MSU Field Crops Insect Guide: Management of Insects and Spider Mites in Sugar Beet
New August 2021

Prepared by:
Chris DiFonzo
Field Crops Entomologist
Department of Entomology
288 Farm Lane
East Lansing, MI
difonzo@msu.edu

Daniel Bublitz
Sugar Beet Extension Specialist
Saginaw Valley Research & Extension Center
9923 Kruger Rd
Frankenmuth, MI
bublitzd@msu.edu

How to Use this Guide

This publication is set up as a series of stand-alone tables with information on insect biology, damage, management recommendations, and insecticides registered in Michigan on **sugar beets.** Pesticide names and rates are current as of the date at the top of the page.

- ✓ **Table 1** shows the timing of common insect pests in the crop, from early to late season.

- ✓ **Table 2** is a checklist of damage symptoms from these insects to aid in field scouting.

- ✓ **Table 3** has information on the life cycle of each insect, plus a detailed description of its damage and the conditions that may lead to or favor infestations. A rating of pest status (and thus damage potential) is given based on experience in the state. Most insect pests are uncommon or do not increase to damaging levels in a typical year.

- ✓ **Table 4** has information on management of each pest. Most insects are kept in check by natural enemies (biological control) or by adverse environmental conditions. Some pest problems can be reduced by simply changing or avoiding certain agronomic practices. Table 4 also gives scouting and threshold recommendations. Note that these recommendations vary in quality. Key pests tend to have research-based scouting methods and thresholds. But many insects are not at damaging levels often enough to generate good information; sampling recommendations and thresholds for these species are based on observations, experience, or a best guess. This is noted in the table.

- ✓ Insecticides registered in Michigan on the crop are listed in **Table 5** (at planting) and **Table 6** (foliar sprays)**.** Active ingredients (AI) are listed alphabetically in column 1. All products with the same active ingredient are grouped together under each AI for easy comparison or substitution of one product for another. Label rates and pests are listed in columns 2 and 3. A letter under a pest indicates that a particular insect is on the label (i.e., the label claims control of that insect). The letter corresponds to an application rate in column 2. Some insecticides are applied at a single rate for all insects ('a'), while others vary ('a', 'b', 'c'). The final columns in the table list the preharvest interval (PHI) in days and notes on application - for example bee toxicity warnings, minimum recommended spray volumes, or other restrictions.

Sugar beets Table 1. Timing of damage from common insects and related pests in Michigan.
Pests are listed from early to late-season. Key species are highlighted in bold text.

Common name	Overwintering stage, location	May	June	July	August into September
springtails	in soil and residue	damage to seedlings			
cutworm (several species)	Winter cutworm: larvae in residue Black cutworm: migrates north	feeding on seedlings			
white grubs	larvae (grubs), underground	root damage to seedlings		larval damage to tap root by June beetle sp.	
wireworm	larvae in soil	root damage to seedlings		larval damage to tap root	
spinach leafminer	pupae in soil	leaf mining by larvae			
flea beetle	adults, in residue & protected areas	feeding by adults on leaves (shot holing)			
sugar beet root aphid	on roots of lambsquarters		multiple generations puncture root cells to feed		
armyworm	Southern USA, migrate north		caterpillars feed on foliage		
grasshoppers (multiple species)	egg clusters, underground		nymphs, then adults, feed on foliage		
webworms (beet, garden, alfalfa)	larvae or pupae in soil		caterpillars feed on foliage (timing depends on species)		
aphids on leaves (several species)	depends on species			multiple generations pierce leaves to feed on plant sap	
Japanese beetle	grubs in soil			adults feed on leaves	
leafhoppers (several species)	depends on species			nymphs and adults pierce leaves to feed on plant sap	
spider mite	adult females, at base of hosts			multiple generations pierce plant cells to feed	
lygus bug (tarnished plant bug)	adults, in residue & protected areas			nymphs and adults pierce leaves to feed on plant sap	
thrips	depends on species			adults and nymphs 'punch' and suck plant cells	
wooly bears & zebra caterpillars	depends on species			caterpillars feed on foliage	

Sugar Beet Table 2: Damage checklist to aid in scouting for insects and related pests.

Plant part or timing Type of damage or injury	aphids (leaves)	armyworm	cutworms	flea beetle	grasshoppers	Japanese beetle	leafhoppers	lygus bug	spider mite	spinach leafminer	springtails	sugarbeet root aphid	thrips	webworm	white grub	wireworm	wooly/ zebra caterpillar
Stand (emergence)																	
stand loss / gaps in row											x				x	x	
wilted or cut plants			x												x	x	
Stand (later in season)																	
wilting or dead plants												x					
Leaves																	
scraping of leaf surface											x						
leaf mining										x							
shot- or pin holes				x							x						
irregular leaf feeding		x	x		x									x			
skeletonizing between veins						x								x			x
defoliation		x			x	x								x			x
leaf curling	x						x										
sticky honeydew	x																
yellowing of leaf tips, margins								x									
tiny yellow spots (stippling)							x		x				x				
generalized leaf yellowing							x		x								
wilted plants			x									x			x	x	
webbing									x					x			
Roots																	
roots pruned or cut															x	x	
chewing into tap root															x	x	
white, waxy coating												x					

Sugar Beet Table 3: Life cycle, damage, and pest status of insects in sugar beets

Pest status is rated as follows. Rating applies to Michigan.

- Rare: Insect is *unusual, not found in most fields*
- Uncommon: Insect is present in many fields, but *typically not in damaging numbers*
- Occasional: Insect is present in most fields, *sometimes increasing to damaging levels*
- Important: Insect is present in most fields, *often increasing to damaging levels*; often a target of integrated management or insecticide use by growers

- Sporadic: Economic outbreaks may occur in certain fields or seasons after *extreme weather* or *mass movement* from south to north early in the season
- Localized: Economic outbreaks may occur in specific locations under *specific agronomic conditions*, for example, in no-till or in late plantings

Pest (abbreviation)	Life cycle and Number of generations	Description of Damage	Conditions which favor infestation or damage	Pest Status in Michigan
aphids *on leaves* *On roots, see sugarbeet root aphid*	Summer population is all female. Females do not mate to reproduce (parthenogenesis) and give birth to live young. Multiple overlapping generations	• All stages suck plant sap from leaves • Heavy infestation may lead to stunting, curling of leaves, weakening of plants	• Drought stress may be made worse by aphids removing plant sap	Uncommon Often present, but numbers rarely high enough to cause damage
armyworm	Adult moths migrate into Michigan in early spring. Eggs are laid on low-growing weeds, in grassy field margins, or in pasture or wheat.	• Caterpillars defoliate beets • Feeding often occurs at night • Larvae may march enmasse from one field to another (hence the name 'army')	• Weedy fields • Beets adjacent to infested pasture or wheat.	Uncommon Infestations of wheat and corn occur after a heavy spring flight from the south; beets not preferred
cutworm - black	Adult moths migrate into Michigan in early spring. Eggs are laid on low-growing weeds or crop residue. Larvae often hide during the day & feed at night. Pupation in soil.	• Young larvae feed on leaves • Extensive damage occurs when older larvae cut at or below soil surface, leading to wilting and death of plants	• Fields with a weed problem or planted to cover crop (egg-laying site for females) • No-till fields	Uncommon Outbreaks occur after a heavy spring flight from the south
cutworm - winter	Cold-tolerant larvae overwinter in residue and thatch; they may be active very early in the season. Pupates in the soil in spring. New moths emerge and lay eggs in June.	• Larvae feed on seedling and leaves • During rare outbreaks, large numbers of larvae sometimes move in a wave across a road or field	• Unknown	Uncommon
flea beetle *several species*	Adults overwinter in crop residue. They emerge in spring and feed on weeds and crops, including beets.	• Adult beetles chew small round holes in leaves	• Weedy fields or borders	Uncommon Shot holing is noticeable, but rarely enough to cause concern
grasshoppers *several species*	Eggs overwinter in soil. Nymphs emerge in June. The amount of feeding increases with size. Females lay groups of eggs in the undisturbed soil in late summer. 1 generation per year	• All stages defoliate leaves; feeding has a ragged appearance	• Adjacent fallow areas or pasture, which are egg laying sites • A hot dry summer & fall can lead to a high population the following year	Uncommon Often present, but outbreaks are rare in Michigan

Pest (abbreviation)	Life cycle and Number of generations	Description of Damage	Conditions which favor infestation or damage	Pest Status in Michigan
Japanese beetle	Larvae (grubs) overwinter. Adults typically begin to emerge in July, feed, mate, and lay eggs in soil. Adults may be active into early fall.	• Adult beetles feed on numerous host plants, including beets; feeding has a skeletonized appearance	• Nothing specific	Uncommon Present, but not at damaging levels
leafhoppers	Several species feed on beets. Adults lay eggs in plant stems.	• Both adults and nymphs suck plant sap; symptoms under high populations include leaf curling and yellowing	• Nothing specific	Uncommon Present, but not at damaging levels
lygus bug *including tarnished plant bug*	Adults overwinter in residue and on field edges. Weeds and early crops like alfalfa are fed on and colonized first There are multiple generations during the summer	• Adults and nymphs inject a toxic saliva during feeding and suck plant sap • Fed-on leaves turn yellow or brown at tips and edges; damaged plants may wilt • Damage to beets is difficult to recreate or quantify in plots; when symptoms appear, feeding occurred days prior	• Movement into beets may coincide with cutting of adjacent alfalfa fields or with dry down of weeds on field edge	Localized Numbers may be higher in fields adjacent to alfalfa
spider mites	Adult females overwinter in field borders and sheltered areas. In spring, they move to new growth, and lay eggs. Mites spread from field to field by crawling or blowing in the wind. Multiple overlapping generations	• Adults & nymphs pierce individual plant cells, resulting in tiny yellow spots called stippling • Webbing is a sign of a heavy infestation • Severe damage results in leaf yellowing or death, and water loss	• Prolonged hot, dry weather favors outbreaks, enhances the impact of feeding • Infestations often start on dusty edges of fields	Sporadic Outbreaks occur in hot, dry seasons
spinach leafminer	Pupae overwinter and flies emerge in spring. Females lay eggs on beet leaves. Larvae (maggots) feed, then drop to the soil surface to pupate. Multiple generations, but only the first is important on sugarbeet	• Larvae create distinctive, winding mines as they feed internally in the leaf	• Nothing specific	Occasional Mining is noticeable, but rarely enough to cause concern
springtails	Common arthropods related to insects. Assist decomposition by breaking down crop residue. Some feed on fungi. Often an indicator of good soil health, but when populations are high, may damage beet seedlings	• Nymphs and adults scrape or scar cotyledons just as they emerge from the soil • Heavy feeding is reported to destroy seedlings and reduce stand	• Planting into heavy residue, particularly corn stalks, where springtails are abundant • Moist conditions & slow emergence after planting	Occasional Damage is rare unless numbers are very high
sugarbeet root aphid (SBRA)	Females overwinter locally in soil or on roots of weeds (especially lambsquarter), moving onto beets planted in the same field. Winged forms can also move to new fields. Summer population is all female. Females reproduce without mating and give birth to live young. Multiple overlapping generations	• All stages suck plant sap from roots • Root aphids cover themselves in a protective layer of wax; under heavy infestation, this wax can reduce water and nutrient uptake by beets.	• Lambsquarters infestation, because aphids overwinter on its roots • Dry conditions help root aphids spread, as soil cracks allow them to access roots; drought also enhances the impact of SBRA root feeding	Occasional and Localized SBRA persists on lambsquarter; Infested areas show up in beet fields in hot, dry seasons
thrips	Adults and nymphs overwinter in residue. Populations initially build on grasses and in wheat. Note that thrips are an important food source for some of the beneficial insects (such as pirate bugs) that control other pests.	• Nymphs and adults feed with a single mandible, using it to puncture plant cells and slurp up the liquid inside • Punctured cells dry up, resulting in areas of dead cells; under heavy infestation, leaves dry up, curl, or die	• Dry conditions in early summer • Adults may move into beets from adjacent wheat fields or grassy borders as they dry down	Uncommon Usually present, but numbers rarely high enough to cause damage.

Pest (abbreviation)	Life cycle and Number of generations	Description of Damage	Conditions which favor infestation or damage	Pest Status in Michigan
webworms *several species*	Larvae overwinter. Adult moths emerge in spring and lay eggs on a number of hosts. Beet webworm caterpillars occur in June and again in August.	• Caterpillars spin webs and feed on beet leaves, usually near the leaf base	• Weedy fields, as moths may lay eggs on some weed species	Uncommon
white grubs - *several species*	Mature grubs overwinter under-ground. Adults emerge May - July, depending on species. Eggs laid in soil in the summer. Grubs feed on roots, then move down in soil profile in late fall to overwinter. In spring, grubs feed for a period, then pupate. 1 generation per year except for June beetle with a multiyear life cycle	• Larvae (grubs) prune root hairs or whole roots of small plants • On larger plants, grubs chew into or sever the tap root, causing wilting, water and nutrient deficiency, or plant death	• Planting after a grass sod or fallow • Sandy fields or parts of fields	Uncommon and Localized Often tied to fields or parts of fields with a sandy soil type
wireworm *several species*	Wireworms are the larval stage of click beetle; adults are harmless Depending on species, wireworms spend several years in the larval stage, feeding on seeds, roots, and tubers.	• Larvae feed on germinating seeds, seedlings, and on the growing tap root • A heavy infestation may reduce stand	• Planting after fallow or pasture, or into a field that had a grass weed control issue last season • Cool, wet weather that delays crop development • Sandy fields or parts of fields	Uncommon
Wooly bear and zebra caterpillars	Depends on species, but larvae are present in July and August	• Larvae feed on leaves	• Nothing specific	Uncommon High numbers may be noticed in some years, but usually are not damaging

Sugar Beet Table 4: Management notes, scouting recommendations, and thresholds.

Pest	Notes on non-chemical and chemical management	scouting recommendation	Spray threshold
aphids *on leaves* *On roots, see sugarbeet root aphid*	• Biological: Predators (such as ladybugs, lacewings, and parasitoids keep populations in check. Under humid conditions, entomopathogenic fungi infect and kill aphids • Environmental: Heavy rainfall and irrigation may wash off aphids. Adequate moisture reduces feeding stress and increases humidity for infection by pathogens	Check 100 plants (20 plants x 5 sets)	Rough guideline: one colony (group of ~30 aphids) per plant Rarely justified in Michigan
armyworm	• Biological: Predators (such as ladybugs) and parasitoids can reduce numbers • Agronomic: Good weed control reduces egg laying in a field • Insecticides: A border treatment may be possible if armyworms are moving into beets from an adjacent field	No specific recommendation Edges of fields are at greater risk	Rough guideline: >25% defoliation
cutworm - black	• Biological: Ground-dwelling predators (beetles) • Agronomic: Good weed control reduces egg laying	Check 100 plants (20 plants x 5 sets), particularly in low areas of the field, for cutting and wilting Dig around base of cut plants to find larvae	5% of plants cut
cutworm - winter	• Biological: Ground-dwelling predators (such as beetles) and birds likely provide some control	Same as black cutworm	5% of plants cut A rare, odd outbreak occurred in 2007
flea beetle	• Agronomic: Good weed control reduces alternate hosts	Check 100 seedlings (20 plants x 5 sets) for feeding damage; newly-emerged plants are most vulnerable	Rough guideline: 25% of seedlings with feeding damage
grasshoppers	• Biological: Blister beetle larvae prey on eggs, while insects, birds, and mammals eat nymphs & adults; Natural fungal pathogens kill eggs and nymphs under wet spring conditions • Agronomic: Tillage reduces survival of eggs and newly hatched nymphs • Insecticide: May be able to limit sprayed area if hoppers invade from a neighboring field or grassy border	No specific recommendation	Rough guideline: >25% defoliation I have never seen populations high enough to treat in Michigan
Japanese beetle	• Agronomic: Tillage reduces survival of overwintering grubs	No specific recommendation	Rough guideline - 25% or more defoliation by JB and other insects
leafhoppers	• No specific guidelines	No specific recommendation	None I have never seen populations high enough to treat in Michigan
lygus bug	• Insecticides: Not very effective at managing this insect; by the time damage (yellowing) is seen on older leaves, the feeding occurred days ago and the insects may not be present	Check 100 plants (20 plants x 5 sets) for bugs or for the distinctive yellowing Note: Lygus are fast and hard to scout for	Rough guideline - 1 bug per plant or when significant yellowing occurs on new growth
spider mites	• Biological: Under humid conditions, a natural fungal pathogen can infect and wipe out mite populations in a matter of days. Some natural enemies eat mites • Agronomic: Irrigation mitigates the impact of spider mite feeding and increases humidity for fungal biocontrol, but during a drought, even irrigation isn't enough • Environmental: Rainfall has a similar effect as irrigation	Infestations often start on field edges Look for mites on undersides of leaves using hand lens or tap leaves over a black piece of paper	A guess: Treat when mites appear on >25% of the plants and first yellowing is seen

Pest	Notes on non-chemical and chemical management	scouting recommendation	Spray threshold
spider mites ***continued***	• Insecticide: Insecticide resistance is common in mites. Some insecticides (including most pyrethroids) will flare mite populations by killing off natural enemies. Likewise, fungicide applications may disrupt fungal pathogens of mites. Insurance applications of both are discouraged; be cautious about pesticide applications in dry years	Webbing is present when populations are high	Mites are difficult to control and spraying is often a losing proposition
spinach leafminer	• Insecticide: Sprays are most effective when applied just before or during egg hatch	Check 100 small plants (20 plants x 5 sets) for leaf mines	Treat if 50% or more of plants have egg masses and small mines are present
springtails (foliar)	• Agronomic: Tillage to incorporate and destroy crop residue the fall prior to planting beets • Insecticide: No insecticides registered for sugarbeet specifically list foliar-feeding springtails on the label, although some probably provide control. Note that the manufacturer is not responsible for poor performance	No specific recommendation	None established If stand is severely damaged, follow guidelines for making a replant decision
sugarbeet root aphid (SBRA)	• Agronomic: Resistant varieties are available; control of the alternate weed host, lambsquarters, also helps to reduce the local population in a field • Insecticides: Soil insecticides are not very effective at managing this pest	No specific recommendation Look for aphids and wax on roots in areas with wilted beets	None established Use resistant varieties if you have SBRA in a field
thrips	• Biological: Generally kept in check by predators • Environmental: Rainfall or irrigation reduces populations • Insecticides: A caution about spraying: Thrips can be viewed as semi-beneficial, because they are predators of spider mite eggs. Spraying for thrips may contribute to a spider mite outbreak in the future, especially under dry conditions	Infestations often start on field edges Look for thrips on undersides of leaves using hand lens or tap leaves over a piece of paper	None established
webworm	• Biological: Many parasites and predators attack caterpillars	No specific recommendation Check leaves in several locations in the field	Rough guideline: small larvae present on 50-75% of leaves
white grubs	• Biological: Some species are attacked by pathogens. • Agronomic: If practical, fall plowing of long-standing fallow fields & pasture prior to planting is recommended. Tillage also exposes grubs to mammals and birds Note: It is important to identify grubs found in the field to distinguish annual species from multiyear June beetle species	No specific recommendation Grubs tend to be patchy, and in sandier parts of fields. They may be detected when plowing in the fall or spring, or if birds follow tillage equipment	None established
wireworm	• Agronomic: Tillage and longer rotations can reduce wireworm infestations	No specific recommendation	None established
Wooly bears & zebra caterpillar	• Nothing specific	No specific recommendation	None established Rough guideline: >25% defoliation

Sugar Beet Table 5: Insecticides registered on sugar beet in Michigan for use at planting, with preharvest intervals and precautions

- Insecticides are grouped by active ingredient(s), which are listed alphabetically, allowing for easy comparison of products with the same chemistry
- Application rates are listed for pests which appear on the manufacturer label; if a column is blank, the pest is not on the label. The letters in the pest columns refer to the label use rate from column two
- Note that insecticide rates per 1000 feet of row are based on a **30-inch row spacing**. See label for specific per-acre rate and gauge-setting charts for narrower row spacing

Active ingredient Trade Names	**Labelled rate(s)** per 1000 feet of row or per acre	**cutworms**	**root aphid**	**slugs & snails**	**white grub**	**wireworm**	**Precautions and Remarks**
cypermethrin (zeta) Mustang Mustang Maxx	(a) 4.3 oz per acre (a) 4.0 oz per acre	a			a	a	• For cutworm, apply on soil surface or broadcast in 3-5 gal water • For grubs and wireworm, apply in-furrow or in a 3-4 inch T-band over the open furrow
esfenvalerate Asana XL S-FenvaloStar Zyrate	(a) 0.45 oz per 1000 ft	a					• Apply in-furrow, T-band or banded
iron phosphate Sluggo	(a) 20-44 lbs per acre			a			• Broadcast pellets; use higher rate for heavy infestations • For best results, apply bait in the evening and on moist soil • Product certified for organic production
terbufos Counter 20G (Lock'N Load, Smartbox, or SmartCartidge)	(a) 3 - 6 oz per 1000 ft		*		a	a	• Apply banded or 'modified' in-furrow (2-3 inches behind the seed after some soil has covered the seed); do not let granules directly contact seed, as injury may occur • Maximums 9.8 lbs per acre for any row spacing • Higher rate may also suppress cutworms and sugar beet cyst nematode * See label for banded postemergence use against sugar beet root aphid. Note the 90 day pre-harvest interval for this application.

Sugar Beet Table 6: Foliar insecticides registered on sugar beets in Michigan, with preharvest intervals and precautions

- Insecticides are grouped by active ingredient(s), which are listed alphabetically, allowing for easy comparison of products with the same chemistry
- Application rates are listed for pests which appear on the manufacturer label; If a column is blank, the pest is not on the label. The letters in the pest columns refer to the label use rate from column two
- Caterpillars = woollybear, saltmarsh, thistle, & zebra caterpillars

Active ingredient Trade Names	**Labelled rate per acre**	**aphids (foliar)**	**armyworm**	**caterpillars**	**cutworms**	**flea beetle**	**grasshopper**	**leafhopper**	**lygus bug**	**spider mite**	**spinach leafminer**	**springtails**	**thrips**	**webworm**	**Pre harvest interval (PHI) in days**	**Precautions and Remarks**
Bacillus thuringiensis (Bt) Agree WG* Javelin WG Xentari DF	(a) 0.5 - 2.0 lb (a) 0.25 - 1.5 lb (a) 0.5 - 1.5 lb		a	a	a									a	0	• Selective biological insecticide to control caterpillars. Larvae must eat treated foliage to be controlled so good coverage is important. Must be targeted on small (1st - 2nd stage) larvae • All are certified for organic production * The Agree WG label only lists armyworm
carbaryl Carbaryl 4L Sevin 4F Sevin XLR Plus	(a) 1.0 - 1.5 quarts		a		a	a								a	28	• Max 3 quarts per acre • For cutworm, effective on species feeding on top of plant • Toxic to bees - do not apply if weeds in field are in bloom
cyantraniliprole Dupont Exirel Exirel	(a) 13.5 - 20.5 oz (b) 10.0 - 20.5 oz	a	b		b	a							*		1	• Thorough coverage is essential; application for aphid control requires an effective adjuvant (see label) *Application may suppress thrips
cypermethrin (alpha) Fastac CS Fastac EC*	(a) 2.2 - 3.8 oz	a	a		a	a	a								50	• Minimum spray volume 2 gal by air and 10 gal by ground • Do not graze or harvest treated tops for feed • Fastac CS is a microencapsulated formulation * Fastac EC does not list aphids & armyworm on the label
cypermethrin (zeta) Mustang Mustang Maxx	(a) 2.4 - 4.3 oz (a) 2.24 - 4.0 oz	a	a	a	a	a	a	a	a		a			a	50	• Minimum spray volume 2 gal by air and 10 gal by ground • Max 12.9 oz per acre per season, including at plant use • Aphid control depends on species
esfenvalerate Asana XL S-FenvaloStar Zyrate	(a) 5.8 - 9.6 oz		a	a	a	a	a	a							21	• Max 28.8 oz per acre per season

Active ingredient Trade Names	**Labelled rate per acre**	**aphids (foliar)**	**armyworm**	**caterpillars**	**cutworms**	**flea beetle**	**grasshopper**	**leafhopper**	**lygus bug**	**spider mite**	**spinach leafminer**	**springtails**	**thrips**	**webworm**	**Pre harvest interval (PHI) in days**	**Precautions and Remarks**
methomyl Annihilate LV Lannate LV Nudrin LV Annihilate SP Corrida 90WSP Lannate SP Nudrin SP	(a) 0.75 - 3.0 pints (b) 1.5 pints (a) 0.25 - 1 lb (b) 0.5 lb			a	b	a								a	21 beets 30 tops	• Highly toxic to bees; be careful about drift onto nearby crops or application on blooming weeds • See label for set-back requirements from surface water
methoxyfenozide Intrepid 2F	(a) 8 - 16 oz		a	a	a									a	7	• Minimum spray volume 10 gal by air and ground • Cutworms, suppression only • Narrow spectrum, targets caterpillars. Product has a novel mode of action that disrupts molting. Spray timing is important; applications need to be made at egg hatch or just as feeding starts
naled Dibrom 8E	(a) 1 pint	a	a				a	a	a	a					2	• See label for setback requirements from surface water
pyrethrins Evergreen EC 60-6 PyGanic EC 1.4 II PyGanic Specialty	(a) 2.0 - 12.6 oz (a) 16 - 64 oz (a) 4.5 - 15.6 oz	a	a	a	a	a	a	a	a			a	a	a	0 when sprays dry	• Plant-derived insecticides that knock down insects quickly but have very short residual control. Coverage is critical • Max 10 applications per season, min. 3-day spray interval • PyGanic is OMRI listed for use on organic crops; Evergreen does not have OMRI certification • Highly toxic to bees exposed to direct treatment; do not apply on or drift onto blooming crops or weeds
spinosyns **(spinetoram & spinosad)** Radiant SS	(a) 6 - 8 oz		a			a							a		7	• Must target egg hatch or small larvae • Flea beetles - suppression only. Thrips control is improved adding an adjuvant as detailed on the label. Be careful using oil-based adjuvants in sugarbeet tank mixes.
spirotetramat Movento Movento HL	(a) 5 - 9 oz (a) 2.25-4.5 oz	a													28	• Systemic - moves through plant into leaves and roots; systemic activity may be limited in cold or dry weather when plant isn't actively growing • Minimum spray volume 5 gal by air and 15 gal for ground; see label for recommendation to add an adjuvant • Also controls root aphid and suppresses cyst nematode