

Insect, Nematode, and Disease Control in Michigan Field Crops

MSU Bulletin E-1582 2006 Field Season

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**This bulletin contains information on the management of field crops insects, nematodes, and diseases, including recommendations for pesticide use. Every attempt is made to verify product names, formulations, use rates, and other important information, but products and labels may change before the field season begins. Always read the label of a product to reconfirm rates, precautions, PPE, and other important information before use.

Sugar Beet Insect Pests

Aphids – foliar

Pest status: Common insects, occasionally an economic pest

Description: Small oval to pear shaped soft-bodied insects. Color varies from bright green to pink to brown. Have conspicuous tail-pipe like structures called cornicles.

Life cycle: Aphids present during the field season are all female, and give live birth without mating with males. Multiple overlapping generations each season.

Type of damage: Sucking pest. Removes plant sap from leaves and stems; heavy infestation may lead to stunting, curling of new leaves, and general weakening of plants.

Conditions favoring damage: Hot, dry weather enhances aphid damage.

Sampling/ scouting: Check 5 groups of 20 plants per field.

Management: Biological – natural enemies (ladybugs, lacewings, wasps) and diseases generally keep aphids in check.

Threshold: 1 colony (30 or more aphids) per plant.

List of registered insecticides, *RUP (rate per acre):

Diazinon 50W* (0.75 to 1 lb) or AG500* (0.75 to 1 pt)

Metasystox-R 2EC* (1.5 to 3 pt)

Lannate LV* (0.75 to 3 pt) or SP* (0.25 to 1 lb)

Aphids - Sugar Beet Root Aphid

Pest status: Fairly common, localized economic populations

Description: Small, oval to pear shaped, pale yellow soft-bodied insects.

Life cycle: Females overwinter in soil or on roots of lambsquarter, and move to beets later in the season. During the field season, aphids are all female, and give birth to live offspring without mating. Multiple generations.

Type of damage: Sucking pest; secretes a distinctive white, waxy substance which inhibits water and nutrient uptake by beets.

Conditions favoring damage: Dry weather.

Sampling/ scouting: Scout fields for aphids or wax on roots, particularly in areas with wilted beets.

Notes: Application of Counter to control another pest may aid in control of SRA. However, application of Counter specifically to control SRA is not recommended. Check with your company representative for more detailed information on Counter.

List of registered insecticides, *RUP (rate per acre):

Counter 20CR* (3 to 6 oz per 1,000 feet of row, suppression only)

Armyworm (true armyworm, beet armyworm, fall armyworm)

Pest status: Occasional economic pests

Life cycle: depends on species

Type of damage: Defoliation (chewing). Larvae often feed at night.

Conditions favoring damage: Female moths are attracted to grassy or weedy fields early in the season for egg laying; in midsummer, true armyworms may move from surrounding fields (small grain, pasture, sod) into beets.

Sampling/ scouting: Check several areas of the field for larvae. For true armyworm, edges of fields are at greater risk.

Management: Biological - insects, rodents, and birds feed on armyworms. Cultural – good weed control can reduce infestation from true armyworm

Threshold: 25% or more of foliage damaged by armyworms.

List of registered insecticides, *RUP (rate per acre):

Agree WG (0.5 to 2lb)

Lorsban 4E* (1 to 2 pt broadcast or 0.66 -1.33 pt banded)

Biobit HP (0.5 to 2 lb)

Mustang Max* (2.24 to 4.0 oz)

Chlorpyrifos 4E* (1.5 to 2 pt broadcast)

Pyganic EC 1.4 II (16 to 64 oz) or 5.0 II (4.5 to 18 oz)

Dipel ES (2 to 4 pt), DF (1.0 to 2.0 lb)

Sevin 4F or XLR Plus (1 to 1.5 qt)

Javelin WG (0.25 to 1.5 lb)

Sevin 80S or 80WSP (1.25 to 1.875 lb)

Lannate LV* (0.75 to 3 pt) or SP* (0.25 to 1 lb)

Spintor 2SC (4 to 8 oz)

Lepinox WDG (1 to 2 lbs)

Beet Webworm (beet and alfalfa webworms)

Pest status: Rarely an economic pest

Description: Larvae are slender, greenish-black or pink. Alfalfa WW - 6 dark spots on each body segment; beet WW – black stripe down back bordered by a white line on each side.

Type of damage: Spin webs and feed on beet leaves, usually near the leaf base.

Conditions favoring damage: Weedy fields, because females deposit eggs on some weed species.

Management: Biological – many parasites and predators. Insecticides – generally not needed.

Threshold: Rough guideline - 25% or more of leaves with feeding + larvae present OR small larvae present on 50-75% of leaves.

List of registered insecticides, *RUP (rate per acre):

Asana XL* (5.8 to 9.6 oz)

Biobit HP (0.5 to 1lb)

Dipel DF (0.5 to 1lb)

Lannate* LV (0.75 to 3 pt) or SP (0.25 to 1 lb)

Lorsban 4E* (1 - 2 pt broadcast or 0.66 -1.33 pt banded)

Mustang* (2.24 to 4.0 oz)

Pyganic EC 1.4 II (16 to 64 oz)

Pyganic EC 5.0 II (4.5 to 18 oz)

Sevin 4F or XLR Plus (1 to 1.5 qt)

Sevin 80S or 80WSP (1.25 to 1.875 lb)

Cutworm

Pest status: Occasional economic pest (depends on year); problems often localized

Description: Light gray / black caterpillar with 4 bumps on the top of each segment, and a narrow light stripe down the back.

Life cycle: Adult moths migrate to Michigan from southern states. Females lay eggs primarily on weeds. Young larvae feed above ground on weeds and beets, larger larvae feed below the surface on the stem.

Type of damage: Young larvae feed on leaves. Extensive damage by older larvae cutting plants at or below soil surface, leading to wilting and death of plants.

Conditions favoring damage: Weeds – favor egg laying; dry conditions – drive larvae down into the soil, increasing cutting damage.

Sampling/scouting: After beet emergence, check 5 groups of 20 plants, particularly in low areas of the field. Look for cut or wilted plants. Dig around base of cut plants to find larvae.

Management: Biological – ground-dwelling predators (beetles); Cultural – good weed control.

Threshold: 5% of plants cut.

For more information: MSU bulletin E-2274.

List of registered insecticides, *RUP (rate per acre):

Asana XL* (5.8 to 9.6 oz)

Biobit HP (0.5 to 1lb)

Chlorpyrifos 4E* (2 pt foliar, 1 pt banded at planting)

Dipel DF (0.5 to 1lb)

Dipel ES (1 to 2 pts)

Lorsban 4E* (2 pt broadcast or 1.33 pt banded)

Lorsban 15G (6.6 to 9 oz per 1,000 row ft)

Mustang Max* (2.24 to 4.0 oz)

Mustang Max* (4 oz at planting - in furrow or in a 3-4 inch T-band)

Sevin 4 F or XLR Plus (1.5 qt)

Sevin 80 S or 80 WSP (1.875 lb)

Flea Beetles (includes potato, corn, red-headed, and striped FB)

Pest status: Common insect, occasionally an economic pest

Description: All species have large hind legs and jump when disturbed. Potato and corn FB - small, shiny, round, black. Striped FB - dark, elongate, with 2 pale stripes running lengthwise down back.

Life cycle: Adults overwinter in crop residue or field borders, emerge in spring and begin feeding.

Type of damage: Small holes chewed in leaves by adults (shot-holing).

Conditions favoring damage: Weedy fields and borders

Management: Cultural - good weed control.

Sampling/scouting: Check 5 groups of 20 seedlings for feeding damage; newly emerged plants are most vulnerable, generally not a problem in mature beets.

Threshold: 25% of seedlings with feeding damage.

List of registered insecticides, *RUP (rate per acre):

Asana XL* (5.8 to 9.6 oz)

Lannate LV* (0.75 to 3 pt) or SP* (0.25 to 1 lb)

Lorsban 4E* (2 pt broadcast or 1.33 pt banded)

Mustang Max* (2.24 to 4.0 oz)

Mustang Max* (2.24 to 4.0 oz)

Pyganic EC 1.4 II (16 to 64 oz) or 5.0 II (4.5 to 18 oz)

Sevin 4F or XLR Plus (1 to 1.5 qt)

Sevin 80S or 80WSP (1.25 to 1.875 lb)

Grasshoppers

Pest status: Common insect, occasional outbreaks.

Life cycle: Eggs overwinter in the soil, and nymphs hatch in June. Nymphs molt as they grow, and feeding increases with size. Females lay eggs in the soil in late summer.

Type of damage: Defoliation (chewing) by nymphs and adults.

Conditions favoring damage: Unplowed or fallow areas next to fields are preferred egg-laying sites, and may contribute to populations in a field. Dry, warm weather often enhances survival of nymphs. Damage to sugarbeets can occur late in season when other crops are scarce.

Sampling/scouting: Check 5 groups of 20 plants for damage.

Management: Cultural- plowing and cultivation to destroy eggs. Biological – a fungal pathogen can kill many eggs and nymphs under wet spring conditions. Natural enemies include animals (birds, rodents, amphibians), parasitic wasps, and ground beetles.

Threshold: 25% or more leaves damaged.

List of registered insecticides, *RUP (rate per acre):

Asana XL* (5.8 to 9.6 oz)

Mustang Max* (2.24 to 4.0 oz)

Chlorpyrifos 4E* (0.5 to 1 pt)

Sevin 4F or XLR Plus (0.5 to 1.5 qt)

Diazinon 50W* (1 lb) or AG500* (1 pt)

Sevin 80S or 80WSP (0.62 to 1.875 lb)

Lorsban 4E* (0.5 to 1 pt)

Leafhoppers

Pest status: Common insects, rarely economic pests

Description: Small, fast moving, torpedo-shaped insects. Nymphs resemble adults but are much smaller and lack wings.

Life cycle: Several species occur in beets. Multiple generations.

Type of damage: Sucking pest. Both adults and nymphs remove plant sap as they feed. Symptoms include leaf curling and yellowing.

Threshold: Leafhoppers are not usually a problem in beets. A rough guideline is to treat when large numbers of leafhoppers are seen and leaf curling is present.

List of registered insecticides, *RUP (rate per acre):

Asana XL* (5.8 to 9.6 oz)

Pyganic EC 1.4 II (16 to 64 oz) or 5.0 II (4.5 to 18 oz)

Diazinon 50W* (0.75 to 1 lb) or AG500* (0.75 to 1 pt)

Sevin 4F or XLR Plus (1 to 1.5 qt)

Dibrom 8E (1 pt)

Sevin 80S or 80WSP (1.25 to 1.875 lb)

Metasystox-R 2E* (1.5 to 3 pt)

Thimet / Phorate 20G* (4.5 oz per 1,000 row ft)

Plant Bugs (includes Tarnished Plant Bug)

Pest status: Common insects, economic populations in some years.

Description: Oval “true bugs”; Tarnished plant bug is dark brown with a yellow V-shaped mark on the back. Other plant bugs are green. Both have a large piercing sucking mouthpart. Nymphs resemble adults, but lack wings.

Life cycle: Adults overwinter in weeds or crop debris. Eggs are laid into plant tissue. Multiple generations, wide host range.

Type of damage: Sucking pest. Adults and nymphs remove plant sap and inject toxic saliva. Affected leaves turn yellow to brown at tips and edges. Injured plants wilt more easily.

Conditions favoring damage: Adult movement into beet fields may coincide with cutting of alfalfa.

Sampling/ scouting: Check 5 sets of 20 plants for yellowing leaves and TPB

Threshold: Rough guideline is to treat when significant yellowing from feeding occurs and new leaves are being affected

List of registered insecticides, *RUP (rate per acre):

Mustang Max* (2.24 to 4.0 oz)

Spinach Leafminer

Pest status: Occasionally an economic pest.

Description: Adult is a slender gray fly with white area between eyes. The larvae feed inside leaf mines.

Life cycle: Females lay white, oval eggs in groups of 3 to 8 on undersides of beet leaves. Larvae (maggots) move inside the leaf and feed on tissue between the upper and lower surface. Larvae drop out of the leaf, pupate in the soil. Multiple generations, but only the first attacks beets.

Type of damage: Larvae create distinctive, winding mines as they feed internally on the leaf.

Conditions favoring damage: Seedling beets are more susceptible to damage than older beets.

Sampling/ scouting: Check 5 sets of 20 plants for egg masses or small mines.

Management: Scouting is crucial - insecticides are most effective if applied just before or at egg hatch.

Threshold: Treat if 50% or more of plants have egg masses and small mines are present.

List of registered insecticides, *RUP (rate per acre):

Diazinon 50WP* (0.75 to 1 lb) AG 500 (0.75 to 1 pt)

Temik 15G* (14 to 20 lb per acre or 9.5 to 13.5 oz per 1,000 row ft)

Lorsban 4E* (1 pt broadcast or 0.66 pt banded ~ MICHIGAN only)

Thimet / Phorate 20 G* (4.5 oz per 1,000 row ft)

Springtail

Springtails are tiny soil insects that spring when disturbed. They are common in soil and normally are beneficial. They eat decaying plant material, fungi or bacteria, breaking down residue and improving soil structure. On newly emerging beets, springtail damage is rare unless populations are very high (thousands per square foot). This happens most often in fields with moist soil and high residue or in early-planted fields under cool, wet conditions. Fields that had damage in a given season are at greater risk for damage in future years. Springtails feed on root tissue leaving scars. They also feed aboveground on foliage, leaving a scraped or scarred appearance, and even reducing stand in severe cases. There is no threshold for this pest in beets, and no insecticides list springtails on the label. However, if damage is severe, the following insecticides are registered on beets, and may provide some springtails control. Note that the manufacturer is not responsible for poor performance.

For more information: MSU CAT Alert article, May 19, 2005 http://www.ipm.msu.edu/CAT05_fld/FC05-19-05.htm

Asana XL* (5.8 to 9.6 oz/acre)

Lannate 90SP* (0.25 to 1 lb/acre)

Lannate 2.4LV* (0.75 to 3 pints/acre)

Mustang Max* (2.24 to 4.0 oz)

Variegated Cutworm

Pest status: rarely an economic pest

Description: larvae vary in color, have band of yellow diamond-shaped spots on back

Life cycle: Adult moths migrate to MI from southern states. Females lay eggs primarily on weeds. Larvae feed above ground.

Type of damage: Larvae feed on leaves, defoliating young plants

Conditions favoring damage: Weedy fields and borders

Management: Biological ~ ground-dwelling predators eat cutworms; Cultural ~ good weed control reduces egg-laying sites.

Sampling/scouting: After beet emergence, check 5 groups of 20 plants for feeding damage. Look around plant base for larvae.

Threshold: 25% or more of leaves with feeding damage.

List of registered insecticides, *RUP (rate per acre):

Asana XL* (5.8 to 9.6 oz)

Lorsban 4E* (2 pt broadcast or 1.33 pt banded)

Dipel DF (0.5 to 1lb) or ES (1 to 2 pts)

Mustang Max* (2.24 to 4.0 oz)

Lannate LV* (1.5 pt) or SP* (0.5 lb)

White Grubs

Pest status: Common insect, localized problems.

Description: White, C-shaped larvae of May and June beetles.

Life cycle: Grubs can live for several years in undisturbed grassy areas.

Type of damage: Larvae prune small roots, damage larger roots and may sever taproots.

Conditions favoring damage: Beets following an established grass sod or fallow.

Management: Spring and fall plowing of established sod is recommended before crop is planted; Soil insecticide generally not required.

List of registered insecticides, *RUP (rate per acre):

Counter 20 CR* (3 to 6 oz per 1,000 row ft, in furrow or banded)

Mustang Max* (4 oz at planting - in furrow or in a 3-4 inch T-band)

Wireworms

Pest status: Common insect, localized problems

Description: Slender, shiny, brown larvae with wiry segmented body, up to 1.5 inches long.

Life cycle: Immature form of the click beetle; found in grasslands, sod, or fallow fields. Wireworms can spend several years in the immature stage during which they feed on newly-planted seeds as well as developing beets.

Type of damage: Feeds on germinating seed, seedlings, and larger roots.

Conditions favoring damage: Cool, wet weather. Beets following an established grass sod

Sampling/ scouting: Scout for wireworms with a bait trap (see web site below) at least one week before planting.

Management: Cultural – spring and fall plowing of established sod and a season of clean fallow before a crop is planted is recommended, where practical.

Threshold: One or more wireworms per bait trap.

For more information: http://www.ipm.msu.edu/CAT02_fld/FC5-16-02.htm [explains trap design and use]

List of registered insecticides, *RUP (rate per acre):

Counter 20CR* (3 to 6 oz per 1,000 row ft)

Lorsban 15G (6.5 to 9 oz banded per 1,000 row ft. Suppression only)

Diazinon 14 G* (21 to 28 lb), 50 W (6 to 8 lb)

Mustang Max* (4 oz at planting - in furrow or in a 3-4 inch T-band)

Insecticides registered for Sugar Beets

Trade name	Common name	Class	Recommended for:	PHI days	REI hrs	Precautions and Remarks
Asana XL (RUP)	esfenvalerate	Pyr	Beet webworm, cutworms, flea beetles, grasshoppers, leaf hoppers	21	12	Maximum 29 oz per acre.
Bt [Agree, Biobit, Dipel, Javelin, Lepinox]	<i>Bacillus thuringiensis</i>	Biol	armyworm, beet webworm, cutworms	0	4	Use only to control small armyworms when populations are light. Full spray coverage is important.
Counter 20 CR (RUP)	terbufos	OP	wireworms, grubs, root aphid suppression	110	48	Maximum 5 applications per season. Do not place granules in direct contact with the seed as crop injury may occur. Maximum 1 application per season.
Diazinon (RUP) 50W, AG500	diazinon	OP	aphids (foliar), grasshoppers, leaf hoppers, spinach leaf miner, wireworms	14	24	Maximum 5 applications per season.
Dibrom 8E	naled	OP	leaf hoppers	2	48	
Lannate LV, SP (RUP)	methomyl	Carb	aphids (foliar), armyworm, beet webworm, flea beetles, variegated cutworm	7	48	
Lorsban 4E (RUP) & Chlorpyrifos 4E (RUP)	chlorpyrifos	OP	armyworm, beet webworm, cutworms, flea beetles, grasshoppers, spinach leafminer	30	24	Do not exceed 8 pt per acre per season.
Lorsban 15G	chlorpyrifos	OP	Cutworms, wireworms	--	24	At planting, banded before or after the press wheel (T-band or band). Maximum 1 application per year. Do not allow granules to contact seed.
Metasystox R 2EC*	oxydemeton methyl	OP	aphids (foliar), leaf hoppers	30	48	Maximum 2 applications per season.
Mustang Max (RUP)	zeta-cypermethrin	Pyr	armyworm, cutworm, flea beetles, grasshoppers, plant bugs, spinach leafminer, wireworm, white grubs	50	12	Maximum 12 fluid ounces per season. Currently under a 24c 'special local needs' registration in Michigan.
Pyganic EC	pyrethrin	Bio	aphids (foliar), armyworm, beet webworm, flea beetles, leaf hoppers	0	12	Listed by the Organic Materials Review Institute (OMRI) for use in organic production.
Sevin 4F, XLR, 80S, 80WSP	carbaryl	Carb	armyworm, beet webworm, cutworms, flea beetles, grasshoppers, leafhoppers	28	12	Maximum 4 lb active per season. Not recommended for tank mixing with herbicide due to potential for crop injury.
Spintor 2SC	spinosad	other	armyworm	3	4	Max 4 applications per season.
Temik 15G (RUP)	aldicarb	Carb	spinach leafminer	90	48	At planting, drill granules 1-3 inches below seed line. Post-emergence, apply granules on both sides of row and work into soil.
Thimet/ Phorate 20G (RUP)	phorate	OP	leafhoppers, spinach leafminer	30	48	Do not place banded application in direct contact with seed. Do not broadcast if leaves are wet. Maximum 7.4 lb/acre. Do not feed tops.