Small Grain insect pests

Aphids

Although aphids are common in the fall and spring, populations are rarely high enough to merit treatment, especially if field are planted after the fly-free date.

Description: Small oval to pear shaped soft-bodied insects with cornicles ("tailpipes") at the back of the body. Color varies from bright green to pink to brown, depending on species.

Life cycle: Aphids present during the field season are all female, and do not need to mate to reproduce; females give birth to live young. Multiple overlapping generations.

Type of Damage: Sucks plant sap from leaves and stems. Heavy infestation may lead to yellowing/browning, stunting, curling of new leaves, and general weakening of plants. Aphids are also virus vectors.

Scouting: See MSU Bulletin E-2549, Insect Management in Wheat and Other Small Grains, for details on the presence/absence scouting method and decision table.

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

Threshold: General guideline is 12 – 15 aphids per tiller during seedling to boot stage.

Note: Although grain aphids can transmit barley yellow dwarf virus (= red leaf in oats), this is generally not a problem in the fall in Michigan. Also, insecticides usually do not stop transmission of the virus. Aphids should be sprayed only when they are numerous enough to directly threaten yield in the spring and summer.

See page 10 in the seed treatment section to determine the impact of seed treatments on aphids.

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

Baythroid 2* and XL* (1.8 to 2.4 oz) *Wheat only.*
Cobalt* (7 to 13 oz) *Wheat only*
Cruiser 5FS (0.75 to 1.33 oz / CWT) *Wheat & Barley only*
Dimethoate 4 EC, 400 (0.5 to 0.75 pt) *Wheat only.*
Dimethoate 5lb (6.4 to 9.6 oz) *Wheat only*
Lambda-Cy EC* (2.56 to 3.84 oz)
Lannate LV* (0.75 to 1.5 pt) or SP* (0.25 to 0.5 lb)
Malathion 5EC (1.5 pt) or 57EC (1.5 to 2 pt)
Malathion 8 Aquamul (1.25 pt) or 8F (1 to 1.25 pts)
Mustang Max EC* and EW* (3.2 to 4 oz) *Wheat only*
Proaxis* (2.56 to 3.84 oz) *Wheat only*
Silencer* (2.56 to 3.84 oz)
Warrior w/ ZeonTech* (2.56 to 3.84 oz)

Armyworm

Armyworm outbreaks do occur in small grains, 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: Likely migrate to Michigan each spring. Eggs are laid on the surfaces of grasses, especially the headlands of small grains. Two to three generations per year, the first generation in late May to early June.

Type of damage: Defoliation by larvae, first generation most damaging. Larvae eat leaves, stems, and sometimes the heads of small grains.

Scouting: Mainly active at night and during overcast days. During the day, larvae can be found at the base of plants and under debris.

Threshold: Before heading, treat when there are four or more worms per square foot.
At heading (to prevent head clipping), treat when there are two or more worms per square foot

For more information: MSU CAT Alert articles from 2004

May 13 'Watch for cutworm and armyworm' http://www.ipm.msu.edu/CAT04_fld/FC05-13-04.htm
June 17 'Armyworms abound' http://www.ipm.msu.edu/CAT04_fld/FC06-17-04.htm

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

Baythroid 2* (1 to 1.8 oz) *Wheat only*
Bt products (Dipel, Javelin, Xentari)
- many products, see labels for specific rates
Cobalt* (13 to 25 oz) *Wheat only*
Entrust (1 to 2 oz)
Lambda-Cy EC* (2.56 to 3.84 oz)
Lannate LV* (0.75 to 1.5 pt) or SP* (0.25 to 0.5 lb)
Malathion 5 and 57EC (2 pt)
Malathion 8F (1.0 to 1.25 pts)
Mustang Max EC* and EW* (1.76 to 4 oz) *Wheat only*
Proaxis* (2.56 to 3.84 oz) *Wheat only*
Pyganic EC 1.4 II (16 to 64 oz) or 5.0 II (4.5 to 18 oz)
Radiant SC (3 to 6 oz)
Sevin 4F or XLR Plus (1 to 1.5 qt) *Wheat only*.
Sevin 80S or 80WSP (1.25 to 1.875 lb) *Wheat only*.
Silencer* (2.56 to 3.84 oz)
Tracer (1.5 to 3 oz)
Warrior w/ ZeonTech* (2.56 to 3.84 oz)

Cereal Leaf Beetle

Cereal leaf beetle is usually kept in check by biological control.

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.

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. These adults emerge in late June and feed for about 3 weeks, then become sedentary. One generation per year.

Type of damage: Usually begins on field borders of winter grain, then goes to the preferred spring grain. Defoliation by chewing between leaf veins. Larvae feed on the surface of leaves, while adults feed on the whole leaf. This damage gives a "frosted" appearance to a severely infested field.

Scouting: Begin when temperatures reach 60 degrees. Check 20 stems in five areas of the field.

Management: Cultural- Hairy varieties are less likely to be infested. Biological- wasp parasitoids, lady beetles and various other natural enemies.

Threshold: Treat when there is a combination of 3 or more eggs and larvae per plant and the larvae are fairly visible on small plants. For larger plants treat when there is one or more larvae per flag leaf.

Note: First discovered in the U.S. in Berrien County Michigan, 1962.

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

Baythroid 2* and XL* (1.0 to 1.8 oz) *Wheat only*
Cobalt* (13 to 25 oz) *Wheat only*
Entrust (0.5 to 2 oz)
Lambda-Cy EC* (2.56 to 3.84 oz)
Lannate LV* (0.75 to 1.5 pt) or SP* (0.25 to 0.5 lb)
Malathion 5 (1.0 to 1.5 pt) *Wheat, barley, oats and rye.*
Malathion ULV (4 to 8 fl oz) *Barley, oats, and wheat*
Mustang Max EC* and EW* (1.76 to 4 oz) *Wheat only*
Proaxis* (2.56 to 3.84 oz) *Wheat only*
Radiant SC (2 to 6 oz)
Sevin 4F and XLR Plus (1 qt) *Wheat only.*
Sevin 80S and 80WSP (1.25 lb) *Wheat only.*
Silencer* (2.56 to 3.84 oz)
Tracer (1 to 3 oz)
Warrior w/ ZeonTech* (2.56 to 3.84 oz)

European Corn Borer

European corn borers are sometimes found in small grains tunneling in stems. The visible symptom of this damage is whitening (bleaching) of wheat heads. Generally this only occurs in years with heavy EBC populations, in scattered areas of the field. Treatment is not necessary.

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 nearby 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 birds, rodents, amphibians, parasitic wasps, and ground beetles.

Threshold: Treat when there are eight grasshoppers or more per sq yd in small plants (less than 6 in tall), or 16 or more per sq yd in taller plants.

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

Baythroid 2* and XL* (1.8 to 2.4 oz) *Wheat only*
Cobalt* (7 to 13 oz) *Wheat only*
Dimethoate 4 EC, 400 (0.75 pt) *Wheat only*
Dimethoate 4E *(0.75 pts) or 267 (1.125 pts)*
Dimethoate 5 lb (9.6 oz) *Wheat only*
Lambda-Cy EC* (2.56 to 3.84 oz)
Malathion 5 (1.5 to 2 pt)
Malathion 8F (1 to 1.25 pts) or 8 Aquamul (1.25)
Mustang Max EC* and EW* (3.2 to 4 oz) *Wheat only*
Proaxis* (2.56 to 3.84 oz) *Wheat only*
Radiant SC (3 to 6 oz) *Suppression*
Sevin 4F or XLR Plus (0.5 to 1.5 qt) *Wheat only*
Sevin 80W or 80WSP (0.66 to 1.87 lb) *Wheat only*
Silencer* (2.56 to 3.84 oz)
Warrior w/ ZeonTech* (2.56 to 3.84 oz)

Hessian Fly

Hessian fly is controlled without insecticides by planting winter wheat after adult flies are dead late summer or early fall.

"Fly-free dates" are given below for each county (all dates are in September). For additional information, see Extension Bulletin E-2549, *Insect Management in Wheat and Other Small Grains*, available at county Extension offices.

County	Earliest seeding date (Sept)	County	Earliest seeding date (Sept)	County	Earliest seeding date (Sept)
Alcona	6	Hillsdale	19	Montmorency	7
Allegan	20	Huron	13	Muskegon	18
Alpena	9	Ingham	17	Newaygo	15
Antrim	4	Ionia	16	Oakland	16
Arenac	13	Iosco	7	Oceana	16
Barry	18	Isabella	11	Ogemaw	10
Bay	14	Jackson	16	Osceola	10
Benzie	16	Kalamazoo	20	Oscoda	7
Berrien	23	Kalkaska	5	Otsego	6
Branch	19	Kent	18	Ottawa	19
Calhoun	19	Lake	13	Presque Isle	8
Cass	22	Lapeer	15	Roscommon	7
Charlevoix	3	Leelanau	8	Saginaw	16
Cheboygan	4	Lenawee	25	Sanilac	15
Claire	12	Livingston	16	St. Clair	16
Clinton	17	Macomb	18	St. Joseph	23
Crawford	6	Manistee	13	Shiawassee	16
Eaton	16	Mason	13	Tuscola	15
Emmet	4	Mecosta	12	Van Buren	22
Genesee	17	Midland	15	Washtenaw	18
Gladwin	12	Missaukee	9	Wayne	18
Grand Traverse	8	Monroe	21	Wexford	9
Gratiot	15	Montcalm	15		

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 to the point where replanting is necessary.

Conditions favoring damage: Planting into wheat stubble or other heavy crop residue; fields with a recent history of slug damage; aerial-seeded wheat exposed on the soil surface; cool, wet conditions favor slug survival and damage.

Sampling/ scouting: Methods not established.

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

List of registered insecticides (rate per acre):

Deadline MP 4 % Bait (10 to 20 lb)

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

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 fields in spring. Females insert eggs in plant tissue. Adults and larvae both feed on plants.

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. Young plants can generally outgrow feeding injury

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 observed.

Notes: Damage may be confused with some types of herbicide injury

White Grubs

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

White grubs build up in undisturbed soil and are damaging to crops planted in fields broken from sod. European chafer, an introduced grub species, has a history of infesting winter wheat planted after soybean. MSU field trials suggest that a grub density of 4 per square foot reduces stand, tillering, and yield of winter wheat. No insecticides are labeled for white grub control in small grains. Fall and spring plowing of old pasture or other established grasses with a season of clean fallow before a crop is planted is recommended.

Winter cutworm (*Noctua pronuba*)

The first report of damage in the U.S. by this insect was in northern Michigan in fall 2007.

Life cycle: Adults (yellow underwing moths) begin to emerge in May, but some may emerge later in the summer. Moths fly at night well into October. Caterpillars are found perhaps as early as July, but are commonly found by August and September. Winter cutworms can withstand very cold conditions, feeding in fields well into fall, when nighttime temperatures dip below freezing. Even during the winter, caterpillars emerge and feed on warm days.

Type of damage: Defoliation by caterpillars in the fall. Defoliated stands suffered total or severe loss the next spring (plants were lost).

Conditions favoring damage: In 2007, economic damage was found in fields only in the upper 1/3 of the lower peninsula.

Management: No insecticide labels specifically list winter cutworm as a target, although pyrethroids were effective in 2007. I suggest using guidelines and insecticide listed in this section for cutworm control as a baseline.

Wireworms

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

Description: Slender, shiny, brown caterpillar 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 several years in the immature stage during which they feed on newly-planted seeds as well as roots.

Type of damage: Feeds on germinating seed.

Sampling/ scouting: Scout for wireworms with a bait trap (http://www.ipm.msu.edu/CAT02_fld/FC5-16-02.htm) at least one week before planting.

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

Threshold: One or more wireworm per bait trap.

See page 10 in the seed treatment section for a list of products to control wireworm

Insecticides Registered for Small Grains

Trade name	Common name	Class	Recommended for:	PHI days	REI hrs	Precautions and Remarks
Baythroid 2 & XL **(RUP)**	cyfluthrin & beta cyfluthrin	Pyr	aphids, armyworm, CLB, cutworm, grasshoppers	30	12	
Bt [for ex. Dipel Javelin, Xentari]	*Bacillus thuringiensis*	Bio	armyworm	0	4	Do Not Apply to rye. Effective only on small (1st-2nd stage) larvae, and with moderate populations. Full coverage is required.
Cobalt **(RUP)**	chlorpyrifos + gamma cyhalothrin	OP Pyr	aphids, armyworm, CLB, cutworm, grasshoppers	28	24	Maximum of 2 applications of products containing chlorpyrifos per year.
Cruiser 5FS	thiameth-oxam	Nic	aphids, wireworms	--	--	Seed treatment, wheat and barley
Deadline MP 4 % Bait	metalde-hyde	Other	slugs, snails	--	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. May be fatal to dogs - use caution around pets.
Dimethoate 4EC, 267, 4E, 400, 5lb	dimethoate	OP	aphids, grasshoppers	35	48	Use in wheat and sorghum only. Maximum of two applications per season. Full coverage not required.
Entrust	spinosad	Bio	armyworm, CLB	21	4	Max 5.6 oz per acre per season. Do not allow cattle to graze unless spray is dry.
Lambda-Cy EC **(RUP)**	lambda-cyhalothrin	Pyr	See Warrior	30	24	Do not apply more than 7.68 oz per acre per season.
Lannate LV, SP **(RUP)**	methomyl	Carb	aphids, armyworm, CLB	7	48	Maximum of 4 applications per season.

Trade name	Common name	Class	Recommended for:	PHI days	REI hrs	Precautions and Remarks
Malathion 5, 57 EC, 8F,8 Aqua	malathion	OP	aphids, armyworm, CLB, grasshoppers	7	12	
Mustang Max EC, EW **(RUP)**	zeta-cypermethrin	Pyr	CLB, grasshoppers, thrips	14	12	Maximum 20 oz per acre per season. Retreatment interval = 14 days.
Proaxis **(RUP)**	gamma cyhalothrin	Pyr	aphids, armyworm, CLB, grasshoppers	30	24	Do not apply more than 0.48 pints per acre per season. Use on wheat only.
Pyganic EC	pyrethrins	Bio	armyworm, thrips	0	12	Listed by OMRI for use in organic production.
Radiant SC	spinetoram	Bio	armyworm, CLB, hoppers	21 grain 3 hay forage	4	Maximum 18 oz per acre per year. Maximum 3 applications per year.
Sevin 4F, XLR Plus, 50W, 80S, 80WSP	carbaryl	Carb	armyworm, CLB, grasshoppers	21	7	Use only on wheat. Maximum of 2 applications per season.
Silencer **(RUP)**	lambda-cyhalothrin	Pyr	See Warrior	30	24	Do not apply more than 7.68 oz per acre per season.
Snail and Slug Pellets 3.5% Bait	metalde-hyde	Other	slugs, snails	--	12	Apply every 2 weeks or as needed. Broadcast pellets and wet the soil before or after application. Do not allow pellets to contact edible portion of plant. Keep children, pets and poultry away from treated area.
Tracer	spinosad	Other	armyworm, CLB	21	4	
Warrior w/ ZeonTech **(RUP)**	lambda-cyhalothrin	Pyr	aphids, armyworm, CLB, grasshoppers	30	24	Do not apply more than 7.68 oz per acre per season.