

Soybean Insect Pests

Armyworm

Armyworm outbreaks occasionally occur in multiple crops, in years with heavy flights north into Michigan.

Description: Larvae (caterpillars) variable in color, from black to brown to greenish. Narrow light stripe across back and broad stripes running down sides of body.

Life cycle: Likely migrate to Michigan each spring. 2-3 generations per year.

Type of damage: Defoliation by larvae.

Conditions favoring damage: Grassy or weedy fields; double-cropping with small grains such as wheat

Threshold: 25% defoliation

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

Bacillus thuringiensis (check product labels for rates)

[Agree WG, Dipel ES / DF, Javelin WG, Xentari DF]

Baythroid 2* and XL* (1.6 to 2.8 oz)

Brigade 2EC* (2.1 to 6.4 oz)

Capture 2EC* (2.1 to 6.4 oz)

Carbaryl 4L (2 to 3 pt)

Chlorpyrifos 4E* (1 to 1.5 pt)

Cobalt* (13 to 26 oz)

Entrust (1.25 to 2 oz)

Intrepid 2F (4 to 8 oz)

Lambda-Cy EC* (3.2 to 3.84 oz)

Larvin 3.2* (10 to 30 fl oz)

Lannate LV* (0.75 to 1.0 pt) and SP* (0.25 to 0.375 lb)

Lorsban 4E* and Advanced* (1 to 2 pt)

Mustang Max EC* and EW* (3.2 to 4 oz)

Nufos 4E* (1 to 1.5 pt)

Orthene 75S (1 to 1.33 lbs) or 90S (0.83 to 1.1 lbs)

Orthene 97 (0.75 to 1 lb)

Pounce 3.2EC* (4 to 8 oz)

Proaxis* (3.2 to 3.84 oz)

Radiant SC (2 to 4 oz)

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

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

Silencer* (3.2 to 3.84 oz)

Tracer (1.5 to 2 oz)

Warrior* (3.2 to 3.84 oz)

Bean Leaf Beetle (BLB)

CDD has not seen early-season BLB feeding over threshold. Later-season feeding on pods may be increasing in incidence.

Description: Small beetle (1/4 inch long) with variable coloration; wings greenish-yellow or red, with 4 black spots and black stripe along edge; wing spots may be absent, but a black triangle is always present on wings behind head.

Life cycle: Adults overwinter in leaf litter and wooded field margins, become active in spring. Move into alfalfa, then migrate into soybeans after first alfalfa cutting; 1-2 generations per year.

Type of damage: Chewing pest; larvae feed on root hairs and nodules; adults defoliate younger plants, leaving small round holes between major leaf veins; adult feeding on developing pods causes scarring and reduces yield and seed quality.

Management: Young soybeans can tolerate considerable injury without loss of yield; Cultural – late planting helps avoid BLB.

Threshold: 25% or more defoliation throughout field; 50% defoliation of seedlings or 25% defoliation during pod setting/filling, or if pod damage more than 10%.

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

Ambush* 25W (3.2 to 6.4 oz)

Arctic 3.2 EC* (2 to 4 oz)

Asana XL* (5.8 to 9.6 fl oz)

Baythroid 2* and XL* (1.6 to 2.8 oz)

Brigade 2EC* (2.1 to 6.4 oz)

Capture 2EC* (2.1 to 6.4 oz)

Carbaryl 4L (1 to 2 pt)

Chlorpyrifos 4E* (1 to 2 pt)

Cobalt* (19 to 38 oz)

Dimethoate 4EC (1 pt)

Dimethoate 267 (1.5 pts)

Lambda-Cy EC* (1.92 to 3.2 oz)

Lannate LV* (0.75 to 1.0 pt) and SP* (0.25 to 0.5 lb)

Larvin 3.2* (18 to 30 fl oz)

Leverage 2.7* (3.8 oz) and 360* (2.8 oz)

Lorsban 4E* and Advanced* (1 to 2 pt)

Mustang Max EC* and EW* (2.8 to 4 oz)

Nufos 4E* (1 to 2 pt)

Orthene 75S (1 to 1.33 lbs) or 90S (0.83 to 1.1 lbs)

Orthene 97 (0.75 to 1 lb)

PennCap-M* (2 to 3 pt)

Permethrin/ Perm-Up 3.2EC* (2 to 4 oz)

Pounce 3.2EC* (2 to 4 fl oz)

Pounce 25WP* (3.2 to 6.4 fl oz)

Proaxis* (1.92 to 3.2 oz)

Sevin 4F and XLR Plus (0.5 to 1 qt)

Sevin 80S and 80WSP (0.63 to 1.25 lb)

Silencer* (1.92 to 3.2 oz)

Warrior* (1.92 to 3.2 oz)

Cutworms

Cutworm outbreaks occur sporadically when there are heavy flights north into Michigan in the spring.

Description: Larvae (caterpillar) up to 2 inches in length. Variable color (black-gray).

Life cycle: Adults migrate into Michigan in early spring and lay eggs on weeds or crop debris. Several generations per season.

Type of damage: Larvae cut seedlings, reducing stand development; older plants not as affected.

Sampling/scouting: Look for wilted or cut plants and dig around base of cut seedlings to confirm identity of larvae.

Conditions favoring damage: Weedy fields and borders (especially areas with low, prostrate weed growth); high crop residue; planting into plowed sod or pasture; cover crops; wet areas; no-till.

Management: Soybean tolerates considerable stand reduction without loss of yield; Chemical-rescue (post-plant) option preferred.

Threshold: 5% or more of small plants show cutworm damage, and larvae are less than 1.5 inches

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

Ambush 25W* (3.2 to 6.4 oz)	Larvin 3.2* (20 to 30 fl oz)
Arctic 3.2 EC (2 to 4 oz)	Leverage 360* (2.8 oz)
Asana XL* (5.8 to 9.6 fl oz)	Lorsban 4E* and Advanced* (1 to 2 pt)
Baythroid 2* and XL* (0.8 to 1.6 oz)	Mustang Max EC* and EW* (1.28 to 4 oz)
Brigade 2EC* (2.1 to 6.4 oz)	Nufos 4E* (1 to 2 pt)
Capture 2EC* (2.1 to 6.4 oz)	Permethrin/ Perm-Up 3.2EC* (2 to 4 oz)
Carbaryl 4L (2 to 3 pt)	Pounce 3.2EC* (2 to 4 fl oz) or 25W* (3.2 to 6.4 oz)
Chlorpyrifos 4E* (1 to 2 pt)	Proaxis* (1.92 to 3.2 oz)
Chlorpyrifos 4E* (1 to 1.5 pt)	Sevin 4F and XLR Plus (1 to 1.5 qt)
Cobalt* (13 to 26 oz)	Sevin 80S and 80WSP (1.25 to 1.875 lb)
Empower 2* (3.5 to 8.7 lbs/ acre)	Silencer* (1.92 to 3.2 oz)
Lambda-Cy EC* (1.92 to 3.2 oz)	Warrior* (1.92 to 3.2 oz)

Grasshoppers

Grasshoppers are common in agricultural fields, but cause damage only during occasional outbreak years.

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: Growing season preceded by 2 or more years of dry weather; Undisturbed grassy sites next to fields (preferred for egg laying); dry, warm weather can enhance survival of nymphs.

Management: Biological – A fungal pathogen can kill many eggs and nymphs under wet spring conditions. Many animals (birds, rodents, amphibians) eat grasshoppers.

Threshold: 25% or more defoliation throughout field.

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

Asana XL* (5.8 to 9.6 fl oz)	Leverage 2.7* (3.8 oz) and 360* (2.8 oz)
Baythroid 2* and XL* (2.0 to 2.8 oz)	Lorsban 4E* and Advanced* (0.5 to 1 pt)
Brigade 2EC* (2.1 to 6.4 oz)	Mustang Max EC* and EW* (3.2 to 4 oz)
Capture 2EC* (1.6 to 6.4 oz)	Nufos 4E* (0.5 to 1 pt)
Carbaryl 4L (1 to 3 pt)	Orthene 75S (0.33 to 0.67 lbs) or 90S (0.28 to 0.56 lbs)
Chlorpyrifos 4E* (0.5 to 1 pt)	Orthene 97 (0.25 to 0.5 lb)
Chlorpyrifos 4E* (1 to 1.5 pt)	PennCap-M* (2 to 3 pt)
Cobalt* (7 to 13 oz)	Proaxis* (3.2 to 3.84 oz)
Dimethoate 4EC (1 pt)	Sevin 4F and XLR Plus (0.5 to 1.5 qt)
Dimethoate 267 (1.5 pts)	Sevin 80S (0.63 to 1.875 lb)
Dimilin* 25W and 2L (2 oz)	Silencer* (3.2 to 3.84 oz)
Lambda-Cy EC* (3.2 to 3.84 oz)	Warrior* (3.2 to 3.84 oz)

Green Cloverworm and Loopers

CDD has never seen large numbers of cloverworm or loopers in Michigan soybean.

Description: Pale green caterpillar with 2 white stripes running along side of body; ~1 inch long.

Life cycle: In early spring, adults lay eggs singly on underside of leaves; larvae feed on foliage.

Type of damage: Newly hatched larvae feed on the underside of leaves. As they grow they chew through the leaves.

Management: Biological -many natural enemies and diseases.

Threshold: Rough guideline is 25% or more defoliation throughout entire field.

For more information: <http://www.entm.purdue.edu/Entomology/ext/targets/e-series/EseriesPDF/E-78.pdf>

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

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|----------------------------------------------------------------------------|------------------------------------------------------|
| Ambush 25W* (3.2 to 6.4 fl oz) | Leverage 2.7* (3.8 oz) and 360* (2.8 oz) |
| Arctic 3.2 EC (2 to 4 oz) | Lorsban 4E* and Advanced* (0.5 to 1 pt) |
| Asana XL* (2.9 to 5.8 fl oz) | Mustang Max EC* and EW* (2.8 to 4 oz) |
| <i>Bt</i> = <i>Bacillus thuringiensis</i> (check product labels for rates) | Nufos 4E* (0.5 to 1 pt) |
| [Agree WG, Dipel ES/ DF, Javelin WG, Xentari DF] | Orthene 75S (1 to 1.33 lbs) or 90S (0.83 to 1.1 lbs) |
| Baythroid 2* and XL* (0.8 to 1.6 oz) | Orthene 97 (0.75 to 1 lb) |
| Brigade 2EC* (2.1 to 6.4 oz) | PennCap-M* (2 to 3 pt) |
| Capture 2EC* (2.1 to 6.4 oz) | Permethrin/ Perm-Up 3.2EC* (2 to 4 oz) |
| Carbaryl 4L (1 to 2 pt) | Pounce 3.2EC* (2 to 4 oz) |
| Chlorpyrifos 4E* (0.5 to 1 pt) | Pounce 25WP* (3.2 to 6.4 oz) |
| Cobalt* (7 to 13 oz) | Proaxis* (1.92 to 3.2 oz) |
| Dimilin 25W* and 2L* (2 to 4 oz) | Radiant SC (2 to 4 oz) |
| Entrust (1.25 to 2 oz) | Sevin 4F and XLR Plus (0.5 to 1 qt) |
| Intrepid 2F (4 to 8 oz) | Sevin 80S and 80WSP (0.63 to 1.25 lb) |
| Lambda-Cy EC* (1.92 to 3.2 oz) | Silencer* (1.92 to 3.2 oz) |
| Lannate LV* (0.4 to 0.75 pt) or SP* (0.125 to 0.5 lb) | Tracer (1 to 2 oz) |
| Larvin 3.2* (10 to 30 fl oz) | Warrior* (1.92 to 3.2 oz) |

Japanese Beetle

Although Japanese beetle feeding is common, CDD has never seen a commercial field actually over threshold.

Description: Adult is metallic green or bronze with reddish wing-covers and tufts of white hair down the side; approx. ¼ inch long

Life cycle: Wide host range; one generation per year.

Type of damage: Adults feed on leaf tissue between veins, giving ‘skeletonized’ appearance

Sampling/scouting: Look at several areas of field to assess defoliation, rather than a single area, as feeding is not uniform throughout field; consider upper and lower leaves in your assessment

Threshold: Feeding by Japanese beetle alone usually not sufficient to warrant treatment; a general threshold is 25% defoliation due to combined feeding from Japanese beetles and other insects such as bean leaf beetles, grasshoppers, etc.

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

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|------------------------------------------|----------------------------------------|
| Ambush 25W* (6.4 to 12.8 fl oz) | Mustang Max EC* and EW* (2.8 to 4 oz) |
| Arctic 3.2 EC (2 to 4 oz) | PennCap-M* (3 to 4 pt) |
| Asana XL* (5.8 to 9.6 fl oz) | Permethrin/ Perm-Up 3.2EC* (2 to 4 oz) |
| Baythroid 2* and XL* (1.6 to 2.8 oz) | Pounce 3.2EC* (2 to 4 oz) |
| Brigade 2EC* (2.1 to 6.4 oz) | Pounce 25WP* (3.2 to 6.4 oz) |
| Capture 2EC* (2.1 to 6.4 oz) | Proaxis* (3.2 to 3.84 oz) |
| Carbaryl 4L (1 to 2 pt) | Sevin 4 F and XLR Plus (0.5 to 1 qt) |
| Cobalt* (19 to 38 oz) | Sevin 80S and 80WSP (0.63 to 1.25 lb) |
| Lambda-Cy EC* (3.2 to 3.84 oz) | Silencer* (3.2 to 3.84 oz) |
| Leverage 2.7* (3.8 oz) and 360* (2.8 oz) | Warrior* (3.2 to 3.84 oz) |

Mexican Bean Beetle (MBB)

MBB is rare on soybeans in Michigan.

Description: Adult – oval beetle, ~1/2 inch long, yellow/orange with 16 small black spots on wings; larvae – bright yellow grubs with dark bristly spines.

Life cycle: Adults overwinter in crop debris, woodlots, etc.

Type of damage: Chewing pest; larvae and adults feed on undersides of leaves and between veins, giving leaf a lacy appearance.

Management: Greatest potential for yield loss from flowering through pod fill; dry hot summers may reduce populations.

Threshold: 25% or more defoliation throughout field, or 1 or more adults per plant in established plants.

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

Ambush 25W* (3.2 to 6.4 oz)	Lorsban 4E* and Advanced* (1 to 1.5 pt)
Arctic 3.2 EC (2 to 4 oz)	Mustang Max EC* and EW* (2.8 to 4 oz)
Asana XL* (2.9 to 5.8 fl oz)	Nufos 4E* (1 to 2 pt)
Baythroid 2* and XL* (1.6 to 2.8 oz)	Orthene 75S (1 to 1.33 lbs) or 90S (0.83 to 1.1 lbs)
Carbaryl 4L (1 to 2 pt)	Orthene 97 (0.5 to 1 lb)
Chlorpyrifos 4E* (1 to 1.5 pt)	PennCap-M* (2 to 3 pt)
Cobalt* (19 to 38 oz)	Permethrin/ Perm-Up 3.2EC* (2 to 4 oz)
Dimethoate 267 (1.5 pt) or 4EC, 400 (1 pt)	Pounce 3.2 EC (2 to 4 oz)
Dimilin 25W* or 2L* (2 to 4 oz)	Pounce 25WP* (3.2 to 6.4 oz)
Lambda-Cy EC* (1.92 to 3.2 oz)	Proaxis* (1.92 to 3.2 oz)
Lannate LV* (0.4 to 0.75 pt) or SP* (0.125 to 0.5 lb)	Sevin 4F and XLR Plus (0.5 to 1 qt) or 80WSP (1.25 lb)
Larvin 3.2* (18 to 30 fl oz)	Silencer* (1.92 to 3.2 oz)
Leverage 2.7* (3.8 oz) and 360* (2.8 oz)	Warrior* (1.92 to 3.2 oz)

Potato Leafhopper (PLH)

Not an important pest of commercial soybeans in Michigan. May damage sensitive breeding lines or specialty beans.

Description: Small, bright green, torpedo shaped insects. Fast moving - often move in a “crab-like” fashion. Nymphs resemble adults but are lime green/ yellow, much smaller, lack wings.

Life cycle: Adults are carried into Michigan from the south on weather fronts in May/early June. May colonize alfalfa and other hosts prior to soybean seedling emergence. Females lay eggs in soybean leaf veins and petioles. Multiple overlapping generations.

Type of damage: Adults and nymphs suck plant sap, causing leaf edges to become yellowish and cupped (curled downward and inward); greatest injury often seen in border rows adjacent to alfalfa.

Management: Cultural – ‘hairy’ soybean cultivars interfere with PLH feeding.

Threshold: 1 or more PLH per trifoliate leaf, and leaves show first signs of cupping.

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

Ambush 25W* (3.2 to 6.4 fl oz)	Mustang Max EC* and EW* (2.8 to 4 oz)
Arctic 3.2 EC (2 to 4 oz)	Orthene 75S (0.67-1.33 lbs), 90S (0.56-1.1 lbs), 97 (0.5-1.0 lb)
Asana XL* (2.9 to 5.8 fl oz)	Permethrin/ Perm-Up 3.2EC* (2 to 4 oz)
Baythroid 2* and XL* (0.8 to 1.6 oz)	Pounce 3.2EC* (2 to 4 fl oz)
Brigade 2EC* (2.1 to 6.4 oz)	Pounce 25WP* (3.2 to 6.4 oz)
Capture 2EC* (1.6 to 6.4 oz)	Proaxis* (1.92 to 3.2 oz)
Carbaryl 4L (2 pt)	Sevin 4F and XLR Plus (1 qt)
Cobalt* (19 to 38 oz)	Sevin 80S and 80WSP (1.25 lb)
Dimethoate 4EC and DiGon 400 (1 pt) or 267 (1.5 pt)	Silencer* (1.92 to 3.2 oz)
Lambda-Cy EC* (1.92 to 3.2 oz)	Warrior* (1.92 to 3.2 oz)
Leverage 2.7* (3 oz) and 360* (2.8 oz)	
Lorsban 4E* and Advanced* (1 to 2 pt)	

Seedcorn Maggot

Seedcorn maggot is a localized problem, depending on fresh organic matter and cool, wet conditions.

Description: Larva- small (1/4 inch), white maggot; adult – small gray fly.

Life cycle: Overwinter as pupae in soil; adults emerge as flies in early spring, lay eggs in disturbed soil with decaying organic matter. Multiple generations.

Type of damage: Maggots feed on germinating seed; may cause variable emergence, stand loss, delayed development, or plants with two main stems (Y-plants).

Conditions favoring damage: Cool wet soil (delays germination), soils high in organic matter from cover crop or manure.

Management: Cultural - decreased potential for injury in reduced tillage fields; Chemical- seed treatment before planting is the easiest control method and can be used in air blast planters. Planter box treatments are also effective in conventional planters, but can't be used with air blast planters. Seed and planter box treatments often come mixed with fungicides. Be sure that the insecticide is applied at the amount recommended when a prepared mixture is used. Soil insecticides (Phorate, Thimet or Temik) applied for nematode control will also control seedcorn maggot.

Threshold: None. Treat soybeans planted into soils high in organic matter.

See Soybean seed treatment table on page 10 for a list of products to control seedcorn maggot.

Slugs

Only a problem under cool and wet conditions.

Type of damage: May damage seedlings by feeding on stems, cotyledons, and leaves; up to 40% defoliation can be tolerated in pre-bloom plants, but if growing point is killed, stands can be significantly reduced.

Conditions favoring damage: Planting into wheat stubble or other heavy crop residue, or into a field with recent history of slug damage; cool, wet conditions

Threshold: No established threshold; consider treating if slug damage threatens to reduce stand density below an acceptable level.

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

Deadline MP's 4% Bait (10 to 40 lb)

Snail and Slug Pellets 3.5% Bait (various products and rates)

Soybean Aphid

A key yield-limiting pest in outbreak years.

Type of damage: Aphids are sucking pests that remove plant sap. Soybean aphids can reproduce rapidly, resulting in hundreds of aphids per leaf; this population level appears to reduce pod number, beans per pod, and bean size. Heavily infested plants are coated with sticky honeydew and black sooty mold, and may also exhibit top-down symptoms of potassium deficiency (yellow leaf margins, leaf cupping, stunting).

Conditions favoring damage: Dry conditions increase the impact of aphid feeding. Earlier-infested (early July), late-planted (June) and potassium deficient fields are at greater risk for yield loss if aphid-infested.

Management: In some years, aphid populations are held in check by a combination of natural enemies and fungal pathogens. Proper fertility, esp. potassium levels, may delay aphid increase or reduce aphid damage.

Sampling: Fields should be sampled multiple times to determine if populations are increasing. Count the number of SBA per plant, or use the 'Speed Scouting' technique at http://www.soybeans.umn.edu/crop/insects/aphid/aphid_sampling.htm

Threshold: 250 aphids per plant on vegetative through R5 stage beans, with INCREASING APHID POPULATIONS. In practical terms, aphids should be common (on most or all plants) and abundant (several hundred aphids per plant). The threshold provides a ~7 day treatment window.

Timing: Timing is critical. Spraying too early (below the 250 threshold) potentially disrupts natural enemies, leading to higher aphid populations and re-application later in the season. If fields are sprayed too late (honeydew, sooty mold), yield has already been lost. Sprays in late August often do not result in yield increases compared to unsprayed trials.

Product Efficacy: It is important to get excellent coverage when treating for aphids - use the highest pressure and gal/ acre practical when spraying, and choose a nozzle type recommended for insecticide coverage. When tank-mixing insecticides with other products, be sure to maximize the application for insecticide coverage.

List of recommended insecticides, *RUP (rate per acre): PHIs are given in [square parentheses]**(Seed treatments are listed on page 9)**

Asana XL* (5.8 fl. oz) [21]	Lorsban 4E* and Advanced* (1 pt) [28]
Baythroid 2* and XL* (2 to 2.8 oz) [30]	Mustang Max EC* and EW* (3.2 to 4 oz) [21]
Bifenture EC* (2.1 to 6.4 oz) [18]	Nufos 4E* (1 pt) [28]
Brigade 2EC* (2.1 to 6.4 oz) [18]	Orthene 75S (1-1.33 lbs), 90S (0.83-1.1 lbs), 97 (0.5-1.0 lb)
Capture 2EC (2.1 to 6.4 oz) [18]	PennCap-M* (1 to 3 pts) [20]
Chlorpyrifos 4E* (1 pt) [28]	Proaxis* (1.92 to 3.2 oz) [30]
Cobalt* (13 to 26 oz) [30]	Silencer* (3.2 oz) [30]
Lambda-Cy EC* (1.92 to 3.2 oz) [30]	Warrior* (3.2 oz) [30]
Leverage 2.7* (3.8 oz) and 360* (2.8 oz) [45]	

Spider Mites**Mite outbreaks occur in certain years, normally later in the season under hot, dry conditions.****Description:** Very small, wingless, 8-legged invertebrate. Two-spotted spider mite is greenish yellow to orange with 1 large black spot on each side of body.**Life cycle:** Adults overwinter in field borders and sheltered areas; in spring, move to new growth and lay eggs on underside of leaves; may spread by crawling or be blown by wind; all stages feed on plants; populations can expand quickly.**Type of damage:** Sucking pest; insert mouthparts into individual plant cells, resulting in small speckled yellow spots (stippling)**Conditions favoring damage:** Prolonged dry, hot weather.**Sampling/scouting:** Look for mites on underside of leaves using hand lens, or tap leaves over a piece of paper; webbing may be present on leaves if population is high.**Management:** Biological – a natural fungal pathogen may infect and kill mites under warm, humid conditions.**Threshold:** Based on damage levels.*Level 1:* Mites barely detected, found only on undersides of leaves in dry locations or on edges of fields.

Assessment: Non-economic.

Level 2 = Mites easily found on undersides of leaves, still only in dry locations or on field edges. Leaves are still green, but stippling injury is detectable on undersides of leaves of infested plants.

Assessment: Non-economic, but keep monitoring.

Level 3 = All plants infested when examined closely, exhibiting varying levels of stippling, even on healthy leaves. Some speckling and discoloration of lower leaves. Field margins and dry areas exhibit severe damage.

Assessment: Rescue treatment is warranted, especially if many immature mites and eggs are present.

Level 4 = All plants heavily infested when examined closely. Discolored and wilted leaves easily found throughout the field. Severe damage evident.

Assessment: Effective rescue treatment will save field.

Level 5 = Extremely high numbers. Field discolored, leaves drying down. Significant foliage and stand loss.

Assessment: Rescue treatment may not save field. However, new growth may resume if treated.

Notes: Mites are difficult to control chemically. Most insecticides kill mites, but not eggs; newly hatched nymphs can thus repopulate after treatment. Insecticides do kill natural mite predators, leading to ‘flaring’ of mite populations after a spray. Repeated spraying can lead to resistance. If soybean aphid populations are also heavy, dimethoate is not the recommended choice to control both pests.**List of registered insecticides, *RUP (rate per acre):**

Bifenture EC* (5.12 to 6.4 oz)	Cobalt* (13 to 26 oz – see supplemental label)
Brigade 2EC* (5.12 to 6.4 oz)	Dimethoate 267 (1.5 pt) or 4EC, 400 (1 pt)
Capture 2EC* (5.12 to 6.4 oz)	Lorsban 4E* and Advanced* (0.5 to 1 pt)
Chlorpyrifos 4E* (0.5 to 1 pt)	Nufos 4E* (0.5 to 1 pt)

Thrips

Although common on plants, CDD has never seen thrips over threshold in any field crop.

Description: Adult – small, slender, brown and white banded abdomen, narrow fringed wings; larva – wingless, yellow/orange.

Life cycle: Adults move into Michigan on airstreams in the spring. Females insert eggs into plant tissue.

Type of damage: Most obvious early in season; adult & nymph rasping/sucking mouthparts scrape cells on leaf underside, leaving silvery scratches which may turn leaves brown; young leaves may appear crinkled.

Conditions favoring damage: Hot dry weather coupled with large thrips populations.

Management: Biological – natural enemies (minute pirate bugs, predacious thrips and mites).

Threshold: Rough guideline – treat when 30% of plants have thrips and some drying of leaves is seen.

Notes: Young plants can generally outgrow feeding injury; damage may be confused with some types of herbicide injury.

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

Baythroid 2* and XL* (0.8 to 1.6 oz)	Orthene 75S (0.33 to 0.67 lbs) or 90S (0.28 to 0.56 lbs)
Brigade 2EC* (2.1 to 6.4 oz)	Orthene 97 (0.5 to 1.0 lb)
Capture 2EC* (2.1 to 6.4 oz)	PennCap-M* (2 to 3 pt)
Carbaryl 4L (2 pt)	Proaxis* (1.92 to 3.2 oz)
Cobalt* (19 to 38 oz)	Sevin 4 F and XLR Plus (1 qt)
Lambda-Cy EC* (1.92 to 3.2 oz)	Sevin 80S and 80WSP (1.25 lb)
Lannate LV* (0.75 to 1.0 pt) or SP* (0.25 to 0.5 lbs)	Silencer* (1.92 to 3.2 oz)
Leverage 2.7* (3.8 oz) and 360* (2.8 oz)	Warrior* (1.92 to 3.2 oz)
Mustang Max EC* and EW* (3.2 to 4.0 oz)	

Wireworms

Wireworms are a localized problem, often depending on previous crop.

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

Life cycle: Immature form of click beetle; found in grasslands, sod, or fallow fields. Wireworms can spend 2 to 6 years in the larval stage, during which they feed on underground parts of plants.

Type of damage: Feeds on seeds, preventing germination. Also feeds on roots.

Sampling/ scouting: Scout for wireworms with a bait station at least one week before planting.

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

Threshold: One or more wireworms per bait trap.

See soybean seed treatment table on page 10 for a list of products to control wireworm.

Insecticides Registered on Soybean

Trade Name	Common Name	Class	Registered for:	PHI days	REI hrs	Precautions and Remarks
Ambush (RUP)	permethrin	Pyr	BLB, cloverworm, cutworm, Japanese beetle, MBB, PLH	60	12	Maximum 24 oz per acre per season. Do not graze or feed forage.
Arctic 3.2 EC	permethrin	Pyr	BLB, cloverworm, cutworm, Japanese beetle, MBB, PLH	60	12	Maximum 0.4 lb a.i. per acre per season.
Asana XL (RUP)	esfenvalerate	Pyr	BLB, cloverworm, cutworm, grasshoppers, Japanese beetle, MBB, PLH, SBA	21	12	Do not exceed 38 oz per acre per season. Do not graze or feed forage to livestock.
Bt [Agree, Dipel, Javelin, Xentari]	<i>Bacillus thuringiensis</i>	Bio	armyworm, cloverworm	0	4	Use only to control small armyworms when populations are light. Full coverage is important.
Baythroid 2 & XL (RUP)	cyfluthrin & beta-cyfluthrin	Pyr	armyworm, BLB, cutworm, grasshopper, cloverworm, JB, MBB, PLH, SBA, thrips	45	12	Maximum 11.2 oz per acre per season. Max 4 applications per season.
Bifenture EC (RUP)	bifenthrin	Pyr	mites, SBA	18	12	Max 19.2 oz per acre per season
Brigade 2EC Capture 2EC (RUP)	bifenthrin	Pyr	armyworm, BLB, cutworm, grasshopper, cloverworm, JB, MBB, mites, PLH, thrips	18	12	Maximum 0.2 lbs a.i. per acre per season.
Carbaryl 4L	carbaryl	Carb	armyworm, BLB, cloverworm, cutworm, grasshopper, MBB, PLH, thrips	21	12	Similar to Sevin (below)
Chlorpyrifos 4E (RUP)	chlorpyrifos	OP	See Lorsban 4E	28	24	Similar to Lorsban 4E (below)
Cobalt (RUP)	chlorpyrifos + gamma cyhalothrin	OP Pyr	armyworm, BLB, cloverworm, cutworm, grasshoppers, JB, MBB, PLH, SBA, spider mite	30	24	Max 85 oz per acre per season.
Deadline MPs	metaldehyde	other	slugs	--	12	Broadcast by ground or air every 3 to 4 weeks during season as needed. For best results apply in the evening, preferably after a rain or irrigation. Keep children, pets, and poultry away from treated areas.
Dimethoate	dimethoate	OP	BLB, grasshoppers, MBB, mites, PLH	21	48	Full coverage is not required when using dimethoate.
Dimilin 25W & 2L (RUP)	diflubenzuron	IGR	cloverworm, grasshoppers, MBB	21	12	Do not graze or feed forage to livestock. Maximum 2 applications per season. Dimilin inhibits molting of larvae. 3-7 days may be required before populations are reduced.
Empower 2 (RUP)	bifenthrin	Pyr	cutworm, seedcorn maggot, wireworm	3	24	Maximum 0.2 lbs a.i. per acre per season.
Entrust	spinosad	Bio	armyworm, cloverworm, loopers	28	4	Max 0.18 lb active per acre per year. Do not feed treated vines to livestock.
Govern 4E (RUP)	chlorpyrifos	OP	Same as Lorsban 4E	28	24	Maximum 6 pt per acre per season.
Intrepid 2F	methoxyfenoxyfenozide	other	armyworm, cloverworm, loopers	14	4	Max 64 oz per acre per season. Max 4 applications per season.
Lambda-Cy EC (RUP)	lambda-cyhalothrin	Pyr	Same as Warrior	30	24	Max 7.68 oz per acre per season.

Trade Name	Common Name	Class	Registered for:	PHI days	REI hrs	Precautions and Remarks
Lannate LV & SP (RUP)	methomyl	Carb	BLB, cloverworm, MBB, thrips	14	48	Maximum 3 applications per crop.
Larvin 3.2 (RUP)	thiodicarb	Carb	armyworm, BLB, MBB, cloverworm, cutworm,	28	12	Do not exceed 120 pints per acre per season. Do not feed treated forage to livestock.
Leverage 2.7 & 360 (RUP)	imidacloprid + cyfluthrin	Nic Pyr	BLB, cloverworm, grasshoppers, JB, MBB, SBA	45	12	2.7 = Max 11.4 oz per acre per season; 360 = max 9 oz per acre per season. Retreatment interval = 7 days.
Lorsban 4E & Advanced (RUP)	chlorpyrifos	OP	armyworm, BLB, cloverworm, cutworm, grasshoppers, MBB, mites, SBA	28	24	Maximum 6 pt per acre per season. Do not graze or feed forage to livestock.
Mustang Max EC, EW (RUP)	zeta cypermethrin	Pyr	armyworm, BLB, cloverworm, cutworm, grasshoppers, MBB, PLH, SBA, thrips	21	12	Maximum 24 oz per acre per season. Do not graze treated areas or feed forage. Retreatment interval = 7 days.
Nufos 4E (RUP)	chlorpyrifos	OP	Same as Lorsban 4E	28	24	Maximum 6 pints per acre per season.
Orthene 75S, 90S, 97	acephate	OP	Armyworm, BLB, grasshopper, MBB, PLH, SBA	14	24	Do not graze or cut vines for hay or forage. Maximum 4 lbs a.i. per acre per season.
Permethrin 3.2AG Perm-up 3.2EC (RUP)	permethrin	Pyr	BLB, cloverworm, cutworm, Japanese beetle, MBB, PLH	60	12	Maximum 16 oz. per acre per season. Do not graze treated areas or feed forage.
Pounce (RUP)	permethrin	Pyr	armyworm, BLB, cloverworm, cutworm, Japanese beetle, MBB, PLH	60	12	Max 24 oz per acre per season. Do not graze or feed forage.
Proaxis (RUP)	gamma cyhalothrin	Pyr	armyworm, BLB, cloverworm, cutworm, hoppers, Japanese beetle, MBB, PLH, SBA, thrips	30	24	Max 0.03 lb a.i. per acre per season. Do not graze or feed forage.
Radiant SC	spinetoram	Bio	armyworm, cloverworm	28	4	Do not apply more than 14 oz and 4 applications per acre per year. Retreatment interval = 4 days.
Sevin	carbaryl	Carb	armyworm, BLB, cloverworm, cutworm, grasshoppers, Japanese beetle, MBB, PLH, thrips	21	12	Do not mix with 2,4-DB herbicides.
Snail and Slug Pellets	metaldehyde	other	slugs	--	12	May apply every 2 weeks or as needed. Do not allow pellets to contact edible portion of plant. Keep children, pets, and poultry away from treated areas.
Silencer (RUP)	lambda-cyhalothrin	Pyr	Same as Warrior	30	24	Max 7.68 oz per acre per season.
Tracer	spinosad	other	armyworm, cloverworm	28	4	Max 6 oz per acre per season. Do not feed treated forage.
Warrior w/ ZeonTech (RUP)	lambda-cyhalothrin	Pyr	armyworm, BLB, cloverworm, cutworm, grasshopper, Japanese beetle, MBB, PLH, SBA, thrips	30	24	Max 7.68 oz per acre per season. Do not graze or feed forage.