from those of other states in the North Central Region, especially Michigan, due to lack of local data.

This publication is for your information. The University of Minnesota and its officers or employees make no claims or representations that the chemicals discussed will or will not result in residues on agricultural commodities and assume no responsibility for results of their use.

State and Federal laws require that only certified applicators may apply certain pesticides with restricted uses. Information about certification is available from your county extension agent-agriculture.

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The information given in this publication is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Minnesota Extension Service is implied.

RATES OF APPLICATION FOR INSECTICIDES AND FUNGICIDES

Sometimes small amounts of insecticides or fungicides are listed in terms of tablespoons and teaspoons. These always mean level measures—not rounded or heaping.

Recommendations may be given in terms of pounds or gallons of commercial preparation or as pounds of active ingredient per acre. "Pounds active ingredient" means the equivalent of 100-percent chemical. For example: 2 pounds of 50-percent methoxychlor wettable powder contains 1 pound of actual methoxychlor; 4 pounds of a 25-percent wettable powder contains 1 pound of active ingredient, and 20 pounds of a 5-percent dust contains 1 pound of active ingredient.

If you are preparing sprays that contain emulsifiable concentrates, read the label to determine how many pounds of active ingredient are in each gallon of concentrate. For example, 25-percent methoxychlor emulsifiable concentrate contains 2 pounds of active ingredient per gallon. If you wish to apply 1 pound of actual methoxychlor per acre, decide on the amount of liquid you want to apply per acre and add 1/2 gallon of 25-percent methoxychlor concentrate to the amount of water needed for 1 acre.

Most insecticides and fungicides can be mixed. Read the label instructions for specific combinations.

CHEMIGATION OF PESTICIDES

Minnesota Pesticide Control Law requires each chemigation system used for applying pesticides with the irrigation water to be registered with the Minnesota Department of Agriculture (MDA) and contain the necessary approved anti-pollution check valves. Only pesticides displaying product label approved for chemigation application can be applied by this method. Specific information on check valves, registration, and posting is available from MDA (612/297-2614).

1990 Herbicide, Insecticide, and Fungicide Suggestions

Weeds	Herbicide†	Amount/acre commercial product	Remarks and limitations
Germinating grasses and some broadleaves	Lasso 4E (alachlor)	3 qt.	Apply immediately after planting but before the crop or weeds emerge. Also may be applied via center pivot irrigation in 1/2 inch of water. Use low rate on sandy soil.
	Sutan + 6.7E (butylate)	2 1/2 qt.	Apply before planting and incorporate. <i>Do not use on muck or peat.</i>
	Eradicane 6.7E (EPTC)	2 1/2 qt.	Apply before planting and incorporate. Also may be applied via center pivot irrigation in 1/2 to 3/4 inch of water. <i>Do not use on muck or peat.</i>
	Eradicane Extra 6E (EPTC)	3 qt.	Apply before planting and incorporate.
Germinating broadleaves and some grasses	Dual 8E (metolachlor)	1 1/2 qt.	Apply after planting before crop and weeds emerge.
	Aatrex 4L (atrazine)	2-3 qt.	Apply after planting but before weeds emerge. Do not plant sugar beets, vegetables, spring-seeded small grains, or small-seeded legumes the year following Aatrex application or injury may occur. Use lower rate on sandy soils.

†Abbreviations used in tables: phi—preharvest interval, NTL—no time limitations, B—bait, D—dust, DF—dry flowable, DG—dispersible granules, E—emulsifiable concentrate, F—flowable, G—granules, L—liquid, S—solution, and W—wetable powder. Dosages of insecticides are actual chemical per acre, with some exceptions.

*Restricted use pesticide. Post treated areas when required by label.

1990 Herbicide, Insecticide, and Fungicide Suggestions (continued)

Weeds	Herbicide†	Amount/acre		Remarks and limitations
		commercial	product	
Emerged broadleaves	2,4-D amine salts (4E)	1 pt.		Apply after corn emergence up to 18 inches tall. After corn reaches 8 inches, use drop nozzles. Avoid drift to sensitive crops.
Tank mixes for germinating annual weeds	Lasso 4E + Aatrex 4L	2 qt.	1½ qt.	Apply immediately after planting before crop and weeds emerge. Also may be applied via center pivot irrigation in ½ inch of water.
	Lasso 4E + Bladex 4L	2 qt.	2 qt.	Apply immediately after planting before crop or weeds emerge. Do not use on sandy soils with less than 1 percent organic matter. Supersweet corn may be sensitive to Bladex. Apply after planting before weeds emerge.
	Dual 8E + Aatrex 4L	1½ qt.	1½ qt.	Apply immediately after planting but before weeds emerge.
	Dual 8E + Bladex 4L	1½ qt.	2 qt.	Apply before planting and incorporate.
	Sutan Plus 6.7E + Aatrex 4L	2½ qt.	1½ qt.	Apply before planting and incorporate. Do not use on sandy soils with less than 1 percent organic matter.
	Sutan Plus 6.7E + Bladex 4L	2½ qt.	2 qt.	Apply before planting and incorporate. Also suppress quackgrass.
	Eradicane Extra 6E + Aatrex 4L	6 pt.	1½ qt.	Apply before planting and incorporate. Also suppress quackgrass.
	Eradicane Extra 6E + Bladex 4L	6 pt.	2 qt.	Apply preemergence or early postemergence, up to 4-leaf stage in corn. Good for wild proso millet and wooly cup grass.
	Prowl 4E + Bladex 4L + Aatrex 4L	1½ pt. + 2 qt.	+ 1½ qt.	Apply in the fall or spring before planting. Quackgrass should be at least 8 inches tall, actively growing. Allow 5 days after treatment before plowing. Also may use as a spot treatment in the crop.
Quackgrass	Roundup 3E (glyphosate)	2 qt.		Use low rate on sandy soils. Only corn can be grown in the year following treatment. Apply before corn emerges.
	Aatrex 4L (atrazine)	2½-4 qt.		
Yellow nutsedge	Basagran 4E (bentazon)	1 qt.		Treat when nutsedge is 3 to 6 inches tall and repeat 10 days later. Add 1 quart crop oil/acre.
	Eradicane Extra 6.7E (EPTC)	2½ qt.		Apply before planting and incorporate. Also controls annual grasses.
	Sutan plus 6.7E (butylate)	2½ qt.		Apply before planting.
Canada thistle	Aatrex 4L (atrazine)	1½ qt.		Apply before corn emerges. Plant only corn the following year.
	Basagran 4E (bentazon)	1 qt.		Treat when thistle is 3 to 6 inches tall and repeat 10 days later. Add 1 quart crop oil concentrate/acre.
	Roundup 3E (glyphosate)	2 qt.		Apply to emerged thistle before planting or as a spot treatment after planting when thistle is in the bud stage.

Insects	Chemical†	Formulation			Remarks and limitations
		Recommended	Product/acre	Dosage	
<p>Check 20 plants (selected at random, or four random groups of five adjacent plants) from each of five locations in the field. When the plants are young, look especially for cutworms or their damage. Record the number of plants showing feeding injury. If cutworms are suspected to be the cause of observed damage check the ground around the plants for hiding cutworms. They are more likely to occur in weedy parts of the field. On older plants, check for European corn borer (ECB) and corn earworm (CEW) eggs or larvae, corn rootworm adults, sap beetles, and cutworms. Corn rootworm larvae are unlikely to be a problem on first year corn; also, if the crop follows sweet corn, sprays for ECB and CEW are likely to have kept adult numbers and egg-laying low.</p>					
Aphids	diazinon (AG 500, etc.)	4E	1 pt	½ lb.	NTL.
	malathion	5E	1½ pts	1 lb.	5 day phi. NOTE: Some products (e.g., Cythion) are not registered for sweet corn.
	*methyl parathion (PennCap-M)	2FM	2 pt	½ lb.	3 day phi. 12 days forage or grazing.
	*parathion	4E	½ pt	¼ lb.	12 day phi. 48 hr. re-entry. Highly toxic to honey bees.

Treat if aphids are abundant (> 75% of plants heavily infested) when the tassel emerges from the whorl, to prevent honeydew from interfering with pollen shed, about 7 days later. Treatment at or immediately before pollen shed is too late to influence honeydew and will endanger honey bees.

†Abbreviations used in tables: phi—preharvest interval, NTL—no time limitations, B—bait, D—dust, DF—dry flowable, DG—dispersible granules, E—emulsifiable concentrate, F—flowable, G—granules, L—liquid, S—solution, and W—wettable powder. Dosages of insecticides are actual chemical per acre, with some exceptions.

*Restricted use pesticide. Post treated areas when required by label.

Insects	Chemical†	Formulation		Remarks and limitations	
		Recommended	Product/acre Dosage		
Armyworm	carbaryl (Sevin)	XLR plus	3-4 pt	1½-2 lb.	NTL. Not Sevin 4-oil. 35 day phi. 24-hr. re-entry. 1 day phi. Do not exceed 0.5 lb. Al/acre/season. NTL. 3 day phi, forage. Note plant damage precaution on label. 3 day phi; 12 days forage or grazing. 1 day phi. Do not exceed 1.2 lb. Al/acre/season. NTL. Not more than 3 applications/season. 24-hr. re-entry.
	chlorpyrifos (Lorsban)	4E	1-2 pt	½-1 lb.	
	*esfenvalerate (Asana XL)	0.66E	5.8-9.6 fl oz	0.03-0.05 lb.	
	methomyl (Lannate)	90SP	4-7 oz	¼-½ lb.	
	*methyl parathion (PennCap-M)	2FM	2-3 pt	½-¾ lb.	
	*permethrin (Ambush, Pounce)	2E	6.4-12.8 fl oz	0.1-0.2 lb.	
Cutworms Action threshold: 3% cut or 10% damaged or 10 worms/100 plants	trichlorfon (Dylox)	80SP	1¼ lb.	1 lb.	
	carbaryl (Sevin)	20%B	5 lb.	1 lb.	NTL.
	chlorpyrifos (Lorsban)	4E	2-3 pt	1-1½ lb.	35 day phi. 24-hr. re-entry.
	*esfenvalerate (Asana XL)	0.66E	5.8-9.6 fl oz	0.03-0.05 lb.	1 day phi. Do not exceed 0.5 lb. active ingredient/acre/season.
	*permethrin (Ambush, Pounce)	2E	6.4 fl. oz.	0.1 lb.	1 day phi.
		3.2E	4 fl. oz.		
	25W	6.4 fl. oz.			
	trichlorfon (Dylox)	80SP	1¼ lb.	1 lb.	NTL. Not more than 3 applications/season. 24-hr. re-entry.

NOTE: Worms more than half grown are difficult to control. Lorsban 15G, Dyfonate 20G, Counter 15G, Furadan 15G, and Mocap 15G are also registered for cutworm control or suppression. With these "at planting" treatments, additional treatment may be required under moderate to heavy infestations. "Rescue" sprays provide more consistent and cost effective control than do granules applied at planting. Surface treatments are usually ineffective against subterranean species (e.g., glassy cutworm).

Corn earworm	carbaryl (Sevin)	XLR plus	3-4 pt	1½-2 lb.	NTL. Not Sevin 4-oil.
	diazinon (liquid)	4E	2-2½ pt	1-1¼ lb.	NTL.
	*esfenvalerate (Asana XL)	0.66E	5.8-9.6 fl oz	.03-.05 lb.	1 day phi. Do not exceed 0.5 lb. Al/acre/season.
	*methomyl (Lannate)	90SP	¼-½ lb.	.22-.45 lb.	NTL. 3 day phi, forage.
		1.8L	1-2 pt		Note plant damage precaution on label.
	*methyl parathion (PennCap-M)	2FM	2-3 pt	½-¾ lb.	90SP is NOT restricted use.
	*parathion	4E	½ pt	¼ lb.	3 day phi. 12 days, forage or grazing.
					Highly toxic to honey bees.
	*permethrin (Pounce, Ambush)	3.2E	4-8 fl oz	0.1-0.2 lb.	12 day phi. 48 hr. re-entry. Highly toxic to honey bees.
		2E	6.4-12.8 fl oz		1 day phi. Not more than 1.2 lb. Al/acre.
	25W	6.4-12.8 fl oz			
European corn borer	<i>Bacillus thuringiensis</i> (Dipel)	10G	10 lb.	1 lb.	NTL. First generation only.
	carbaryl (Sevin)	XLR plus	2-4 pt	1-2 lb.	NTL. Not Sevin 4-oil.
					XLR plus is the safest formulation of Sevin for honey bees.
	*carbofuran (Furadan)	4F	1 pt.	½ lb.	7 day phi. No more than four applications. Do not enter field within 14 days without protective clothing. Machine harvest only. Do not graze or harvest stalks within 21 days.
	chlorpyrifos (Lorsban)	15G	6.7 lb.	1 lb.	35 day phi. 24-hr. re-entry.
	diazinon	14G	10½ lb.	1½ lb.	NTL. Do not feed treated fodder for 10 days.
	*methomyl (Lannate)	90SP	½ lb.	7 oz	NTL. 3 day phi, forage.
		1.8L	1-2 pt		Note plant damage precaution on label.
	*methyl parathion (PennCap-M)	2FM	2 pt	½ lb.	90SP is NOT restricted use.
					3 day phi. 12 days, forage or grazing.
				Highly toxic to honey bees.	
	*permethrin (Pounce, Ambush)	3.2E	4-8 fl oz	0.1-0.2 lb.	1 day phi. Not more than 1.2 lb. Al/acre/season.
		2E	6.4-12.8 fl oz		
		25W	6.4-12.8 fl oz		

Treatment for first brood is usually not warranted in Minnesota unless infestations are very heavy in late June and early July, so thresholds are exceeded. Monitoring for second brood should start as soon as moths are detected in traps (mid- to late August). If thresholds are exceeded, treat when eggs hatch (about 7-10 days after major moth flight). Direct spray at ear zone. Additional treatments should be made when egg or larval counts exceed action thresholds, or at 3- to 7-day intervals, depending on the intensity of moth flights. See over for thresholds.

†Abbreviations used in tables: phi—preharvest interval, NTL—no time limitations, B—bait, D—dust, DF—dry flowable, DG—dispersible granules, E—emulsifiable concentrate, F—flowable, G—granules, L—liquid, S—solution, and W—wettable powder. Dosages of insecticides are actual chemical per acre, with some exceptions.

*Restricted use pesticide. Post treated areas when required by label.

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1990 Herbicide, Insecticide, and Fungicide Suggestions (continued)

Insects	Chemical†	Formulation		Dose in lb. AI/acre	Remarks and limitations
		Recommended	Product/acre		
ACTION THRESHOLDS FOR EUROPEAN CORN BORER (ECB) AND CORN EARWORM (CEW):					
BEFORE SILKING: Treat processing sweet corn if 20 or more ECB egg masses are found per 100 plants, or 15% or more of the plants have egg masses or show shot-hole feeding damage. Treat fresh market sweet corn if 10% or more of the plants have ECB egg masses or show shot-hole feeding damage.					
1-50% SILKING: Treat if 5% or more of the plants have ECB egg masses on the leaves, or CEW eggs in the silks, or ECB or CEW larvae in the silks.					
51-100% SILKING: Treat if 10% or more of the plants are infested with ECB or CEW eggs or larvae as above.					
BROWN SILKS: Treat if 20% or more of the ears are infested with either ECB or CEW larvae.					
NOTE: Granular formulations are most effective during the whorl stage; liquid formulations are most effective at the ear stage.					
Corn rootworm larvae	*carbofuran (Furadan)	15G	8 oz.	1.2 oz = 1 lb./acre in 40-inch rows	May be applied in furrow or banded.
	chlorpyrifos (Lorsban)	15G	8 oz.	} All same as above.	Apply as band in front of press wheel. Phytotoxic. Do not apply in-furrow or band over open seed furrow. Phytotoxic. Do not apply in-furrow. Phytotoxic. Do not apply in-furrow. May be applied in-furrow or in band. Phytotoxic. Do not apply in-furrow or band over open seed furrow.
	*ethoprop (Mocap)	15G	8 oz.		
	*fonofos (Dyfonate)	20G	6 oz.		
	*phorate (Thimet)	20G	6 oz.		
	*terbufos (Counter)	15G	8 oz.		

The potential for rootworm infestation can be predicted by scouting corn fields weekly for adult beetles during August. If adult counts average less than one beetle per plant during August, a soil insecticide used the next spring will rarely increase yield. If adult counts average more than 5 beetles per plant, rotate to a crop other than corn. Rootworm control may be unsatisfactory during heavy rootworm infestation. If a field was not scouted last year, use a soil insecticide where sweet corn follows field corn. It is not necessary to treat sweet corn following sweet corn when the crop the preceding year was treated routinely in August for European corn borer.

Soil insecticides may be applied during cultivation. Cultivator application of Broot, Counter, Dyfonate, Furadan (15G, 4F), Lorsban (15G, 4E), Mocap, or Thimet/Phorate may provide effective control if applied before larvae hatch in mid-June. Apply at base of stalks and cover with soil. This method may provide poor control if dry soil conditions prevent effective insecticide movement into the root zone.

Avoid continuous use of the same soil insecticide. Continuous use may condition the soil to rapidly degrade the insecticide and result in unsatisfactory control. Rotate insecticides, especially if poor performance occurs. Treatment of first-year corn for corn rootworms is only recommended if that field or adjacent first-year fields have suffered corn rootworm damage in previous years.

Corn rootworm adults ("Silk beetles")	carbaryl (Sevin)	XLR plus	2 pt.	1 lb.	NTL.
	chlorpyrifos (Lorsban)	4E	1-2 pt.	1/2-1 lb.	35 day phi. 24-hr. re-entry.
	diazinon	4E	1/2-1 pt.	1/4-1/2 lb.	NTL.
	*methyl parathion (PennCap-M)	2FM	1-2 pt.	1/4-1/2 lb.	3 day phi. 12 days, forage or grazing. Highly toxic to honey bees.
	*permethrin (Ambush, Pounce)	2E 3.2E	6.4-12.8 fl oz 4-8 fl oz	0.1-0.2 lb.	
Sap beetles ("Picnic beetles")	Control of second brood corn borer and corn ear worm reduces ear tip damage. Reduction of tip damage reduces sap beetle numbers. Some direct control of sap beetle takes place with these treatments.				
Wireworms	*carbofuran (Furadan)	15G	6.7 lb.	1 lb.	Band or in-furrow.
	diazinon	14G	21-28 lb.	3-4 lb.	Broadcast soil treatment at planting.
	mocap	15G	9 lb.	1.4 lb.	Banded in 7-inch band.

In fields with a history of wireworm damage, bait stations can be used to sample wireworms 2 to 3 weeks before planting. Treatment is recommended if captures average more than 1 per trap.

Seed corn maggot	diazinon	50W	1/2 oz./bu.	1/4 oz./bu.	Seed treatment.
	chlorpyrifos (Lorsban)	50SL	2 oz. product/100 wt.		Seed treatment.

Seed treatments are strongly recommended for fields where manure or cover crops have been partially buried by recent tillage. Treatments containing lindane may cause phytotoxicity in some hybrids (especially super sweets). Because tolerance varies between hybrids, test treatments on a limited scale before widespread use. Planting time applications of some corn rootworm insecticides (Counter, Dyfonate, Furadan, Lorsban, and Thimet) will also control these insects.

Diseases	Chemical†	Remarks
Seed rot, damping off	Thiram, Captan	There are several fungicide formulations for seed treatment made by several different companies. Read and follow all label instructions.
Fungal foliar disease: Rust	Dithane M-45, Dithane DF, Dithane F-45	
Helminthosporium leaf spot	Pennco ECB, Maneb 80, Dithane M-45, Dithane DF, Dithane F-45	
Maize dwarf mosaic (MDM)		A serious virus disease, especially on late planted corn. Symptoms include stunting, mottling of new leaves, and poor ear fill. Aphid-transmitted.

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