

Corn (field & seed) Insect Pests

Aphids

Although aphids are common on corn, populations are rarely high enough to cause damage

Description: Small oval to pear shaped soft-bodied insects, varying shades of green. Have cornicles (“tailpipes”) at rear end.

Life cycle: During the summer, all aphids are female and do not need to mate to reproduce; females produce live young (parthenogenesis). Multiple overlapping generations.

Type of damage: Sucks plant sap from leaves, removing water and nutrients. In heavy infestations, honeydew secretions may result in sticky leaves, whorls, and tassels, inhibiting pollen shed and weakening plants.

Conditions favoring damage: Drought stress may be amplified by aphids removing plant sap.

Management: Biological = natural enemies (ladybugs, lacewings, and wasps) and diseases generally keep populations in check. Heavy rainfall may also reduce the population.

Scouting: Check twenty groups of five plant

Threshold: General guidelines - Consider control if you find 50-400 corn leaf aphids per plant on 50% of the plants, or when there is one colony (group) of aphids or more per plant large enough to make the leaves sticky, but before milk stage.

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

Asana XL* (5.8 to 9.6 fl oz)	Lambda-Cy EC* (2.56 to 3.84 oz)
Bifenture EC* (2.1 to 6.4 oz)	Lannate LV* (0.75 to 1.5 pt) or SP* (0.25 to 0.5 lb)
Brigade 2EC* (2.1 to 6.4 oz)	Lorsban 4E* and Advanced* (1 to 2 pt)
Capture 2EC* (2.1 to 6.4 oz)	Malathion 5EC (1.5 pt)
Cobalt* (13 to 26 oz)	Malathion 8 Aquamul (1 pt) or 8F (1 pt)
Dimethoate 4EC and 400 (0.67 to 1 pt)	Silencer* (2.56 to 3.84 oz)
Dimethoate 267 (1.0 to 1.5 pt)	Warrior w/ ZeonTech* (2.56 to 3.84 oz)

Armyworm

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

Description: Caterpillars variable in color (black/brown/green), up to 1 ½ inches long. Narrow, light stripe across back and broad stripes running down sides of body.

Life cycle: Eggs are laid on the lower leaves of grasses, especially in the headlands of small grains. Larvae feed on leaves of weeds and corn, molting several times. Larvae pupate in the soil and adults emerge in about one week. There are two to three generations per year, the first in late May to early June. The first generation is most damaging.

Conditions favoring damage: Reduced tillage corn fields; corn near small grain fields.

Type of damage: Larvae feed on leaf margins, sometimes completely defoliating plants and leaving only the midrib. Corn plants usually recover if growing point is not injured, but a severe infestation can defoliate a field in two days.

Scouting: Mainly active at night and during overcast days. During the day, larvae often hide in the whorl, at the base of plants and under debris.

Management: Good weed control, especially grasses in the field and along field borders, reduces likelihood of severe infestation.

Threshold: Treat when 25% of plants have 2 or more larvae per whorl, OR 75% of plants have 1 larvae. Treat only if caterpillars are less than 1.25 inch in length. May be able to limit spray to the field edge, if armyworms invade from another field or grassy border.

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

Ambush 25W* (6.4 to 12.8 oz)	Lannate LV* (0.75 to 1.5 pt) and SP* (0.25 to 0.5 lb)
Arctic 3.2EC* (4 to 8 oz)	Lorsban 4E* and Advanced* (1 to 2 pt)
Asana XL* (5.8 to 9.6 fl oz)	Lorsban 15G (6 to 8 oz per 1000 row ft, into whorl)
Bt - <i>Bacillus thuringiensis</i> (check specific products for rates) [Dipel, Javelin, Lepinox, Xentari]	Mustang Max EC* and EW* (3.2 to 4.0 oz)
Baythroid 2* & XL* (1.6 to 2.8 oz, controls 1 st - 2 nd instar larvae)	Perm-UP 3.2 EC* (4 to 8 oz)
Bifenture EC* (2.1 to 6.4 oz)	Pounce 3.2EC* (4 to 8 fl oz)
Brigade 2EC* (see label for rate)	Pounce 25WP* (6.4 to 12.8 oz)
Capture 2EC* (2.1 to 6.4 oz) or 1.15G (3.5 to 8.7 lbs into whorl)	Proaxis * (2.56 to 3.84 oz)
Capture LFR (0.2 to 0.39 oz/ 1,000 row feet)	Radiant SC (3 to 6 oz)
Cobalt* (13 to 26 oz)	Sevin 4F or XLR Plus (1 to 2 qt)
Entrust (0.5 to 2 oz/ acre)	Sevin 80S and 80WSP (1.25 to 2.5 lb)
Intrepid 2F (4 to 8 oz)	Silencer* (2.56 to 3.84 oz)
Lambda-Cy EC* (2.56 to 3.84 oz)	Warrior w/ ZeonTech* (2.56 to 3.84 fl oz)

Billbugs

CDD rarely even sees billbug feeding in Michigan.

Description: Adult weevil is gray/brown/black ¼ to ½ inch long

Life cycle: One generation per year. Adults overwinter along field borders. Emergence occurs during corn planting and continues for about five weeks. Eggs are then laid in the soil or in holes eaten in the corn. After hatching, larvae feed on the root crown and go through five to six instars before pupating. Adults emerge between mid summer and fall.

Conditions favoring damage: Small, young plants much more susceptible. Non-rotated corn, reduced tillage corn, field borders, and areas with nutsedge are at greater risk for injury.

Type of damage: Adults create feeding slits on the lower stem and the leaf whorl. When leaves open may see rows of oval-shaped holes (long, oval shot-holing). Larvae feed on the root crown and may severely reduce yield.

Management: Cultural - Crop rotation is an excellent practice because adult billbugs are slow and don't move far. Control of nutsedge and alternate host is highly recommended. Early planting may get corn through susceptible early stages before billbugs emerge.

Threshold: Treat when one-third of small plants or more show feeding of billbugs. Localized treatment on field margins will reduce the amount of insecticide needed.

Special Note: Counter, Furadan, or Lorsban used pre- and at-planting for corn rootworm control will aid in billbug control.

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

Counter CR* & 15G* (see labels for specific rates)

Lorsban 15G (see label for pre- and at-planting rates)

Cereal Leaf Beetle Adults (CLB)

Cereal leaf beetles are managed by biological control. CDD has never seen CLB on corn in Michigan.

Description: Adult up to 1/4 inch long; black body, metallic blue wing covers, a red pronotum (neck), and orange-red legs with black tarsi (feet). Eggs- very tiny, oblong; yellow to brown. Larvae- Up to ¼ inch long pale yellow to black, usually covered in fecal material to camouflage themselves. First discovered in Berrien County in 1962.

Life cycle: Adults overwinter in plant stubble and in cracks and crevices such as under tree bark. Mating occurs during warm spring temperatures and eggs are laid on the upper surface of the grain leaves. Larvae feed for about two weeks and move to the soil to pupate. If soil moisture is high they may pupate on the plant. These adults emerge in late June and feed for about 3 weeks, then become sedentary. One generation per year.

Type of damage: Adults feed on the surface of leaves, between the veins, rarely causing economic damage.

Conditions favoring damage: Beetles usually abundant in the margins of corn fields adjacent to heavily infested small grain fields.

Management: Biological ~ wasp parasitoids, lady beetles and various other natural enemies.

Threshold: Treat areas where leaves of whorl stage corn are whitened ("frosted") from feeding beetles (i.e. over 50% defoliation).

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

Bifenture EC* (2.1 to 6.4 oz)

Malathion ULV (4 to 8 fl oz) or 8 Aquamul (1 pt)

Brigade 2EC* (2.1 to 6.4 oz)

Mustang Max EC* and EW* (2.72 to 4 oz)

Capture 2EC* (2.1 to 6.4 oz)

Proaxis * (2.56 to 3.84 oz)

Cobalt* (13 to 26 oz)

Silencer* (2.56 to 3.84 oz)

Lambda-Cy EC* (2.56 to 3.84 oz)

Warrior w/ ZeonTech* (2.56 to 3.84 oz)

Corn Rootworm (CRW) Adults

CRW beetles may silk clip. Of greatest concern in seed corn fields and in continuous corn with heavy larval pressure.

Description: Adult beetles about 1/4 inch long; color varying from yellow with spots (southern CR), yellow with black stripes (western CR), or green (northern CR).

Life cycle: Overwinter as eggs in the soil. Eggs hatch in late May to early June. Larvae feed on corn roots for about three weeks; pupation lasts for about two weeks. Adults emerge in early July and feed through the summer; emergence peaks around late July-August. Adults mate soon after emergence, females continue to lay eggs until death.

Type of damage: Adults prefer feeding on silks, but also feed on leaves, and soft kernels.

Conditions favoring damage: Planting corn after corn. Late-planted corn with fresh silks later in the season.

Threshold: Treat only when silks are clipped shorter than 0.5 inch before pollination occurs and if adults are still active.

List of registered insecticides for Corn Rootworm Adults, *RUP (rate per acre):

Ambush 25W* (6.4 to 12.8 fl oz)	Lorsban 4E* and Advanced* (1 to 2 pt)
Arctic 3.2EC* (4 to 8 oz)	Malathion ULV (4 fl oz) or 8 Aquamul (1pt)
Asana XL* (5.8 to 9.6 fl oz)	Mustang Max EC* and EW* (2.72 to 4 oz)
Baythroid 2* and XL* (1.6 to 2.8 oz)	Perm-UP 3.2 EC* (4 to 8 oz)
Bifenture EC* (2.1 to 6.4 oz)	Pounce 3.2 EC* (4 to 8 fl oz)
Brigade 2EC* (2.1 to 6.4 oz)	Pounce 25 WP* (6.4 to 12.8 oz)
Capture 2EC* (2.1 to 6.4 oz)	Proaxis * (2.56 to 3.84 oz)
Cobalt* (13 to 26 oz)	Sevin 4F and XLR Plus (1 to 2 qt)
Dimethoate 4EC and 400 (0.67 to 1 pt), 267EC (1 to 1.5 pts)	Sevin 80S and 80WSP (1.25 to 2.5 lb)
Lambda-Cy EC* (2.56 to 3.84 oz)	Silencer* (2.56 to 3.84 oz)
Lannate LV* (0.75 to 1.5 pt) or SP* (0.25 to 0.5 lb)	Warrior w/ ZeonTech* (2.56 to 3.84 oz)

Corn Rootworm (CRW) Larvae

A key pest in some fields and regions. For the most part, crop rotation still is the best option in Michigan to control CRW.

Description: Small, white larvae with a brown head, 3 pairs of short legs.

Life cycle: Overwinter as eggs in the soil. Eggs hatch in late May to early June. Larvae feed on corn roots for about three weeks; pupation lasts for about two weeks. Adults emerge in early July and feed through the summer. Eggs laid in soil of fields.

Type of damage: Small larvae feed on root hairs, tips. Larger larvae feed inside large roots, and can severely prune entire nodes of roots. Root loss leads to plant stress from poor water and nutrient uptake. Poor root formation also leads to lodging of plants, harvest problems.

Conditions favoring damage: Planting corn after corn. Late-planted corn with fresh silks later in the season (attract females for egg laying). Damage to rotated corn occasionally occurs in fields with lush growth of alfalfa, soybeans, or weeds during August and September of the previous year, and that are immediately adjacent to heavily infested fields.

Scouting: Count adult rootworms in the current season as a way to predict the threat of the pest the following season as a way to predict the threat of the pest the following season (described in MSU bulletin E-2438). You are strongly urged to make this count if you plan to grow corn after corn and apply a soil insecticide the following year if necessary.

Management: Cultural ~ Crop rotation remains the most effective way to control CRW.

Threshold: When scouting the current-season's corn to predict need for a soil insecticide the next season, 1 beetle per plant. When scouting soybean, yellow sticky trap catches or more than 5 CRW per trap per day in late July- August suggests the need for rootworm control in next years' corn crop. In the current season, a rating scale is used to evaluate root damage after-the-fact, and assess performance of soil insecticides.

Note: Damage from rotation-resistant variant of western corn rootworm is an increasing problem in southern Berrien, Branch, Calhoun, Cass, Kalamazoo, St. Joseph, and Van Buren Counties. Treatment of such fields may be warranted. Please notify your county MSU Extension agent to report damage in rotated corn and to get current scouting/ treatment recommendations.

See seed treatment section (pg 8-9) for information on transgenic Bt corn options and refuge requirements.

List of registered insecticides, *RUP (rate based on a 30-inch row spacing – method of placement)

Insecticide Placement:

B = seven inch Band placed behind press wheel

BC = Broadcast and incorporated.

IF = In-Furrow

PPI= Pre-Plant Incorporate

T = Seven inch band placed in front of press wheel (T-band)

Aztec 2.1G* (6.7 oz/ 1,000 row feet - T, B, IF)

Force 3G* (4 to 5 oz/ 1,000 row feet - T, B, IF)

Aztec 4.67G* (3 oz / 1,000 row feet – T, B, IF)

Fortress 5G* (3 to 4.5 oz/ 1,000 row ft - T, IF)

Bifenture EC* (0.3 oz/ 1,000 feet of row – T)

Lambda-Cy EC* (0.66 oz/ 1,000 row feet – IF, T)

Brigade 2EC* (0.3 oz / 1,000 row feet - T)

Lorsban 15G (8 oz/1,000 row feet - T, B, IF, Cult)

Capture 2EC* (0.3 oz / 1,000 row feet - T)

Lorsban 4E* (2 pt/acre - Cult) or (6 pt/acre - PPI)

Capture 1.15 G (6.4 to 8 oz/ 1,000 row feet - T)

Lorsban 4E* (2.4 oz/ 1,000 row feet - T)

Capture LFR (0.39 to 0.49 oz/ 1,000 row feet T, IF)

Proaxis * (0.66 oz / 1,000 row feet – IF, T)

Cobalt* (38 to 42 oz/ 1,000 row feet Cult)

Regent 4SC* (0.24 oz/ 1,000 row feet – IF)

Counter CR* (see label for methods and rates)

Silencer* (0.66 oz/ 1,000 row feet – IF, T)

Counter 15G* (see label for methods and rates)

Warrior w/ ZeonTech* (0.66 oz/ 1,000 row feet – IF, T)

Empower 2* 6.4 to 8 oz/ 1,000 row feet

Cutworms

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

Description: Several species, including black, dinghy, and variegated cutworms. Black cutworm is most common - larvae (caterpillar) up to 2 inches in length. Variable coloration (gray to black), 4 tubercles per body segment, inner tubercles smaller than the outer tubercles.

Life cycle: Adult moths migrate into Michigan in early spring. Females lay eggs on low-growing weeds (for example, chickweed) or crop debris. Small larvae first feed on weeds, then may move to the crop when larger, or after weed-kill. Several generations per season.

Type of damage: Small larvae create shot holes in the leaves. Older larvae feed on the leaves (variegated) or cut seedlings (black cutworms), reducing stand development. Older plants usually not as affected by cutting as small seedlings. Larvae generally feed at night, and can tunnel into the lower stalk.

Conditions favoring damage: Low, dense weeds in field (egg laying site for females), areas with high crop residue, planting into plowed sod or pasture, cover crops, wet areas, no-till, and late-planted corn after soybeans.

Sampling/ scouting: Begin scouting as soon as corn seedlings emerge. Look for wilted or cut plants; determine percent seedlings damaged. Dig around base of nearby seedlings to identify larvae.

Management: Biological - parasitoids attack older larvae, while ground beetle larvae and adults prey on cutworm larvae. Chemical – rescue (post-planting) treatment is effective and is the preferred option as populations vary from year to year and by location.

Threshold: Treat when five percent or more of plants show cutworm damage.

Special Note: Insecticides applied at planting for corn rootworm control may also control cutworms. See product labels.

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

Ambush 25W* (6.4 to 12.8 fl oz)	Lorsban 4E* and Advanced* (1 to 2 pt)
Arctic 3.2EC* (4 to 8 oz)	Mustang Max EC* and EW* (1.28 to 2.8 oz)
Asana XL* (5.8 to 9.6 fl oz)	Perm-UP 3.2 EC* (4 to 8 oz)
Baythroid 2* and XL* (0.8 to 1.6 oz)	Pounce 3.2EC*(4 to 8 fl oz)
Bifenture EC* (2.1 to 6.4 oz)	Pounce 25WP* (6.4 to 12.8 oz)
Brigade 2EC* (rate varies by application method))	Proaxis* (1.92 to 3.2 oz foliar or 0.66 oz/1,000 row ft – IF, T)
Capture 2EC* (2.1 to 6.4 oz)	Radiant SC (3 to 6 oz)
Capture LFR (0.2 to 0.39 oz/ 1,000 row feet)	Sevin 4F and XLR Plus (2 qt)
Cobalt* (13 to 26 oz foliar)	Sevin 80S and 80WSP (2.5 lb)
Cobalt* (at planting, see label for specific rates)	Silencer* (1.92 to 3.2 oz)
Intrepid 2F (4 to 8 oz)	Warrior w/ ZeonTech* (1.92 to 3.2 oz foliar)
Lambda-Cy EC* (1.92 to 3.2 oz)	

Flea Beetle

Direct damage is rarely of concern. Seed

Description: Small, shiny black beetles, with enlarged back legs for jumping

Life cycle: Adults overwinter, emerge in the spring. Lay eggs in soil around corn plants. Larvae feed and pupate in soil. Several generations per year.

Type of damage: Beetles feed on the upper leaf surface, leaving white streaking or scratches on leaf epidermis. Beetles also carry and spread Stewarts wilt bacteria – generally not a problem in field corn, but can cause symptoms (linear yellow lesions, wilting, stunting) and yield loss in seed, sweet, and Indian corn.

Conditions favoring damage: mild winters favor survival of both adults and the Stewarts wilt bacteria

Threshold: Treat when half of seedling plants or more show feeding and there are 5 or more beetles per plant

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

Ambush 25 W* (6.4 to 12.8 oz)	Mustang Max EC* and EW* (2.72 to 4 oz)
Arctic 3.2EC* (4 to 8 oz)	Perm-UP 3.2 EC* (4 to 8 oz)
Asana XL* (5.8 to 9.6 fl oz)	Pounce 3.2EC* (4 to 8 fl oz)
Baythroid 2* and XL* (0.8 to 1.6 oz)	Pounce 25WP* (6.4 to 12.8 fl oz)
Bifenture EC* (2.1 to 6.4 oz)	Proaxis * (2.56 to 3.84 oz)
Brigade 2EC* (2.1 to 6.4 oz)	Sevin 4F and XLR Plus (1 to 2 qt)
Capture 2EC* (2.1 to 6.4 oz)	Sevin 80S and 80WSP (1.25 to 2.5 lb)
Cobalt* (13 to 26 oz)	Silencer* (2.56 to 3.84 oz)
Lannate LV* (0.75 to 1.5 pt) or SP* (0.25 to 0.50 lb)	Warrior w/ ZeonTech* (2.56 to 3.84 oz)
Lorsban 4E* and Advanced* (1 to 2 pt)	

European Corn Borer (ECB)

Pest status: Common insect. Outbreaks in some years and at some locations.

Description: Adult ~ white to brown moths with waves brown lines on wings. Eggs ~ white, pinhead sized, laid in masses, overlapping like fish scales. Larvae ~ whitish body with black heads, up to an inch when full grown.

Life cycle: Mature larvae overwinter in corn stubble, debris and soil, pupate occurs in late spring. Adult moths emerge in May. Females lay eggs of the 1st generation on the undersides of corn leaves. Eggs hatch within 5-7 days, larvae feed on the leaves or in the whorl. Mature larvae tunnel into stalk to complete development. 1st generation adults emerge, mate, and females lay 2nd generation eggs. 2nd generation larvae bore into the stalk, ear shank, and ear. In most locations of Michigan there are two generations (usually one generation in the UP). ECB have over 200 species of hosts besides corn, and they can be found in weeds, potatoes, peppers, apples, and small grains.

Type of damage: 1st Generation = Shot holing in the leaves by feeding on the whorl, then tunneling into stalk. 2nd generation = Larvae tunnel into the stalk, shank, and ear. Stalk tunneling weakens plant, disrupts water flow, and creates entry wounds for stalk rot fungus.

Conditions favoring damage: Early-planted (taller) fields at risk for 1st gen.; late-planted (shorter) fields at risk for 2nd gen.

Sampling/ scouting: 1st Generation = Mark off 5 sets of 20 consecutive plants. Count the number of plants with ECB feeding, and unroll some whorls to make sure live larvae are still present. 2nd Generation = Mark off 5 sets of 20 consecutive plants and examine each plant for ECB egg masses.

Management: Biological control - Many insect predators as well as birds, bats, and small mammals eat ECB. Parasitoids and pathogens are also common. Cultural- Stalk shredding and plowing reduce number of overwintering moths, but have little impact on subsequent generations. HPR – Resistant hybrids and early crop maturity also help suppress ECB. Transgenic - Bt hybrids effectively kill ECB; non-Bt corn refuge areas must be planted nearby to reduce the chance of resistance to Bt.

Threshold: A decision to treat for ECB depends on many factors including percent infestation, stage of plant and insect growth, and expected yield. The following general guidelines should be used only if the more accurate method cannot be followed. *First Generation* – (last half of June) 50% or more of plants show early feeding (small, whitish marks on the leaves / shot-holing). *Second Generation* (late July) - eggs present on 50% or more of plants and early feeding is first seen.

Note: Timing is critical for ECB control. Large larvae (1/2 in long or longer) are usually deep in the whorls or leaf sheaths, and cannot be reached by insecticides. Do not try to control large larvae.

See seed treatment section (pg 8-9) for information on transgenic Bt corn options and refuge requirements.

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

Ambush 25W* (6.4 to 12.8 fl oz)

Arctic 3.2EC* (4 to 8 oz)

Asana XL* (7.8 to 9.6 fl oz)

Bt - *Bacillus thuringiensis* (check specific products for rates)

[Dipel, Javelin, Lepinox, Xentari]

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

Bifenture EC* (2.1 to 6.4 oz)

Brigade 2EC* (2.1 to 6.4 oz)

Capture 2EC* (2.1 to 6.4 oz)

Capture 1.15G* (3.5 to 8.7 lbs / acre directed into whorl)

Cobalt* (26 to 38 oz)

Empower 2* (3.5 to 8.7 lbs/ acre directed into whorl - 1st generation)

Entrust (0.5 to 2 oz)

Intrepid 2F (4 to 8 oz)

Lambda-Cy EC* (2.56 to 3.84 oz)

Lorsban 4E* and Advanced* (1.5 to 2 pt)

Mustang Max EC* and EW* (2.72 to 4 oz)

Perm-UP 3.2 EC* (4 to 8 oz)

Pounce 3.2EC* (4 to 8 fl oz)

Pounce 25WP* (6.4 to 12.8 oz)

Proaxis * (2.56 to 3.84 oz)

Radiant SC (3 to 6 oz)

Regent 4SC* (0.24 oz / 1,000 feet of row)

Sevin 4F and XLR Plus (1.5 to 2 qt)

Sevin 80S and 80WSP (1.87 to 2.5 lb)

Silencer* (2.56 to 3.84 oz)

Warrior w/ ZeonTech* (2.56 to 3.84 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: 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.

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: Treat when there are five grasshoppers or more per plant. In tasseled plants, treat when large numbers of hoppers are feeding on the upper leaves.

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

Asana XL* (5.8 to 9.6 fl oz)	Malathion 5EC (1.5 pt), 8F and Aquamul (1pt)
Baythroid 2* and XL* (2.1 to 2.8 oz)	Malathion ULV (8 fl oz)
Bifenture EC* (2.1 to 6.4 oz)	Mustang Max EC* and EW* (2.72 to 4 oz)
Brigade 2EC* (2.1 to 6.4 oz)	Proaxis * (2.56 to 3.84 oz)
Capture 2EC* (2.1 to 6.4 oz)	Sevin 4F or XLR Plus (0.5 to 1.5 qt)
Cobalt* (13 to 26 oz)	Sevin 80S and 80WSP (0.66 to 1.875 lb)
Dimethoate 4EC / 400 (1 pt), 5lb (12.8 oz), or 267 (1.5 pts)	Silencer* (2.56 to 3.84 oz)
Lambda-Cy EC* (2.56 to 3.84 oz)	Warrior w/ ZeonTech* (2.56 to 3.84 oz)
Lorsban 4E* and Advanced* (0.5 to 1 pt)	

Japanese beetle adults

Japanese beetle defoliation of corn in Michigan is not a concern. However, silk clipping can be a problem.

Description: Various, depending on species. Japanese beetle is metallic green or bronze with reddish wing-covers and tufts of white hair down the side.

Life cycle: Japanese beetle and rose chafer have many host plants. Larvae (grubs) feed underground on roots. Adult emerge mid-summer, and feed on leaves, flowers, and pollen. One generation per year.

Type of damage: Adults clip silks. Severe clipping can reduce pollination. Adults also feed on leaves, giving them a skeletonized appearance. However, leaf feeding usually doesn't cause economic damage.

Scouting: Randomly examine plants in five areas of the field. Note length and maturity of the silks.

Management: Typically do not cause enough damage to warrant treatment.

Threshold: Treat if unpollinated silks are pruned to within one-half inch of the husk.

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

Baythroid 2* and XL* (1.6 to 2.8 oz)	Mustang Max EC* and EW* (2.72 to 4 oz)
Bifenture EC* (2.1 to 6.4 oz)	Proaxis * (2.56 to 3.84 oz)
Brigade 2EC* (2.1 to 6.4 oz)	Sevin 4F and XLR Plus (1 to 2 qt)
Capture 2EC* (2.1 to 6.4 oz)	Sevin 80S and 80WSP (1.25 to 2.5 lb)
Cobalt* (38 to 42 oz)	Silencer* (2.56 to 3.84 oz)
Lambda-Cy EC* (2.56 to 3.84 oz)	Warrior w/ ZeonTech* (2.56 to 3.84 oz)

Mites

Mite outbreaks occur in certain years, normally later in the season under hot, dry conditions.

Description: Tiny, wingless, 8-legged; two-spotted spider mite is greenish yellow to orange with 2 black spots on body.

Life cycle: Adults overwinter in field borders and sheltered areas. In spring, adults move to new growth and lay eggs on underside of leaves. Mites spread by crawling or blowing in the wind. Populations can increase quickly in hot, dry weather.

Type of damage: Sucking pest. Adults and nymphs insert mouthparts and feed in individual plant cells, resulting in small speckled yellow spots (stippling), water loss, and leaf damage.

Conditions favoring damage: Prolonged dry, hot weather

Sampling/scouting: Look for mites on undersides 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 can infect and wipe out large mite populations.

Threshold: Treat when one-third of plants or more have mites and when the first yellowing of the leaves appears.

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

Bifenture EC* (5.12 to 6.4 oz)	Comite (2 to 3 pt)
Brigade 2EC* (5.12 to 6.4 oz)	Dimethoate 4EC, 400 (0.67 to 1 pt) or 267EC (1 to 1.5 pt)
Capture 2EC* (5.12 to 6.4 oz)	Dimethoate 5lb (8.4 to 12.8 oz)

Seedcorn Maggot

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

Description: Larva is a small (1/4 inch), white maggot, with no legs or visible head; adult is a small gray fly.

Life cycle: Overwinter as pupae in soil. Adult flies emerge in early spring, laying eggs in disturbed soil with decaying organic matter. Larvae feed on decaying matter or seeds. Several generations per year.

Type of damage: Maggots feed on germinating seed; may cause variable emergence, stand loss and delayed development.

Conditions favoring damage: Cool wet soil (delays germination) or any other factor that slows germination; soils high in organic matter from cover crop or manure.

Management: Cultural – Shallow seeding in prepared, warm soil decreases potential for injury. Delay planting into cover crops until after organic matter decomposition.

Threshold: Treat where corn is planted in soils high in organic matter where manure has been applied, or fields that have a heavy growth of green plant material plowed down in the spring.

List of registered insecticides, *RUP (rate based on a 30-inch row - placement)

Insecticide Placement:

*B = Seven-inch Band placed behind press wheel BC = Broadcast and incorporated.
IF = In-Furrow PPI= Pre-Plant Incorporate
T =Seven-inch band placed in front of press wheel (T-band)*

See the seed treatment section (pg 7) for additional maggot control products.

Aztec 2.1G* (6.7 oz/ 1,000 row feet - T, B, IF)	Empower 2* (rate varies with application method - see label)
Aztec 4.67G* (3 oz/ 1,000 row feet - T, B, IF)	Force 3G* (4 to 5 oz/ 1,000 row feet - T, B, IF)
Bifenture EC* (0.15 to 0.3 oz/ 1,000 feet of row – T)	Fortress 5G* (3.0/ 1,000 row feet - T, IF)
Brigade 2EC* (may be applied PPI with herbicides – see label)	Lambda-Cy EC* (0.66 oz/ 1,000 row feet – IF, T)
Capture 1.15G* (rate varies with application method - see label)	Lorsban 4E* (4 pt/ acre preplant, 2.6 pts/ acre – T)
Capture 2EC* (0.15 to 0.3 oz/ 1,000 row feet - T)	Lorsban 15G (8 oz/ 1,000 row feet – B, IF)
Capture LFR (0.2 to 0.39 oz/ 1,000 row feet)	Proaxis * (0.66 oz / 1,000 row ft – IF, T)
Cobalt* (2.87 oz/ 1,000 row ft - T)	Regent 4SC* (0.24 oz/ 1,000 row feet – IF)
Counter CR* (4.5 to 6 oz/ 1,000 row feet - T, B, IF)	Silencer* (0.66 oz / 1,000 feet of row - T, IF)
Counter 15G* (6 to 8 oz/ 1,000 row feet - T, B, IF)	Warrior w/ ZeonTech* (0.66 oz / 1,000 row feet - T, IF)

Slugs

Only a problem under cool and wet conditions, especially in fields with a history of slug pressure.

Description: 1-2 inches, usually gray to brown in color.

Life cycle: Overwinter as eggs and adults. Females deposit egg masses in soil; these hatch in about one month. Multiple overlapping generations.

Type of damage: May damage seeds and seedlings by feeding on stems, cotyledons, and leaves; heavy feeding on the whorl stage corn may inhibit stand development and reduce yield. Damage often occurs at night.

Conditions favoring damage: Cool, wet conditions in the spring; planting into wheat stubble or other heavy crop residue, or into a field with recent history of slug damage.

Sampling/ scouting: No established method. Note slime trails on the foliage and soil.

Threshold: No thresholds have been established for slugs in corn. Consider treatment if slug damage threatens to reduce plant vigor or stand density below an acceptable level.

List of registered insecticides (rate per acre)

Deadline MPs 4% bait (10 to 40 lb)
Snail and Slug Pellets 3.5% bait (products and rates vary)

Stalk Borers

CDD has never heard of damaging levels of stalk borer in Michigan.

Description: Larvae purple to black. Front half of body is generally darker than rear-half. White stripe down back. Adult moths are dull, white.

Life cycle: Overwinter as eggs. Small larvae tunnel into grasses and other weeds, large larvae may move to corn. Larvae pupate inside tunnels, emerging as moths in August. Eggs (overwinter) deposited on weeds. Stalk borers have a wide host range, and will feed on several hundred different broadleaf and grassy weeds.

Type of damage: Stalk tunneling by larvae – kills small plant outright. Tunneling in larger plants causes “dead heart” (a dead whorl). Infestations can also cause stunting, tillering, and other development problems.

Conditions favoring damage: Corn after corn, grassy field edges, or buffer strips.

Management: Biological - Many insect predators and pathogens. Cultural – mowing field edges to remove egg-laying sites.

Chemical – insecticides can sometimes be applied to field margins, rather than the entire field.

Threshold: Treat when one-third of plants or more show early damage from stalk borers.

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

Ambush 25W* (6.4 to 12.8 oz)

Arctic 3.2EC* (4 to 8 oz)

Asana XL* (5.8 to 9.6 oz)

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

Capture 2EC* (2.1 to 6.4 oz)

Capture LFR (0.2 to 0.39 oz/ 1,000 row feet)

Cobalt* (38 to 42 oz)

Lambda-Cy EC* (2.56 to 3.84 oz)

Lorsban 4E* and Advanced* (2 pt)

Mustang Max EC* and EW* (2.72 to 4 oz)

Pounce 3.2EC* (4 to 8 fl oz)

Pounce 25WP* (6.4 to 12.8 oz) or WSP* (1 to 2 sol. bags)

Proaxis* (2.56 to 3.84 oz)

Regent 4SC* (0.24 oz / 1,000 feet of row)

Silencer* (2.56 to 3.84 oz)

Warrior w/ ZeonTech* (2.56 to 3.84 oz)

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; larvae – resemble adults, but are wingless, yellow/orange

Life cycle: Adults move into corn in the spring. Females insert eggs in plant tissue. Larvae and adults both feed on corn. Multiple, overlapping generations.

Type of damage: Most obvious early in season; adult & nymph rasping/sucking mouthparts scrape cells of leaves, stalks and husks, causing silvery lesions. Severe injury may cause stunting. Injury at the base of ears may cause poor quality, under-developed ears susceptible to secondary infection.

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

Management: Biological – many natural enemies (minute pirate bugs, predacious thrips and mites) attack thrips. Chemical control not usually recommended.

Threshold: None. A tremendous number of thrips would have to be present to cause damage.

Western Bean Cutworm (WBC)

An emerging pest of corn in Michigan. Damage has been found in west and mid-Michigan (roughly in line with I-127/ I-75). Moths were trapped across Michigan to the Canadian border in 2009.

Description: Adults (moths) fly at night and have a distinctive pattern of a dot, crescent, and white bar on the front wing. Eggs are laid on corn plants. Larvae are tan or pinkish, and at first glance appear to be a huge corn borer.

Life cycle: Larvae feed in the later part of the season, attacking the ear in August and September. Larval feeding ends in mid-September, and caterpillars drop to overwinter in the soil. There is one generation per year.

Type of damage: Young larvae feed on tassels and silks. Larval survival is much greater if egg hatch corresponds to presence of tassels and silks. Older larvae feed in the ear. Damage is distinctive – larvae often tunnel in the side of the ear, directly tunneling through kernels. There may be multiple caterpillars per ear. Feeding damage allows other insects and fungi to attack. Damaged ears have an increased risk of quality reduction from mycotoxins.

Sampling/ scouting: Adults should be surveyed using a milk jug trap with a pheromone lure (purchase from Great Lakes IPM, Vestaburg MI). When moths are first collected, scout fields for egg masses and young larvae in the tassel.

Management: Herculex-type Bt corn for European corn borer provides good control of WBC, although some caterpillars may survive and feeding damage may occur to kernels.

Threshold: 5% of plants with an egg mass or young larvae in the tassel. If tassels have not yet emerged, wait to spray until most tassels have emerged. After tasselling, time application for when 70-90% of eggs have hatched. Note - the lower threshold of 5% (versus 8% used in western states) is based on potentially greater survival of WBC in the Great Lakes region.

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

Ambush 25W* (6.4 to 12.8 oz)

Asana XL* (2.9 to 5.8 oz)

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

Bifenture EC* (2.1 to 6.4 oz)

Capture 2EC* (2.1 to 6.4 oz)

Cobalt* (13 to 26 oz)

Lambda-Cy EC* (1.92 to 3.2 oz)

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

Mustang Max EC* and EW* (1.76 to 4 oz)

Perm-UP 3.2 EC* (2 to 4 oz)

Pounce 3.2EC* (2 to 4 oz)

Pounce 25WP* (3.2 to 6.4 oz)

Proaxis* (1.92 to 3.2 oz)

Radiant SC (3 to 6 oz)

Silencer* (1.92 to 3.2 oz)

Warrior w/ ZeonTech* (1.92 to 3.2 oz)

White Grubs

White grubs are a localized problem, often depending on soil type.

Description: White, C-shaped larvae of scarab beetles (includes Japanese, May/ June, European chafer beetles). Up to one inch long in last instar. Orange to brown head.

Life cycle: JB and chafer ~ Adults emerge in mid-summer, lay eggs in fields and turf. Grubs feed until the ground freezes, reaching largest stage in late fall. Grubs resume feeding in early spring, can do considerable damage to small plants. Chafer pupates in late May, JB feeds a little longer. May/June beetle ~ remain in larval stage for several years in undisturbed grassy areas and fallow fields.

Type of damage: Prune small roots and damage larger roots. Corn can wilt, or occasionally turn purple due to inability to take up phosphorus. Severe injury lead to plant death.

Conditions favoring damage: May/June beetles ~ Fields following an established grass, planting into fallow areas.

Sampling/ scouting: Dig one-foot square samples several inches deep and check for grubs. Also watch for grubs moved to the surface when plowing in the spring.

Management: Cultural = spring and fall plowing of established sod is recommended before planting; Chemical = soil insecticide generally not required, but rescue treatments are ineffective.

Threshold: General guideline, minimum of 1 grub per square foot.

See list of registered insecticides on next page

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

Insecticide Placement:

B = seven inch Band placed behind press wheel *BC = Broadcast and incorporated.*
T = seven inch band in front of press wheel (T-band)
IF = In-Furrow *PPI= Pre-Plant Incorporate*

See the seed treatment section (pg 7) for additional grub control products.

Aztec 2.1G* (6.7 oz/ 1,000 feet of row - T, B, IF)	Empower 2* (rate varies with application method - see label)
Aztec 4.67G* (3 oz/ 1,000 feet of row - T, B, IF)	Force 3G* (4 to 5 oz/ 1,000 feet of row - T, B, IF)
Bifenture EC* (0.15 to 0.3 oz/ 1,000 feet of row - T)	Fortress 5G* (3.0 to 3.75 oz/ 1,000 feet of row - T, IF)
Capture 2EC * (rate varies with application method -see label)	Lambda-Cy EC* (0.66 oz/ 1,000 row feet - IF, T)
Capture 1.15G* (rate varies with application method -see label)	Lorsban 15G (8 oz/ 1,000 feet of row - T, IF)
Capture LFR (0.2 to 0.39 oz/ 1,000 row feet - T, I, F)	Proaxis* (0.66 oz / 1,000 feet of row - T, IF)
Cobalt* (2.87 oz/ 1,000 row ft - T)	Regent 4SC* (0.24 oz / 1,000 feet of row - IF)
Counter CR* (4.5 to 6 oz/ 1,000 feet of row - T, IF)	Silencer* (0.66 oz / 1,000 feet of row - T, IF)
Counter 15G* (6 to 8 oz/ 1,000 feet of row - T, IF)	Warrior w/ ZeonTech* (0.66 oz / 1,000 feet of row - T, IF)

Wireworms

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

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

Life cycle: Wireworms are the immature form of click beetles; found in grasslands, sod, or fallow fields. Wireworms can spend several years in the immature stage. Overlapping generations.

Type of damage: Feed on newly-planted corn seeds as well as roots of established corn. May tunnel into the base of seedlings below the soil surface.

Conditions favoring damage: Porous, well drained loam soils. Corn planted into long-standing fallow fields & pasture.

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

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

Threshold: It using bait trap, one or more wireworm per trap. Otherwise, consider treating when wireworms are seen while plowing old pasture or fields that had grasses, or where damage has occurred previously.

For more information: http://www.ipm.msu.edu/CAT02_fld/FC5-16-02.htm

List of registered insecticides, *RUP (rate based on 30-inch row - placement)

Insecticide Placement:

B = seven inch Band placed behind press wheel *BC = Broadcast and incorporated.*
IF = In-Furrow *PPI= Pre-Plant Incorporate*
T = seven inch band placed in front of press wheel (T-band)

See the seed treatment section (pg 7) for additional wireworm control products.

Aztec 2.1G* (6.7 oz/ 1,000 feet of row - T, B, IF)	Counter 15G* (8 oz/ 1,000 feet of row - T, IF, B)
Aztec 4.67G* (3 oz/ 1,000 feet of row - T, B, IF)	Empower 2* (rate varies with application method - see label)
Bifenture EC* (0.15 to 0.3 oz/ 1,000 feet of row - T)	Force 3G* (4 to 5 oz/ 1,000 feet of row - T, B, IF)
Capture 2EC * (rate varies with application method -see label)	Fortress 5G* (3.0 to 3.75 oz/ 1,000 feet of row - T, IF)
Capture 1.15G* (rate varies with application method -see label)	Lorsban 15G (8 oz/ 1,000 feet of row - T, IF, B)
Capture LFR (0.2 to 0.39 oz/ 1,000 row feet - T, I, F)	Lambda-Cy EC* (0.66 oz/ 1,000 row feet - IF, T)
Cobalt* (2.87 oz/ 1,000 row ft - T)	Regent 4SC* (0.24 oz / 1,000 feet of row - IF)
Counter CR* (4.5 to 6 oz/ 1,000 feet of row - T, IF, B)	

Herbicide / Organophosphate (OP) insecticide compatibility chart

Herbicide	Soil-applied OP ¹					Foliar-applied OP	
	Counter 15G	Counter CR in-furrow	Counter CR T-band	Lorsban 15G	Other OPs	⁴ Days before herbicide	⁵ Days after herbicide
<i>Accent Q</i>	DNU	DNU	NR	T	T	7	3
<i>Beacon</i>	DNU	DNU	NR	T	T	10	7
<i>Callisto (foliar)</i>	DNU	DNU	NR	T	T ³	7	7
<i>Capreno</i>	DNU	DNU	DNU	DNU	T	7	7
<i>Equip</i>	DNU	DNU	DNU	T	T	7	7
<i>Hornet WDG (soil-applied)</i>	DNU	DNU	DNU	T ³	T ³	NA	NA
<i>Hornet WDG (foliar-applied)</i>	DNU	DNU	DNU	T ³	T ³	10	10
<i>Option</i>	DNU	DNU	DNU	T	T	7	7
<i>Python</i>	DNU	DNU	DNU	T	T	NA	NA
<i>Require Q</i>	DNU	DNU	DNU	T	T	60	60
<i>Resolve</i>	DNU	DNU	NR	NR	T	7	3
<i>Resolve Q</i>	DNU	DNU	DNU	T	T	60	60
<i>Steadfast Q</i>	DNU	DNU	NR	NR	T	7	3
<i>Unity</i>	DNU	DNU	NR	DNU	T	NA	NA

¹ DNU = Do Not Use. Do not apply herbicide to corn treated with soil applied OP; severe injury may result.
 NR = Not Recommended to make an application of herbicide to corn treated with soil applied OP.
 T = Temporary injury may result from application of herbicide to corn treated with soil applied OP.
 NA = not applicable -- = no information

2 *Aztec & Force* do not appear to interact with herbicides, and can be used without risk of injury.

3 OP insecticides should be banded to reduce risk of crop injury.

4 Foliar-applied OP can be safely applied this many days BEFORE herbicide treatment

7 Foliar-applied OP can be safely applied this many days AFTER herbicide treatment

Insecticides Registered for Corn (field and seed)

Trade name	Common name	Class	Recommended for:	PHI days	REI hrs	Precautions and Remarks
Ambush 25W (RUP)	permethrin	Pyr	armyworm, CRW adults, cutworm, ECB, flea beetle, stalk borers, WBC	30	12	Do not apply more than 0.6 lb a.i. per acre per season. Allow minimum of six days between treatments. PHI for forage is 0 days.
Arctic 3.2 EC (RUP)	permethrin	pyr	Armyworm, CRW adults, cutworm, ECB, flea beetle, stalk borer	30	12	Same precautions as Ambush (above).
Asana XL (RUP)	esfenvalerate	Pyr	aphids, armyworm, CRW adults, cutworm, ECB, flea beetle, grasshoppers, stalk borer, WBC	21	12	Maximum 48 oz per acre per season.
Aztec 2.1G (RUP)	tebupirim-phos + cyfluthrin	OP Pyr	CRW larvae, seedcorn maggot, white grubs, wireworm	--	48	Maximum of 7.3 lbs per acre per season.
Aztec 4.67G (RUP)	tebupirim-phos + cyfluthrin	OP Pyr	CRW larvae, seedcorn maggot, white grubs, wireworm	--	48	Maximum of 3.27 lbs per acre per season.
Bt [Dipel, Javelin, Lepinox, Xentari]	<i>Bacillus thuringiensis</i>	Bio	armyworm, ECB	0	4	Use only to control small armyworm when populations are low. Full spray coverage is needed.
Baythroid 2 & XL (RUP)	cyfluthrin & beta cyfluthrin	Pyr	armyworm, CRW adults, cutworm, ECB, flea beetle, grasshopper, JB adults, stalk borer, WBC	21	12	Maximum of 11.2 oz per acre per season.
Bifenture EC (RUP)	bifenthrin	Pyr	See Brigade and Capture	30	12	Max 19.2 oz total per acre per season.
Brigade 2EC (RUP)	bifenthrin	Pyr	aphids, armyworm, CLB, CRW adults, CRW larvae, cutworm, ECB, flea beetle, grasshopper, JB adults, mites, seedcorn maggot, stalk borer, white grub, wireworm, WBC	30	12 -EC	Max 19.2 oz EC total per acre per season .
Capture 2EC, 1.15G (RUP)					24 -G	Note that the REI for detasseling and roging seed corn treated with Capture 1.15G is 18 DAYS.
Cobalt (RUP)	chlorpyrifos + gamma cyhalothrin		aphids, armyworm, billbug, CLB, CRW, cutworm, ECB, flea beetle, grasshopper, JB adults, seedcorn maggot, stalk borer, WBC, white grub, wireworm	21	24	
Comite	propargite	other	mites	30	168 = 7 days	Max 1 application per season. Apply when corn leaves are dry to prevent crop injury. Rotation interval to small grains is 82 days. Rotation interval to other crops is 6 months, unless propargite is registered on that crop.
Counter CR, 15G (RUP)	terbufos	OP	billbugs, CRW larvae, ECB, seedcorn maggot, white grub, wireworm	30	48	Maximum 6.5 lb 20 CR per acre.
Deadline MPs 4% bait	metalde-hyde	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.

Trade name	Common name	Class	Recommended for:	PHI days	REI hrs	Precautions and Remarks
Dimethoate 4EC, 400, 5 lb, 267 EC	dimethoate	OP	CRW adults, grasshoppers, mites	14	48	Maximum 2 applications per season. Do not apply during pollen shed if bees are actively foraging in field. Dimethoate is systemic and full coverage is not required. Several generics available.
Empower 2 (RUP)	bifenthrin	Pyr	CRW larvae, ECB, seedcorn maggot, white grub, wireworm	30	24	Note that the REI for detasseling and roging seed corn treated with Empower is 18 DAYS.
Entrust	spinosad	Bio	Armyworm, ECB	28	4	Max 3.75 oz per acre per year.
Force 3G (RUP)	tefluthrin	Pyr	CRW larvae, seedcorn maggot, white grubs, wireworm	--	0	Use only high rate for severe infestations. Apply in-furrow for best control. Do not apply within 20 yards of water.
Fortress 5G (RUP)	chlor- ethoxyfos	OP	CRW larvae, seedcorn maggot, white grubs, wireworm	--	48	Rotation interval is 30 days. For optimal control apply IF. Fortress 5G is available in closed handling system.
Intrepid 2F	methoxy- fenozone	Other	armyworm, cutworm, ECB	30	24	Maximum of 8.7 lbs per acre at planting. Maximum of 26.1 lbs per acre per season.
Lambda-Cy EC (RUP)	lambda cyhalothrin	Pyr	See Warrior	21	24	Max 0.96 pt per acre per year. See label for further restrictions by crop stage.
Lannate LV & SP (RUP)	methomyl	carb	aphids, armyworm, CRW adults, flea beetle	21	48	
Lorsban 15G	chlor- pyrifos	OP	armyworm, billbugs, CRW larvae, ECB, seedcorn maggot, stalk borers, white grubs, wireworm, WBC	35	24	Maximum 3 lb per acre per season. For best control, apply as an in-furrow treatment.
Lorsban 4E and Advanced (RUP)	chlor- pyrifos	OP	aphids, armyworm, billbugs, CRW adults; CRW larvae, cutworms, ECB, flea beetle, grasshoppers, seedcorn maggot, stalk borers	21	24	Max 6 pts (4E) or 6.38 pts (Adv) per acre per season. Do not apply with Steadfast herbicide.
Malathion 8F, 5EC, 8 aquamul, ULV	malathion	OP	aphids, CLB, CRW adults, grasshoppers, thrips	5	12	
Mustang Max EC, EW (RUP)	zeta- cypermethrin	Pyr	aphids, armyworm, CRW adults, cutworms, ECB, flea beetles, grasshoppers, stalk borer, WBC	30	12	Max rate 16 oz per acre per season. , see label.
Perm-UP 3.2 EC (RUP)	permethrin	Pyr	See Pounce	30	12	Max 24 oz per acre per season. Retreatment interval = 6 days.
Pounce 3.2EC, 25WP (RUP)	permethrin	Pyr	armyworm, CRW adults, cutworm, ECB, flea beetle, stalk borers, WBC	30	12	Max 24 oz per acre per season. Retreatment interval = 6 days.
Proaxis (RUP)	gamma cyhalothrin	Pyr	armyworm, CLB, CRW adults, CRW larvae, cutworms, ECB, flea beetle, hoppers, Japanese beetle, seedcorn maggot, stalk borer, white grub, WBC	21	24	

CORN

Trade name	Common name	Class	Recommended for:	PHI days	REI hrs	Precautions and Remarks
Radiant SC	spinetoram	Bio	armyworm, cutworm, ECB, WBC	28	4	PHI for forage is only 3 days. Max 16 oz per acre per year.
Regent 4SC (RUP)	fipronil	Other	CRW larvae, ECB, stalk borers, seedcorn maggot, white grubs, wireworms	90	24	Do not apply on row spacings LESS THAN 30 INCHES. Do not apply to sweet corn or popcorn. Do not plant small grains or other rotational crops within 12 months following application. Regent will aid in control of first-generation corn borer.
Sevin 4 F, XLR Plus 80 S, 80 WSP	carbaryl	Carb	armyworm, CRW adults, cutworms, ECB, flea beetles, grasshoppers, Japanese beetle,	48	12	Maximum 4 applications per season. . Preharvest interval is 48 days for fodder, 14 days for grazing and silage.
Silencer (RUP)	lambda cyhalothrin	Pyr	See Warrior	21	24	Max 0.96 pt per acre per year. See label for further restrictions by crop stage.
Snail and Slug Pellets 3.5% bait	metaldehyde	other	slugs	---	12	May apply every 2 weeks or as needed. Broadcast pellets and wet soil before or after application. Do not allow pellets to contact edible portion of plant. Keep children, pets, and poultry away from treated areas.
Thimet / Phorate 20 G (RUP)	phorate	OP	white grubs, wireworms	30	48	For suppression of wireworms only. Maximum two applications per season.
Warrior w/ ZeonTech (RUP)	lambda cyhalothrin	Pyr	armyworm, CLB, CRW adults, CRW larvae, cutworms, ECB, flea beetle, hoppers, Japanese beetle, seedcorn maggot, stalk borer, white grub, WBC	21	24	Max 0.96 pt per acre per year.