

Small Grains

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Armyworm

Sampling

Armyworms should be detected while they are still small and easier to control. Check fields once each week starting the 2nd week of May. Examine first the debris and undergrowth on the ground surface along field margins and lodged areas. Small worms usually are found curled in a C-shape around the bases of the plants or under the debris and winter annual weeds. Armyworm frass or droppings also may be found on the soil surface. If small armyworms are present in these areas, obtain 10 to 20 worm counts at 50-pace intervals throughout the field. Note the average size of the worms, and whether any defoliation of the flag leaf and/or head clipping has occurred.

Decision Making

Parasites, diseases, insect predators, and birds usually keep armyworms under control in small grains. However, the effectiveness of these natural control agents is reduced during cool, wet springs and during growing seasons that follow years of drought.

As a general rule, barley should be treated if the number of armyworms exceeds one per linear foot between rows and most of the worms are greater than 0.75-inch long. In wheat, armyworms tend to nibble on the tips of kernels rather than clip heads; thus, populations of two to three worms per linear foot between rows are required to justify control. In high management wheat fields with 4-inch rows, treatment is recommended when armyworm levels exceed 3 to 5 per square foot of surface area, or per linear foot of row.

Note that wheat fields with mixed infestations of armyworms and sawfly caterpillars may need treatment even if worm counts of each pest do not exceed threshold levels. Also, if the grain crop is close to harvest or the majority of armyworms are longer than 1.5 inches and no head clipping has occurred, control may not be needed

Table 4.33 - Recommended Insecticides for Armyworm Control

Insecticide (Formulation)	Amount active ingredient per acre	Amount product per acre	Time limits: days before harvest	Remarks
carbaryl (Sevin XLR PLUS) (Sevin 80S) (Sevin 4F)	1.0-1.5 lb 1.0-1.5 lb 1.0-1.5 lb	2.0-3.0 pt 1.25-1.88 lb 2.0-3.0 pt	21 21 21	Apply to wheat only. No time limits on use as pasture or forage.
methomyl (Lannate LV) (Lannate SP)	0.225-0.45 lb 0.225-0.45 lb	0.75-1.5 pt 0.25-0.5 lb	7 7	RESTRICTED USE. Do not graze or feed treated forage or hay to livestock within 10 days of last treatment.
lambda-cyhalothrin (Warrior T) (Karate Z) (Kaiso 24WG)	0.02-0.03 lb 0.02-0.03 lb 0.015-0.25 lb	2.56-3.84 oz 1.28-1.92 oz 1.0-1.67 oz	30 30 30	RESTRICTED USE. Do not apply more than 7.68 oz per acre per season. Wheat, wheat hay, and triticale only (Kaiso).
microencapsulated methyl parathion (PennCap-M 2F)	0.5-0.75 lb	2.0-3.0 pt	15	RESTRICTED USE. Do not apply within 15 days of harvest or grazing.
spinosad (Tracer 4SC) (fall armyworm)	0.03 - 0.09 lb 0.047 - 0.09 lb	1.0-3.0 oz 1.5-3.0 oz	21 21	Barley, buckwheat, oats, rye, triticale, wheat. Do not apply within 21 days of grain or straw harvest or within 3 days of forage, fodder, or hay harvest.
zeta-cypermethrin (Mustang Max)	0.011-0.025 lb	1.76-4.0 oz	14	RESTRICTED USE. Wheat and triticale only.

Table 4.33 - Recommended Insecticides for Armyworm Control (cont.)

Insecticide (Formulation)	Amount active ingredient per acre	Amount product per acre	Time limits: days before harvest	Remarks
spinetoram (Radiant SC)	0.023-0.047 lb	3.0-6.0 oz	21	Do not apply within 21 days of grain or straw harvest or within 3 days of forage, fodder, or hay harvest.
gamma-cyhalothrin (Proaxis)	0.01-0.015 lb	2.56-3.84 oz	30	RESTRICTED USE. Wheat, wheat hay and triticale only.
beta-cyfluthrin (Baythroid XL)	0.014-0.019	1.8-2.4 oz	30	Wheat only. Do not graze or forage within 7 days.

Aphids

Grain Aphids at Tillering during Fall and Early Spring:

Sampling

Grain aphids usually are held in check by their natural enemies, which include predators, parasites, and fungal diseases. When looking for aphids, it is important to recognize these natural enemies. Check grain fields each week starting in the fall or early spring if damage symptoms are evident. Infestations of aphids, particularly the greenbug and corn leaf aphid, occasionally build up in the fall. Symptoms are often first noticed as circular, yellow to brown spots with dead plants in the center. These spots may increase in size if the infestation is allowed to persist. To determine aphid activity on tillering grain, examine 20 sites throughout the field. Each site should consist of at least 5 linear feet of a row. Look at areas in the field that are showing plant stress symptoms. Aphid damage may be confused with moisture stress and/or nitrogen deficiency. Count the number of aphids on small plants and, if aphids are numerous, estimate the numbers per linear foot of a row of larger plants. Make a tally of the proportion of each species, particularly if greenbugs are present.

Decision Making

Treatment during the fall and early spring is not often necessary, but may be needed if infestations are threatening and the weather is unusually mild. Treatment is suggested if aphid counts exceed 150 per linear foot of row throughout the majority of the field and a low degree of beneficial insect activity is present. The greenbug can be the most destructive because of the toxic substances it secretes during feeding, so maintain close surveillance of fields if this aphid is the predominate species. One exception to the treatment threshold applies to wheat under intensive-management practices grown in Virginia, where the transmission of virus diseases by aphids is more prevalent. Treatment of intensive management wheat in Virginia is suggested based on the following threshold table:

Table 4.34 - Aphid Numbers

Time of year	Suggested number needed to treat
Fall	
Plant until spring growth begins	15-25/row-foot and yellowing areas scattered throughout the field.
Spring	
After spring growth resumes until hard-dough stage	100/row-foot, plants 3-6 inches tall 200/row-foot, plants 7-10 inches tall 300/row-foot, plants 11+ inches tall
Heading	20-25/grain head

Grain Aphids During the Grain Head Stage:

Sampling

To determine aphid activity after the grain heads form, count the number of aphids on 100 heads throughout the field. Do not bias sampling by checking a few heads along the field margins where infestations usually are higher. Check for natural enemies at the same time that aphids are being counted. Aphids usually are clustered as colonies among bracts of the grain head and may move slightly when disturbed. Anything that actively moves when disturbed is probably a predator. Make a note of the ratio of predators to aphids.

Decision Making

The need for treatment depends primarily on the number of aphids, plant maturity, and the presence of natural enemies. Treatment during the grain head stage is generally considered when aphid numbers exceed more than 25 per head, especially if the crop is late, when cool weather is forecast and the natural enemy complex is lacking. Control is not advised if the crop is approaching the hard dough stage where there is good predator/parasite activity. Ratios of one or more predators to every 50 to 100 aphids are sufficient to achieve biological control.

Table 4.35 - Recommended Insecticides for Aphid Control

Insecticide (Formulation)	Amount active ingredient per acre	Amount product per acre	Time limits: days before harvest	Remarks
<i>Seed Treatments</i>				
imidacloprid (Gaucho XT)	0.43 oz	3.4 oz/cwt	N/A	For wheat and barley. Do not graze or feed livestock on treated areas for 45 days after planting.
+ metalaxyl	0.03 oz	–	–	
+ tebuconazole	0.02 oz	–	–	
thiamethoxam (Cruiser 5FS)	0.47-0.83 oz	0.75-1.33 oz/cwt	N/A	For wheat and barley. 120-day plantback restriction on certain non-labeled crops.
<i>Foliar Treatments</i>				
dimethoate (Dimethoate 4EC)	0.25-0.38 lb	0.5-0.75 pt	35	May not give acceptable control below 60°F. Do not apply within 14 days of grazing. Labeled for use on wheat only. Do not make more than 2 applications/season.
(Dimethoate 2.67EC)	0.25-0.33 lb	0.75-1.0 pt	35	
Malathion 57 EC	1.0 lb	1.5 pt	7	Barley and wheat.
microencapsulated methyl parathion (PennCap-M 2F)	0.5-0.75 lb	2.0-3.0 pt	15	RESTRICTED USE. Do not apply within 15 days of harvest or grazing.
lambda-cyhalothrin (Warrior T)	0.02-0.03 lb	2.56-3.84 oz	30	RESTRICTED USE. Do not apply more than 7.68 oz per acre per season.
(Karate Z)	0.02-0.03 lb	1.28-1.92 oz	30	
lambda-cyhalothrin (Kaiso 24WG)	0.02-0.03 lb	1.33-2.0 oz	30	RESTRICTED USE. Wheat, wheat hay, and triticale only.
zeta-cypermethrin (Mustang Max)	0.02-0.025 lb	3.2-4.0 oz	14	RESTRICTED USE. Wheat and triticale only. Aids in control.
gamma-cyhalothrin (Proaxis)	0.01-0.015 lb	2.56-3.84 oz	30	RESTRICTED USE. Wheat, wheat hay and triticale only.
beta-cyfluthrin (Baythroid XL)	0.014-0.019	1.8-2.4 oz	30	Wheat only. Do not graze or forage within 7 days.
disulfoton (Di-Syston 8E)				RESTRICTED USE. Do not graze treated fields or cut for forage after any application.
Barley	0.5-1.0 lb	8.0 oz-1.0 pt	30	
Wheat	0.25-0.75 lb	4.0-12.0 oz	30	

Cereal Leaf Beetle

Sampling

In many areas of the mid-Atlantic states, cereal leaf beetle eggs are heavily parasitized; thus, the larval stage is the best indicator of the potential yield loss. Once a week, make field inspections of wheat starting in early May and of spring oats starting by mid-May. Examine the flag leaf of wheat or the entire tiller of oats on 5 plants at each of 10 locations in the field. Count the number of larvae per flag leaf or tiller and note any defoliation.

Decision Making

A number of introduced parasites have been instrumental in keeping cereal leaf beetle populations below economic damage levels. Also, favorable planting dates may help suppress populations. Wheat planted early in the fall immediately after the Hessian fly-free date will be more advanced in growth the next spring than late-planted small grains. These early plantings will be less attractive to and more tolerant of the beetles when they peak in the spring. Cereal leaf beetle infestations on spring-planted oats cannot be avoided by means of planting date. Generally, barley is more advanced in maturity and thus less attractive when beetles are active.

Cereal leaf beetle infestations have become more widespread in the last few years. Adults move into small grain in late February and early March and deposit eggs which hatch into larvae. Larvae feed on grain stripping leaves of valuable photosynthetic tissue. New research indicated that damage to both flag and stem leaves reduces yield. New research showed that the best control is achieved if treatments are applied when larva are small. Treatment should be considered if 25, total, eggs and small larvae are found on 100 stems. Of that 25, at least 1/2 should be larvae. Once wheat reaches the hard dough stage, beetle damage has little effect on yield and controls are not needed.

Table 4.36 - Recommended Insecticides for Cereal Leaf Beetle Control

Insecticide (Formulation)	Amount active ingredient per acre	Amount product per acre	Time limits: days before harvest	Remarks
carbaryl (Sevin XLR PLUS)	1.0 lb	2.0 pt	21	Apply to wheat only. No time limits on use as pasture or forage.
(Sevin 80S)	1.25 lb	1.0 lb	21	
(Sevin 4F)	1.0 lb	2.0 pt	21	
methomyl (Lannate LV)	0.225-0.45 lb	0.75-1.5 pt	7	RESTRICTED USE. Do not graze or feed treated forage or hay to livestock within 10 days of last treatment.
(Lannate SP)	0.225-0.45 lb	0.25-0.5 lb	7	
Malathion 57 EC	1.0 lb	1.5 pt	7	Barley and wheat.
carbofuran (Furadan 4F)	0.25 lb	0.5 pt	7	RESTRICTED USE. Apply before heads emerge from boot. Do not make more than two applications/season. Do not feed treated forage to livestock. For waterfowl protection, do not apply on fields in proximity of waterfowl nesting areas and/or on fields where waterfowl are known to repeatedly feed.
lambda-cyhalothrin (Warrior T)	0.02-0.03 lb	2.56-3.84 oz	30	RESTRICTED USE. Do not apply more than 7.68 oz per acre per season.
(Karate Z)	0.02-0.03 lb	1.28-1.92 oz	30	
lambda-cyhalothrin (Kaiso 24WG)	0.02-0.03 lb	1.33-2.0 oz	30	RESTRICTED USE. Wheat, wheat hay, and triticale only.
zeta-cypermethrin (Mustang Max)	0.011-0.025 lb	1.76-4.0 oz	14	RESTRICTED USE. Wheat and triticale only.
gamma-cyhalothrin (Proaxis)	0.01-0.015 lb	2.56-3.84 oz	30	RESTRICTED USE. Wheat, wheat hay and triticale only.
beta-cyfluthrin (Baythroid XL)	0.008-0.014 lb	1.0-1.8 oz	30	Wheat only. Do not graze or forage within 7 days.
spinetoram (Radiant SC)	0.016-0.047 lb	2.0-6.0 oz	21	Do not apply within 21 days of grain or straw harvest or within 3 days of forage, fodder, or hay harvest.

Hessian Fly

The Hessian fly is not a major pest in the mid-Atlantic states because small grains normally are planted after the adult flies occur ("fly-safe" date). There are no insecticidal control measures that can be applied once the field becomes infested. Control is based entirely upon prevention. The important components of preventative fly management include: planting wheat only after the fly-safe planting date; destroying volunteer wheat plants by tillage methods; and planting resistant varieties, especially when planting very early. Check the following tables for the fly-safe dates in your area and contact your local Extension agent for information on resistant varieties. In Virginia, it is generally thought that the fly-safe date is around Oct. 20. However, flies can infest fields planted after that date by moving from volunteer grain plants in or from nearby fields.

Table 4.37 - Safe Planting Dates

<i>Maryland counties</i>					
Anne Arundel	Oct. 7	Dorchester	Oct. 9	Queen Anne's	Oct. 7
Allegany	Sept. 27	Frederick	Oct. 2	St. Mary's	Oct. 9
Baltimore	Oct. 2	Garrett	Sept. 20	Somerset	Oct. 10
Calvert	Oct. 8	Harford	Oct. 1	Talbot	Oct. 8
Caroline	Oct. 7	Howard	Oct. 2	Washington	Oct. 1
Carroll	Sept. 28	Kent	Oct. 6	Wicomico	Oct. 10
Cecil	Oct. 3	Montgomery	Oct. 4	Worcester	Oct. 11
Charles	Oct. 8	Prince George's	Oct. 7		
<i>Delaware counties</i>					
New Castle	Oct. 3	Kent	Oct. 8	Sussex	Oct. 10