

# SUGARBEETS

## Calendar of insect pests of sugarbeet in Michigan

- Pests are listed from early to late-season. Key species are highlighted in bold text.

Common name	Overwintering stage, location	April-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 species	
wireworm	larvae in soil	root damage to seedlings		larval damage to tap root	
<b>spinach leafminer</b>	pupae in soil	leaf mining by larvae			
flea beetle	adults, in residue & protected areas	feeding by adults on leaves (shot holing)			
<b>sugarbeet root aphid</b>	on roots of lambsquarters		multiple generations puncture root cells to feed on plant sap		
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 the base of hosts			multiple generations pierce plant cells to feed	
<b>lygus bug</b> (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	
woolly bears & zebra caterpillars	depends on species			caterpillars feed on foliage	

**Damage checklist to aid in scouting of sugarbeet in Michigan**

<b>Plant part or timing</b> Type of damage or injury	aphids (on leaves)	armyworm	cutworms	flea beetle	grasshoppers	Japanese beetle	leafhoppers	lygus bug	spider mite	spinach leafminer	springtails	sugarbeet root aphid	thrips	webworm	white grub	wireworm	woolly/ zebra caterpillar
<b>Stand (emergence)</b>																	
stand loss / gaps in row											x				x	x	
wilted or cut plants			x												x	x	
<b>Stand (later in season)</b>																	
wilting or dead plants												x					
<b>Leaves</b>																	
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	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			
<b>Roots</b>																	
roots pruned or cut															x	x	
chewing into tap root															x	x	
white, waxy coating												x					

## Biology and impact of insect pests in sugarbeet in Michigan

### *Terms used to describe the pest status of each insect*

- **Rarely a pest:** Unusual. May not even be present in the state.
- **Uncommon pest:** Maybe present but below damaging levels. An outbreak once a generation
- **Occasional pest:** Present, sometimes in high numbers. An outbreak once a decade
- **Important pest:** Present in most fields, potentially increasing to damaging levels every season. A common target of scouting, management programs, or insecticide use.
- **Sporadic pest:** Damaging levels occur after favorable weather patterns (such as drought) or mass movement from south to north during the season
- **Localized pest:** Damaging levels occur in specific locations under specific agronomic conditions, for example in no-till production or in older stands.

Pest (abbreviation)	Life cycle and Number of generations	Impact on the Crop	Conditions which favor infestation or damage	Pest Status in Michigan
<b>aphids</b> <i>on leaves</i>  <i>On roots, see sugarbeet root aphid</i>	Summer population is all female. Females do not mate to reproduce and give birth to live young.  Multiple overlapping generations	<ul style="list-style-type: none"> <li>• All stages suck plant sap from leaves</li> <li>• Heavy infestation may lead to stunting, curling of leaves, weakening of plants</li> </ul>	<ul style="list-style-type: none"> <li>• Drought stress may be made worse by aphids removing plant sap</li> </ul>	Uncommon  Often present, but numbers rarely high enough to cause damage
<b>armyworm</b>	Adult moths migrate into Michigan in early spring.  Eggs are laid on low-growing weeds, in grassy field margins, or in pasture or wheat.	<ul style="list-style-type: none"> <li>• Caterpillars defoliate beets</li> <li>• Feeding often occurs at night</li> <li>• Larvae may march from one field to another (hence the name 'army')</li> </ul>	<ul style="list-style-type: none"> <li>• Weedy fields</li> <li>• Beets adjacent to infested pasture, corn, or wheat (tho beets are not a preferred host)</li> </ul>	Uncommon  Infestations of wheat and corn occur after a heavy spring flight from the south
<b>cutworm - black</b>	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.	<ul style="list-style-type: none"> <li>• Young larvae feed on leaves</li> <li>• Extensive damage occurs when older larvae cut at or below soil surface, leading to wilting and death of plants</li> </ul>	<ul style="list-style-type: none"> <li>• Fields with a weed problem or planted to a cover crop (egg-laying site for moths)</li> <li>• No-till fields</li> </ul>	Uncommon  Outbreaks occur after a heavy spring flight from the south
<b>cutworm - winter</b>	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.	<ul style="list-style-type: none"> <li>• Larvae feed on seedlings and leaves</li> <li>• During rare outbreaks, large numbers of larvae sometimes move in a wave across a road or field</li> </ul>	<ul style="list-style-type: none"> <li>• Unknown</li> </ul>	Uncommon
<b>flea beetle</b>  <i>several species</i>	Adults overwinter in crop residue.  They emerge in spring and feed on weeds and crops, including beets.	<ul style="list-style-type: none"> <li>• Adult beetles chew small round holes in leaves</li> </ul>	<ul style="list-style-type: none"> <li>• Weedy fields or borders</li> </ul>	Uncommon  Shot holing is noticeable, but rarely enough to cause concern
<b>grasshoppers</b>  <i>several species</i>	Eggs overwinter in soil. Nymphs emerge in June. Their feeding increases as they grow. Females lay groups of eggs in undisturbed soil in late summer.  1 generation per year	<ul style="list-style-type: none"> <li>• All stages eat leaves. Feeding has a ragged appearance</li> </ul>	<ul style="list-style-type: none"> <li>• Adjacent fallow areas or pasture, where eggs are laid</li> <li>• A hot dry summer &amp; fall can lead to a high population the following year</li> </ul>	Uncommon  Often present, but outbreaks are rare in Michigan
<b>Japanese beetle</b>	Larvae (grubs) overwinter. Adults typically begin to emerge in July, feed, mate, and lay eggs in soil. Adults may be active into early fall.	<ul style="list-style-type: none"> <li>• Adult beetles feed on numerous host plants, including beets. Feeding has a skeletonized appearance</li> </ul>	<ul style="list-style-type: none"> <li>• Nothing specific</li> </ul>	Uncommon  Present, but not at damaging levels

<b>Pest (abbreviation)</b>	<b>Life cycle and Number of generations</b>	<b>Impact on the Crop</b>	<b>Conditions which favor infestation or damage</b>	<b>Pest Status in Michigan</b>
<b>leafhoppers</b>	Several species feed on beets. Adults lay eggs in plant stems.	<ul style="list-style-type: none"> <li>• Both adults and nymphs suck plant sap. Symptoms under high populations include leaf curling and yellowing</li> </ul>	<ul style="list-style-type: none"> <li>• Nothing specific</li> </ul>	Uncommon  Present, but not at damaging levels
<b>lygus bug</b> <i>including tarnished plant bug</i>	<p>Adults overwinter in residue and on field edges.</p> <p>Weeds and early crops like alfalfa are fed on and colonized first.</p> <p>There are multiple generations during the summer.</p>	<ul style="list-style-type: none"> <li>• Adults and nymphs inject toxic saliva during feeding and suck plant sap</li> <li>• Fed-on leaves turn yellow or brown at tips and edges. Damaged plants may wilt</li> <li>• Damage to beets is difficult to recreate or quantify. When symptoms appear, the feeding happened days earlier.</li> </ul>	<ul style="list-style-type: none"> <li>• Movement into beets may coincide with cutting of adjacent alfalfa fields or with dry down of weeds on field edge</li> </ul>	Localized  Numbers may be higher in fields adjacent to alfalfa
<b>spider mites</b>	<p>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.</p> <p>Multiple overlapping generations</p>	<ul style="list-style-type: none"> <li>• Adults &amp; nymphs pierce individual plant cells, resulting in tiny yellow spots called stippling</li> <li>• Webbing is a sign of a significant infestation</li> <li>• Severe damage results in leaf yellowing or death, water loss</li> </ul>	<ul style="list-style-type: none"> <li>• Prolonged hot, dry weather favors an outbreak &amp; enhances the impact of feeding</li> <li>• Infestations often start on dusty edges of fields</li> </ul>	Sporadic  Outbreaks occur in hot, dry seasons
<b>spinach leafminer</b>	<p>Pupae overwinter and flies emerge in spring. Females lay eggs on beet leaves. Larvae (maggots) feed, then drop to the soil surface to pupate.</p> <p>Multiple generations, but only the first is important on sugarbeet.</p>	<ul style="list-style-type: none"> <li>• Larvae create distinctive, winding mines as they feed internally in the leaf</li> </ul>	<ul style="list-style-type: none"> <li>• Nothing specific</li> </ul>	Occasional  Mining is noticeable, but rarely enough to cause concern
<b>springtails</b>	<p>Springtails are common arthropods related to insects. They break down crop residue or feed on fungi.</p> <p>They are considered an indicator of good soil health, but when populations are high their feeding may damage beet seedlings.</p>	<ul style="list-style-type: none"> <li>• Nymphs and adults scrape or scar cotyledons just as they emerge from the soil</li> <li>• Heavy feeding is reported to destroy seedlings and reduce stand</li> </ul>	<ul style="list-style-type: none"> <li>• Planting into heavy residue, particularly corn stalks, where numbers are high</li> <li>• Moist conditions &amp; slow emergence after planting</li> </ul>	Occasional  Damage is rare unless numbers are very high
<b>sugarbeet root aphid (SBRA)</b>	<p>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.</p> <p>Multiple overlapping generations</p>	<ul style="list-style-type: none"> <li>• All stages suck plant sap from roots. Aboveground symptoms include wilting, yellowing, and stunting. The pattern of damaged plants in the field is often elliptical</li> <li>• Root aphids cover themselves in a protective layer of wax, which can reduce water and nutrient uptake by beet roots</li> <li>• Moderate infestations can reduce yield, sugar content, and recoverable sugar even if above-ground symptoms are lacking</li> </ul>	<ul style="list-style-type: none"> <li>• Aphids overwinter on roots of certain weeds, especially lambsquarters, pigweed, &amp; kochia</li> <li>• Dry conditions help root aphids spread, as soil cracks allow them to access roots</li> <li>• Drought also enhances the impact of SBRA root feeding</li> </ul>	Occasional and Localized  SBRA persists on alternate weed hosts. Infested areas show up in beet fields in dry seasons.  Recent issues with SBRA appear to relate to certain beet varieties.
<b>thrips</b>	<p>Adults and nymphs overwinter in residue. Populations initially build up on grasses and in wheat.</p> <p>Thrips are an important food source for beneficial insects (such as pirate bugs) that control other pests.</p>	<ul style="list-style-type: none"> <li>• Nymphs and adults feed with a single mandible, using it to puncture plant cells and slurp up the liquid inside</li> <li>• Punctured cells dry up, resulting in dead spots. Under heavy infestation, leaves dry up, curl, or die</li> </ul>	<ul style="list-style-type: none"> <li>• Dry conditions in early summer</li> <li>• Adults may move into beets from adjacent wheat fields or grassy borders as they dry down</li> </ul>	Uncommon  Usually present, but numbers are rarely high enough to cause damage

Pest (abbreviation)	Life cycle and Number of generations	Impact on the Crop	Conditions which favor infestation or damage	Pest Status in Michigan
<b>webworms</b> <i>several species</i>	Larvae overwinter. Adult moths emerge in spring and lay eggs on many hosts. Beet webworm caterpillars occur in June and again in August.	<ul style="list-style-type: none"> <li>• Caterpillars spin webs and feed on beet leaves, usually near the leaf base</li> </ul>	<ul style="list-style-type: none"> <li>• Weedy fields, as moths may lay eggs on some of the weed species present</li> </ul>	Uncommon
<b>white grubs -</b> <i>several species</i>	<p>Mature grubs overwinter underground. Adults emerge in May to July, depending on species. Eggs laid in soil in the summer. Grubs feed on roots, then move down the soil profile in late fall to overwinter. In spring, grubs feed for a period, then pupate.</p> <p>1 generation per year except for June Beetle with a multiyear life cycle</p>	<ul style="list-style-type: none"> <li>• Larvae (grubs) prune root hairs or whole roots of small plants</li> <li>• On larger plants, grubs chew into or sever the tap root, causing wilting, water and nutrient deficiency, and even plant death</li> </ul>	<ul style="list-style-type: none"> <li>• Planting after a grass sod or fallow</li> <li>• Sandy fields or parts of fields</li> </ul>	<p>Uncommon and Localized</p> <p>Often related to fields or parts of fields with sandy soil</p>
<b>wireworm</b> <i>several species</i>	<p>Wireworms are the larval stage of click beetles. Adults are harmless</p> <p>Depending on species, wireworms spend several years in the larval stage feeding on seeds, roots, and tubers.</p>	<ul style="list-style-type: none"> <li>• Larvae feed on germinating seeds, seedlings, and on the growing tap root</li> <li>• A heavy infestation may reduce stand</li> </ul>	<ul style="list-style-type: none"> <li>• Planting after fallow or pasture or into a field with grass control issues last season</li> <li>• Cool, wet weather that delays crop development</li> <li>• Sandy fields or parts of fields</li> </ul>	<p>Uncommon</p> <p>I've never seen a severe infestation in Michigan.</p>
<b>woolly bear and zebra caterpillars</b>	Depends on species, but larvae are present in July and August	<ul style="list-style-type: none"> <li>• Larvae feed on leaves</li> </ul>	<ul style="list-style-type: none"> <li>• Nothing specific</li> </ul>	<p>Uncommon</p> <p>High numbers may be noticed in some years, but are not damaging</p>

## Management of insect pests in sugarbeet in Michigan

Pest	Management options and notes	Scouting recommendation	Threshold
<b>aphids</b> <i>on leaves</i>  <i>On roots, see sugarbeet root aphid</i>	<ul style="list-style-type: none"> <li>Biological: Predators (such as ladybugs, lacewings, and parasitoids) keep populations in check. Under humid conditions, entomopathogenic fungi infect and kill aphids</li> <li>Environmental: Heavy rainfall and irrigation may wash off aphids. Adequate moisture reduces feeding stress and increases humidity for infection by pathogens</li> </ul>	Check 100 plants (20 plants x 5 sets)	Rough guideline: one colony (group of ~30 aphids) per plant  Rarely justified in Michigan
<b>armyworm</b>	<ul style="list-style-type: none"> <li>Biological: Predators and parasitoids can reduce numbers. Under humid conditions, entomopathogenic fungi infect larvae</li> <li>Agronomic: Good weed control reduces egg laying in a field</li> <li>Insecticides: A border treatment may be possible if armyworms are moving into beets from an adjacent field</li> </ul>	No specific recommendation  Edges of fields are at greater risk	Rough guideline: 25% or more defoliation by leaf-feeding insects  Beets aren't a preferred host
<b>cutworm - black</b>	<ul style="list-style-type: none"> <li>Biological: Ground-dwelling predators (beetles) likely provide some control</li> <li>Agronomic: Good weed control reduces egg laying</li> </ul>	Check 100 plants (20 plants x 5 sets), for cutting and wilting. Dig around base of cut plants to confirm larvae	5% of plants cut
<b>cutworm - winter</b>	<ul style="list-style-type: none"> <li>Biological: Ground-dwelling predators (beetles) and birds are likely to provide some control</li> </ul>	Same as black cutworm	5% of plants cut  A rare, odd outbreak occurred in 2007
<b>flea beetle</b>	<ul style="list-style-type: none"> <li>Agronomic: Good weed control reduces alternate hosts</li> </ul>	Check 100 seedlings (20 plants x 5 sets) for feeding damage. Newly emerged plants are most vulnerable	Rough guideline: 25% of <u>seedlings</u> with feeding damage
<b>grasshoppers</b>	<ul style="list-style-type: none"> <li>Biological: Blister beetle larvae prey on eggs, while insects, birds, and mammals eat nymphs &amp; adults. Natural fungal pathogens kill eggs and nymphs under wet spring conditions</li> <li>Agronomic: Tillage reduces survival of eggs and newly hatched nymphs</li> <li>Insecticide: May be able to limit sprayed area if hoppers invade from a neighboring field or grassy border</li> </ul>	No specific recommendation	Rough guideline: 25% or more defoliation by leaf-feeding insects  I have never seen populations high enough to treat in Michigan
<b>Japanese beetle</b>	<ul style="list-style-type: none"> <li>Agronomic: Tillage reduces survival of overwintering grubs</li> </ul>	No specific recommendation	Rough guideline: 25% or more defoliation by leaf-feeding insects
<b>leafhoppers</b>	<ul style="list-style-type: none"> <li>No specific guidelines</li> </ul>	No specific recommendation	None  I have never seen populations high enough to treat in Michigan
<b>lygus bug</b>	<ul style="list-style-type: none"> <li>Insecticides: Spraying is not very effective at managing Lygus. By the time damage (yellowing) is seen on older leaves, the feeding occurred potentially many days before, and the insects may not even be present</li> </ul>	Check 100 plants (20 plants x 5 sets) for bugs or for the distinctive yellowing  Note: Lygus are fast and hard to scout	Rough guideline: 1 bug per plant or when significant yellowing occurs on new growth

<b>Pest</b>	<b>Management options and notes</b>	<b>Scouting recommendation</b>	<b>Threshold</b>
<b>spider mite</b>	<ul style="list-style-type: none"> <li>• 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</li> <li>• Agronomic: Irrigation mitigates the impact of spider mite feeding and increases humidity for fungal biocontrol, but during a drought, even irrigation isn't enough</li> <li>• Environmental: Rainfall has a similar effect as irrigation</li> <li>• 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</li> </ul>	<p>Infestations often start on field edges</p> <p>Look for mites on undersides of leaves using hand lens or tap leaves over a black piece of paper</p> <p>Webbing is present when populations are high</p>	<p>A guess: Treat when mites appear on &gt;25% of the plants and first yellowing is seen</p> <p>Mites are difficult to control. Spraying is often a losing proposition</p>
<b>spinach leafminer</b>	<ul style="list-style-type: none"> <li>• Insecticide: Sprays are most effective when applied just before or during egg hatch</li> </ul>	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
<b>springtails (foliar)</b>	<ul style="list-style-type: none"> <li>• Agronomic: Tillage to incorporate and destroy crop residue in the fall prior to planting beets</li> <li>• Insecticide: No sugarbeet insecticides specifically list foliar-feeding springtails on the label, although some probably provide control. Note that the manufacturer is not responsible for poor performance</li> </ul>	No specific recommendation	<p>None established</p> <p>If the stand is severely damaged, follow guidelines for making a replant decision</p>
<b>sugarbeet root aphid (SBRA)</b>	<ul style="list-style-type: none"> <li>• Agronomic: Control of alternate weed hosts, especially lambsquarters, helps to reduce the local population in a field</li> <li>• Varieties: The majority, if not all, beet varieties grown in Michigan are rated as SBRA resistant. The accuracy of the rating is uncertain. In 2024, significant infestations were reported in some fields on resistant beets.</li> <li>• Cultural: Clean equipment when moving between fields.</li> <li>• Insecticides: Soil insecticides are not very effective at managing this pest</li> </ul>	<p>No specific recommendation</p> <p>Look for aphids and wax on roots in areas with wilted beets</p>	<p>None established</p> <p>Use resistant varieties if SBRA is known to be present in a field</p>
<b>thrips</b>	<ul style="list-style-type: none"> <li>• Biological: Generally kept in check by predators</li> <li>• Environmental: Rainfall or irrigation reduces populations</li> <li>• Insecticides: 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</li> </ul>	<p>Infestations often start on field edges</p> <p>Look for thrips on leaf undersides using a hand lens or tap leaves over a piece of paper</p>	None established
<b>webworm</b>	<ul style="list-style-type: none"> <li>• Biological: Many parasites and predators attack caterpillars</li> </ul>	No specific recommendation. Check leaves in several locations in the field	Rough guideline: small larvae present on 50-75% of leaves
<b>white grubs</b>	<ul style="list-style-type: none"> <li>• Biological: Some species are attacked by pathogens.</li> <li>• Agronomic: If practical, fall plowing of long-standing fallow fields &amp; pasture prior to planting is recommended. Tillage also exposes grubs to mammals and birds</li> </ul> <p>Note: It is important to identify grubs found in the field to distinguish annual species from multiyear June beetle species</p>	<p>No specific recommendation</p> <p>Grubs tend to be in sandy parts of fields. They may be detected when plowing in the fall or spring, or if birds follow tillage equipment</p>	None established
<b>wireworm</b>	<ul style="list-style-type: none"> <li>• Agronomic: Tillage and longer rotations can reduce wireworm infestations</li> </ul>	No specific recommendation	None established
<b>woolly bears &amp; zebra caterpillar</b>	<ul style="list-style-type: none"> <li>• Nothing specific</li> </ul>	No specific recommendation	Rough guideline: 25% or more defoliation by leaf-feeding insects

## Soil/at-plant insecticides to manage insect pests of sugarbeet in Michigan

- 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	white grub	wireworm	Precautions and Remarks
<b>cypermethrin (zeta)</b> Mustang Maxx	(a) 4.0 oz per acre	a			a	a	<ul style="list-style-type: none"> <li>• For cutworm, apply on soil surface or broadcast in 3-5 gal water</li> <li>• For grubs and wireworm, apply in-furrow or in a 3-4 inch T-band over the open furrow</li> </ul>
<b>esfenvalerate</b> Asana XL S-FenvaloStar Zyrate	(a) 0.45 oz per 1000 ft	a					<ul style="list-style-type: none"> <li>• Apply in-furrow, T-band or banded</li> </ul>
<b>iron phosphate</b> Ferroxx AQ Sluggo	(a) 20-44 lbs per acre			a			<ul style="list-style-type: none"> <li>• Broadcast pellets; use higher rate for heavy infestations. For best results, apply bait in the evening and on moist soil</li> </ul>
<b>sodium ferric EDTA</b> Ferroxx	(a) 5-20 lbs per acre			a			<ul style="list-style-type: none"> <li>• Broadcast pellets; use higher rate for heavy infestations</li> <li>• Slugs stop feeding, slowly die</li> </ul>
<b>terbufos</b>  Counter 20G (Lock'N Load, Smartbox, or SmartCartidge)	(a) 3 - 6 oz per 1000 ft		*		a	a	<ul style="list-style-type: none"> <li>• 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</li> <li>• Higher rate may also suppress cutworms and sugar beet cyst nematode</li> </ul> <p>* See label for banded <u>postemergence</u> use against sugarbeet root aphid. Note the 90-day pre-harvest interval for this application.</p>

## Foliar insecticides to manage insect pests of sugarbeet in Michigan

- 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
- 'Caterpillar' column includes woolly bear, 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
<b>Bacillus thuringiensis (Bt)</b> 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	<ul style="list-style-type: none"> <li>• Bt is a selective biological insecticide to control caterpillars. Larvae must eat treated foliage to be controlled so good coverage is important. Must be targeted on small (1<sup>st</sup> - 2<sup>nd</sup> stage) larvae.</li> <li>• All are certified for organic production</li> </ul> <p>* The Agree WG label only lists armyworm</p>
<b>carbaryl</b> Carbaryl 4L Sevin 4F Sevin XLR Plus	(a) 1.0 - 1.5 quarts		a		a	a								a	28	<ul style="list-style-type: none"> <li>• Max 3 quarts per acre</li> <li>• For cutworm, effective on species feeding on top of plant</li> <li>• Toxic to bees - do not apply if weeds in field are in bloom</li> </ul>
<b>cyantraniliprole</b> Dupont Exirel Exirel	(a) 13.5 - 20.5 oz (b) 10.0 - 20.5 oz	a	b		b	a							*		1	<ul style="list-style-type: none"> <li>• Thorough coverage is essential; application for aphid control requires an effective adjuvant (see label)</li> </ul> <p>*Application may suppress thrips</p>
<b>chlorantraniliprole</b> Vantacor	(a) 1.2 - 2.5 oz		a								a				1	<ul style="list-style-type: none"> <li>• Use higher rate in dense canopy or under rainy / high temp conditions</li> <li>• See label for leafminer, but suppression only</li> </ul>
<b>cypermethrin (alpha)</b> Fastac CS Fastac EC*	(a) 2.2 - 3.8 oz	a	a		a	a	a								50	<ul style="list-style-type: none"> <li>• Minimum spray volume 2 gal by air and 10 gal by ground</li> <li>• Do not graze or harvest treated tops for feed</li> <li>• Fastac CS is a microencapsulated formulation</li> <li>* Fastac EC does not list aphids &amp; armyworm on the label</li> </ul>
<b>cypermethrin (zeta)</b> Mustang Maxx	(a) 2.24 - 4.0 oz	a	a	a	a	a	a	a	a		a			a	50	<ul style="list-style-type: none"> <li>• Aphid control depends on species</li> </ul>
<b>esfenvalerate</b> Asana XL S-FenvaloStar Zyrate	(a) 5.8 - 9.6 oz		a	a	a	a	a	a							21	

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
<b>methomyl</b> Annihilate LV Lanveer 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 lbs (b) 0.5 lb			a	b	a								a	21 beets  30 tops	<ul style="list-style-type: none"> <li>Highly toxic to bees; be careful about drifting onto nearby crops or application on blooming weeds</li> <li>See label for set-back requirements from surface water</li> </ul>
<b>methoxyfenozide</b> Intrepid 2F	(a) 8 - 16 oz		a	a	a									a	7	<ul style="list-style-type: none"> <li>Minimum spray volume 10 gal by air and ground</li> <li>Cutworms, suppression only</li> <li>Narrow spectrum, targets caterpillars. Novel mode of action disrupts molting. Spray timing is critical; applications need to be made at egg hatch or just as feeding starts</li> <li>Endangered species warning for use in Montcalm Co. Michigan. Access EPA's 'Bulletins Live! Two' web site</li> </ul>
<b>naled</b> Dibrom 8E	(a) 1 pint	a	a				a	a	a	a					2	<ul style="list-style-type: none"> <li>See label for setback requirements from surface water</li> </ul>
<b>pyrethrins</b> Evergreen EC 60-6  PyGanic EC 1.4 II  PyGanic 5.0	(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	<ul style="list-style-type: none"> <li>Plant-derived insecticides that knock down insects quickly but have short residual control. Coverage is critical</li> <li>Highly toxic to bees exposed to direct treatment; do not apply on or drift onto blooming crops or weeds</li> </ul>
<b>spinosyns (spinetoram &amp; spinosad)</b> Radiant SS	(a) 6 - 8 oz		a			a							a		7	<ul style="list-style-type: none"> <li>Must target egg hatch or small larvae</li> <li>Flea beetles - suppression only. Thrips control is improved by adding an adjuvant as detailed on the label. Be careful using oil-based adjuvants in sugarbeet tank mixes.</li> </ul>
<b>spirotetramat</b> Movento  Movento HL	(a) 5 - 9 oz  (a) 2.25-4.5 oz	a													28	<ul style="list-style-type: none"> <li>Systemic - moves through plant into leaves and roots; systemic activity may be limited in cold or dry weather when plant isn't actively growing</li> <li>Minimum spray volume 5 gal by air and 15 gal for ground; see label for recommendation to add an adjuvant</li> <li>Also controls root aphid and suppresses cyst nematode</li> </ul>