Insect Management in Field Corn – 2018

David Owens, Extension Entomologist and Bill Cissel, Extension IPM Agent, University of Delaware
(adapted from the Virginia Tech Pest Management Guide, section written by Curt Laub, Research Associate, Virginia Tech)

Seedcorn Maggot (SCM)

There are no rescue treatments available for SCM control. Preventive treatment is advised on early and no-till plantings before soil is warm enough to promote quick germination. Old sod fields, pasture, heavily manured fields and fields with previous histories of seed corn maggot damage should be treated regardless of planting time or type of tillage.

Seed Treatments: Commercial seed applied treatments including clothianidin, imidacloprid, thiamethoxam and combination of thiamethoxam + chlorantraniliprole are rated as providing excellent control at all rates in University trials. In some cases, the exception has been where manure/green manures are applied before planting. In those situations the higher rates provide better control. Hopper box treatments containing permethrin are rated as only providing fair control.

At Planting: The following granular and liquid insecticides are labeled for at planting use on field corn. When allowable on the label, the best seed corn maggot control will be achieved when they are applied in-furrow.

Liquid Insecticides include beta cyfluthrin (Baythroid XL), bifenthrin (Capture LFR or OLF), and lambda-cyhalothrin (Warrior II or OLF)

Granular Insecticides include chlorpyrifos (Lorsban 15G), tefluthrin (Force 3 G) and terbufos (Counter 20G).

Note: The label is the law. Be sure to read the label for use rates, correct placement, days before harvest after application and other restrictions (including but not limited to interactions with certain herbicides). OLF=other labeled formulation.

Insecticides Labeled for Control of Seed Corn Maggot At Planting – be sure to read the label for placement since varies with product			
Insecticide (Formulation)	**Amount product per 1000 row-ft.**	**Amount product per acre**	**Time limits: days before harvest after application**
beta-cyfluthrin (Baythroid XL)	0.12 to 0.16 fl. oz.	2.0 to 2.8 fl. oz./A (for 30 inch row spacing)	Grain or Fodder: 21 Green Forages: 0
bifenthrin (Capture LFR) or OLF	0.2 to 0.78 fl. oz.	3.4 to 13.6 fl. oz.	See label
lambda-cyhalothrin (Warrior II [2.08]) or OLF	0.33 fl.oz. (for 30 –inch row spacing)	5.75 fl. oz. (for 30 inch row spacing)	21
tefluthrin (Force 3G)	4.0 to 5.0 oz.	4.4 to 5.5 lb. (for 30 inch row spacing)	See Label
terbufos (Counter 20G Lock 'N Load)	4.5 to 6.0 oz.	4.9 to 6.5 lb. (for 30 inch row spacing)	See Label

Wireworms (WW)

There are no rescue treatments available for WW control. The following sampling methods can be used to determine if an at-planting treatment is needed.

1. Sampling: *Early sampling before planting should include either bait stations or soil sampling.*

Bait Stations: Two paired bait stations per acre are made by placing 0.5 cup of an equal mixture of untreated corn and wheat in the soil 4 inches deep and 9 inches wide. Set bait stations in fields to be planted at least 3 weeks before the planting date. Check by digging in about 2 weeks and record the number of wireworms for each station.

Soil Sampling: Sample one square foot of soil 6 inches deep; one sample should be taken for each 10 acres with a minimum of 5 sites per field; field should not be tilled before samples are taken and soil temperature at 6 inches should be 45-50 degrees F.

2. Decision Making: Economic thresholds for wireworms have not been established on corn; however, the following guidelines can be used to make a management decision.

Bait Stations and Soil Sampling: If you find an average of 1 or more wireworms per bait station or per square foot of soil, a soil insecticide applied in the seed furrow and/or a seed applied treatment should be used to protect the germinated seed and newly-emerged seedlings.

Seed Treatments: Commercial seed applied treatments including clothianidin, imidacloprid, thiamethoxam and combination of thiamethoxam + chlorantraniliprole are rated as providing good control at the low and medium rates and excellent control at the high rate in University trials. Under extremely high pressure, an at-planting insecticide may also be needed. Where data is available, hopper box treatments containing permethrin are rated as providing poor control, especially under heavy pressure.

At Planting: The following granular and liquid insecticides are labeled for at planting use on field corn. When allowable on the label, the best wireworm control will be achieved when they are applied in-furrow.

Liquid insecticides include beta cyfluthrin (Baythroid XL), bifenthrin (Capture LFR or OLF), and lambda-cyhalothrin (Warrior II or OLF)

Granular insecticides include chlorpyrifos (Lorsban 15G), ethoprop (Mocap 15G), phorate (Thimet 20G), tefluthrin (Force 3 G) and terbufos (Counter 20G).

Note: The label is the law. Be sure to read the label for use rates, correct placement, days before harvest after application and other restrictions (including but not limited to interactions with certain herbicides). OLF=other labeled formulation.

Insecticides Labeled for Control of Wireworms At Planting - be sure to read the label for placement since varies with products ***In fields with a history of problems, the highest labeled rates are often needed to***

achieve satisfactory control.			
Insecticide (Formulation)	**Amount product per 1,000 row-ft.**	**Amount product per acre**	**Time limits: days before harvest**
beta-cyfluthrin (Baythroid XL)	0.12 to 0.16 fl. oz.	2.0 to 2.8 oz./A (for 30 inch row spacing)	Grain or Fodder: 21 Green forages: 0
bifenthrin (Capture LFR) or OLF	0.2 to 0.78 fl. oz.	3.4 to13.6 fl. oz.	See label
ethoprop (Mocap 15G Lock'N Load) or OLF	8.0 oz.	8.8 lb (for 30 inch row spacing)	See label
lambda-cyhalothrin (Warrior II [2.08]) or OLF	0.33 fl.oz. (for 30 –inch row spacing)	5.75 fl. oz. (for 30 inch row spacing)	21
phorate (Thimet 20G Lock 'N Load) or OLF	4.5 to 6.0 oz.	4.9 to 6.5 lb. (for 30 inch row spacing)	See label
tefluthrin (Force 3G)	4.0 to 5.0 oz.	4.4 to 5.5 lb. (for 30 inch row spacing)	See label
terbufos (Counter 20G Lock 'N Load) or OLF	4.5 to 6.0 oz.	4.9 to 6.5 lb. (for 30 inch row spacing)	See label

White Grubs (WG)

There are no rescue treatments available for WG control. The following sampling methods can be used to determine if an at-planting treatment is needed.

1. Sampling

Compact Method (CM) Fall and Spring Soil Sampling: A Compact Method (CM) Soil Sampling Strategy was developed in Virginia, but has not been evaluated in our area. The CM is based on an 8-inch square by 6-inch deep volume of soil that is hand-sifted for white grubs on a green plastic leaf collection bag placed on the ground next to the sample site. The CM is as accurate as the traditional 12-inch square/ standard method, but is about 57% faster. The CM soil sampling strategy was designed for fall sampling as a means to provide producers with a field-specific pest management tool for better managing white grubs on their farms. Using the CM for spring soil sampling of white grubs before planting corn is as useful as fall sampling with the CM. However, keep in mind that sampling in the fall gives more time to make a management decision.

Treatment Thresholds: The fall action threshold is ≥1.6 white grubs per CM soil sample. The spring action threshold is ≥1.04 white grubs per CM soil sample.

The following represents the minimum number of compact method samples needed to be 95 percent confident your sample average is within the specified percentage of the actual field mean:

25% 3 to 4 samples/field (about 10-15 minutes)
20% 5 to 6 samples/field (about 20-25 minutes)
15% 10 samples/field (about 30-40 minutes)
10% 22 samples/field (about ≥1.5 hours)

One point of caution, although soil sampling for white grubs works well in most soils: it is easier to hand- sift lighter, sandier soils than heavier soils which do not break apart easily. No data is available for muck soils.

Traditional 12-inch square/standard method: This method is most effective when soil temperatures have reached 50 degrees F. at 6 inches deep. This method is also only effective if done before soil is tilled. At each site, sample one square foot of soil area dug twelve inches deep. A minimum of two samples must be taken for every 10 acres and no less than 10 samples per field.

Treatment Threshold: As a general guideline, an at-planting treatment may be needed for white grubs if you find one white grub per square foot of soil.

Seed Treatments: Commercial seed applied treatments including clothianidin, imidacloprid, thiamethoxam and combination of thiamethoxam + chlorantraniliprole are rated as providing poor control at the low rates, good control at the medium rates and excellent control at the high rate in University trials. Under extremely high pressure and with certain grub species, an at-planting insecticide is needed to provide effective control. Where data is available, hopper box treatments containing permethrin are rated as providing poor control.

At Planting: The following granular and liquid insecticides are labeled for at planting use on field corn. When allowable on the label, the best white grub control will be achieved when they are applied in-furrow.

Liquid insecticides include beta cyfluthrin (Baythroid XL), bifenthrin (Capture LFR or OLF), and lambda-cyhalothrin (Warrior II or OLF)

Granular insecticides include chlorpyrifos (Lorsban 15G), tefluthrin (Force 3G) and terbufos (Counter 20G).

Note: The label is the law. Be sure to read the label for use rates, correct placement, days before harvest after application and other restrictions (including but not limited to interactions with certain herbicides). OLF=other labeled formulation.

Insecticides Labeled for Control of White Grubs At Planting - be sure to read the label for placement since varies with products *In fields with a history of problems, the highest labeled rates are often needed to achieve satisfactory control.*			
Insecticide (Formulation)	**Amount product per 1,000 row-ft.**	**Amount product per acre**	**Time limits: days before harvest**
beta-cyfluthrin (Baythroid XL)	0.14 to 0.16 fl. oz.	2.5 to 2.8 fl. oz. (for 30 inch row spacing)	Grain or Fodder: 21 Green forages: 0
bifenthrin (Capture LFR)	0.2 to 0.78 fl. oz.	3.4 to 13.6 fl. oz.	See label
lambda-cyhalothrin (Warrior II [2.08])	0.33 fl.oz. (for 30 –inch row spacing)	5.75 fl. oz. (for 30 inch row spacing)	21
phorate (Thimet 20G Lock 'N Load) or OLF	4.5 to 6.0 oz.	4.9 to 6.5 lb. (for 30 inch row spacing)	See label
tefluthrin (Force 3G)	4.0 to 5.0 oz.	4.4 to 5.5 lb. (for 30 inch row spacing)	See Label
terbufos (Counter 20G Lock N Load)	4.5 to 6.0 oz.	5.0 to 6.5 lb. (for 30 inch row spacing)	See Label

Cutworm

Black cutworm outbreaks are favored by a combination of the following factors: late planting and planting into poorly drained soil, presence of heavy broadleaf weed growth before planting, planting no-till into soybean stubble, and reduced tillage. Although at planting materials can provide effective

control, scouting will provide the best indication of whether an economic level is present.

1. Sampling: Corn fields should be checked twice a week from the spike through the 5th-leaf stage. Leaf feeding is the first sign that cutworms are present. Examine 10 plants in 10 locations for the presence of leaf feeding (small irregular holes from small larvae too small to cut plants) and cut plants. You should also look for live cutworms and estimate the average size of the larvae.

2. Decision Making: As a general guideline, a rescue treatment should be considered on 1-2 leaf stage corn when you find 3 % or more of the plants cut or 10% or more of the plants with fresh leaf feeding and larvae are present. At the 2 to 4 leaf stage, a rescue treatment should be considered when you find 5% of the plants cut and larvae are present.

NOTE – The label is the law. Be sure to read the label before making any pesticide applications and observe all label restrictions including but not limited to days from last application to harvest.

Insecticides Labeled for Control of Cutworms			
Insecticide (Formulation)	**Amount active ingredient acre**	**Amount product per acre**	**Time limits: days before harvest**
Pre-Emergence			
bifenthrin (Capture LFR) or OLF	0.04 lb.	3.4 fl. oz.	-----
bifenthrin (Bifenture 2EC) or OLF	0.04 lb.	2.56 fl. oz.	30
permethrin (Perm-UP 3.2 EC) or OLF	0.1 to 0.15 lb.	4.0 to 6.0 fl. oz.	Grain or Fodder (Stover): 30
Post- Emergence			
beta-cyfluthrin (Baythroid XL)	0.007 to 0.013 lb.	0.8 to 1.6 fl. oz.	Grain or Fodder: 21 Green forages: 0
bifenthrin (Bifenture 2EC) or OLF	0.033 to 0.10 lb.	2.1 to 6.4 fl. oz.	30
bifenthrin + zeta-cypermethrin (Hero [1.24 lbs. Al/ gal prod])	0.025 to 0.06 lb.	2.6 to 6.1 fl. oz.	Grain and Stover: 30 Forage: 60
esfenvalerate (Asana XL)	0.03 to 0.05 lb.	5.8 to 9.6 fl. oz.	21
lambda-cyhalothrin (Warrior II [2.08EC]) or OLF	0.015 to 0.025 lb	0.96 to 1.60 fl. oz.	21
permethrin (Perm-UP 3.2EC) or OLF	0.1 – to 0.15 lb.	4.0 to 6.0 fl. fl. oz.	Grain or Fodder (Stover): 30
zeta-cypermethrin (Mustang Maxx)	0.008 to 0.0175 lb.	1.28 to 2.8 fl. oz.	Grain, Stover and Forage: 7

True Armyworm

1. Sampling: No-till fields planted into a small grain cover crop, pastures, or weedy fields all have a

high risk for armyworm infestation. Survey field edges where margins border small grains or large grassy areas and watch for damaged plants. Examine 10 plants at each of 10 locations within the field and record the percentage of damaged plants, the average size, and the severity of injury.

2. Decision Making: Armyworms can migrate from small grains starting in late May. Spot treatments may be warranted if infestations are confined to small areas. Control for armyworms is recommended if 25 percent or more of the plants are infested and larvae are less than 0.75 inch-long. Worms greater than 1.25 inches in length usually have completed their feeding.

NOTE – The label is the law. Be sure to read the label before making any pesticide applications and observe all label restrictions including but not limited to days from last application to harvest.

Insecticides Labeled for Control of True Armyworm			
Insecticide (Formulation)	**Amount active ingredient acre**	**Amount product per acre**	**Time limits: days before harvest**
Pre-Emergence			
bifenthrin (Capture LFR)	0.04	3.4 fl. oz.	See label
bifenthrin (Bifenture 2EC) or OLF	0.04 lb.	2.56 fl. oz.	30
permethrin (Perm-UP 3.2EC)	0.1 – 0.15 lb.	4.0 -6.0 fl. oz.	Grain or Fodder (Stover): 30
Post- Emergence			
beta-cyfluthrin (Baythroid XL)	0.013 to 0.022 lb.	1.6 to 2.8 fl. oz.	Grain or Fodder: 21 Green forages: 0 1st and 2nd instars only
bifenthrin (Bifenture 2EC) or OLF	0.033 to 0.10 lb.	2.1 to 6.4 fl. oz.	30
bifenthrin + zeta-cypermethrin (Hero [1.24 lbs. Al/ gal prod])	0.04 to 0.1 lb.	4.0 to 10.3 fl. oz.	Grain and Stover: 30 Forage: 60
esfenvalerate (Asana XL)	0.03 to 0.05 lb.	5.8 to 9.6 fl. oz.	21
lambda-cyhalothrin (Warrior II [2.08EC]) or OLF	0.02 to 0.03 lb.	1.28 to 1.92 fl. oz.	21 higher rates for larger larvae
methomyl (Lannate LV)	0.45 lb.	1.5 pt.	Forage: 3 Ears and Stover: 21
permethrin (Perm-UP 3.2EC)	0.1 to 0.15 lb.	4.0 to 6.0 fl. oz.	Grain or Fodder (Stover): 30
zeta-cypermethrin (Mustang Maxx)	0.02 to 0.025 lb.	3.2 to 4.0 fl. oz.	Grain, Stover, and Forage: 7

Slugs

1. Sampling: Slugs can become serious pests in no-till fields during spring periods of cool, wet weather. Fields with heavy layers of manure, crop refuse, or thick weed cover are at higher risk from slugs. Because slugs feed at night and hide during the day in the mulch and surface trash near the seedlings, they often are not suspected of being the cause of the shredded leaves on the young corn seedlings. Examine 10 plants in 10 locations for the presence of feeding damage and slime trails; you will need to observe plants at night or during cloudy conditions to actually observe slugs feeding on plants. You should also check for slugs under surface trash and in open seed slots.

2. Decision Making: Although no precise thresholds are available for slug management, populations of 3 to 5 slugs around each plant at the spike through 3rd-leaf stage may be economic, especially if injury is heavy, plant growth is slow, and cool, wet conditions prevail. Also, corn seedlings that have reached the 3rd-leaf stage of growth generally are able to outgrow feeding damage by slugs.

NOTE – The label is the law. Be sure to read the label before making any pesticide applications and observe all label restrictions including but not limited to days from last application to harvest.

Mollusicides Labeled for Slug Control			
Insecticide (Formulation)	**Amount active** ingredient	**Amount product per acre**	**Time limits: days before harvest after application**
metaldehyde (Deadline M-Ps) or OLF	-----	See new labels for amount allowed and method of application based on growth stages	0
iron phosphate (Sluggo)	-----	20 to 44 lb.	see label
Iron phosphate (Ferroxx AQ)	-----	15 lb.	see label
sodium ferric EDTA (Iron Fist)	-----	10 to 40 lb.	see label

Grasshoppers

Sampling and Decision Making: No sampling and treatment thresholds are available for our area. This information from VA can be used as a guideline for making a treatment decision.

Examine fields next to pastures and other grassy areas where grasshoppers overwinter and develop. Treat field margins when young grasshoppers enter the field from roadsides. Treatment of entire field is seldom necessary; however, sprays may be justified when 5 to 8 grasshoppers per square yard are present during the silking period.

Insecticides Labeled for Control of Grasshoppers			
Insecticide (Formulation)	**Amount active ingredient acre**	**Amount product per acre**	**Time limits: days before harvest**
beta-cyfluthrin (Baythroid XL)	0.017 to 0.022 lb.	2.1 to 2.8 fl. oz.	Grain or Fodder: 21 Green forages: 0
bifenthrin (Bifenture 2EC) or OLF	0.033 to 0.10 lb.	2.1 to 6.4 fl. oz.	30
bifenthrin + zeta-cypermethrin (Hero [1.24 lbs Al/ gal prod])	0.025 to 0.06 lb.	2.6 to 6.1 fl. oz.	Grain and Stover: 30 Forage: 60
carbaryl (Sevin XLR Plus)	0.5 to1.5 lb.	0.5 to1.5 qt.	Grain and Fodder: 48 Harvest or Grazing of forage and silage:14
esfenvalerate (Asana XL)	0.03 to 0.05 lb.	5.8 to 9.6 fl. oz.	21
lambda-cyhalothrin (Warrior II [2.08EC]) or OLF	0.02 to 0.03 lb.	1.28 to 1.92 fl. oz.	21
zeta-cypermethrin (Mustang Maxx)	0.017 to 0.025 lb.	2.72 to 4.0 fl. oz.	Grain, Stover and Forage: 7

Spider Mite

Sampling and Decision Making: No sampling and treatment thresholds are available for our area. This information from VA can be used as a guideline for making a treatment decision.

Spider mite populations often seem to explode as plants reach the grain-fill period, especially during extended hot, dry weather when the plants are stressed. If corn has not dented, treatment may be warranted if mite colonies are present along the midribs on the lower surfaces of one-third to one-half of the leaves on 50 percent of the plants.

NOTE – The label is the law. Be sure to read the label before making any pesticide applications and observe all label restrictions including but not limited to days from last application to harvest.

Insecticides Labeled for Control of Spider Mites			
Insecticide (Formulation)	**Amount active ingredient acre**	**Amount product per acre**	**Time limits: days before harvest**
bifenthrin (Bifenture 2 EC) or OLF	0.10 lb.	6.4 fl. oz.	30
bifenthrin + zeta-cypermethrin (Hero [1.24 lbs Al/ gal prod])	0.10 lb.	10.3 fl. oz.	Grain and Stover: 30 Forage: 60
etoxazole (Zeal SC)	0.045 to 0.135	2.0 to 6.0 fl. oz.	21 days
spiromesifin (Oberon 2SC)	0.089 to 0.25 lb.	5.7 to 16.0 fl. oz.	Green forage/ silage: 5 Grain or Stover: 30

Japanese Beetles

1. Sampling: *Examine 10 plants in each of 10 locations in the field to determine the stage of pollination, the number of beetles per plant, and the percentage of plants with silks cut back to 1/2 inch or less.*

2. Decision Making: Treatment may be needed if silks are clipped back to less than 1/2 inch before 50% pollination and beetles are present and actively feeding and there is an average of more than 3 Japanese beetles per silk. Pollen shed for an individual tassel generally takes 2-7 days to complete and 1-2 weeks for an entire field.

Insecticides Labeled for Control of Japanese Beetles			
Insecticide (Formulation)	**Amount active ingredient acre**	**Amount product per acre**	**Time limits: days before harvest**
beta-cyfluthrin (Baythroid XL)	0.013 to 0.022 lb.	1.6 to 2.8 fl. oz.	Grain or Fodder: 21 Green forages: 0
bifenthrin (Bifenture 2EC) or OLF	0.033 to 0.10 lb.	2.1 to 6.4 fl. oz.	30
bifenthrin + zeta-cypermethrin (Hero [1.24 lbs AI/ gal prod])	0.04 to 0.1 lb.	4.0 to10.3 fl. oz.	Grain and Stover: 30 Forage: 60
esfenvalerate (Asana XL)	0.03 to 0.05 lb.	5.8 to 9.6 fl. oz.	21
lambda-cyhalothrin (Warrior II [2.08EC]) or OLF	0.02 to 0.03 lb.	1.28 to 1.92 fl. oz.	21
zeta-cypermethrin (Mustang Maxx)	0.017 to 0.025 lb.	2.72 to 4.0 fl. oz.	Grain, Stover and Forage: 7

Fall Armyworm

1. Sampling: Examine 10 consecutive plants at each of 10 locations in the field for the presence of whorl feeding. Larvae feed in the whorls of the plants causing a shredded or ragged appearance. They may burrow deep into the whorls and feed on the growing tips.

2. Decision Making: Plants infested with fall armyworms often recover and grow normally without any significant effect on yield. Control at the whorl stage is usually not practical, particularly by air, and should not be attempted unless 75 percent of the plants exhibit whorl feeding and one or more larvae per plant are found. This threshold drops to 50 percent if 2 or more larvae per plant are found.

NOTE – The label is the law. Be sure to read the label before making any pesticide applications and observe all label restrictions including but not limited to days from last application to harvest.

Insecticides Labeled for Control of Fall Armyworm			
Insecticide (Formulation)	**Amount active ingredient acre**	**Amount product per acre**	**Time limits: days before harvest**
chlorantraniliprole (Coragen 1.67 SC)	0.045 to 0.098 lb.	3.5 to 7.5 fl. oz.	14
lambda-cyhalothrin + chlorantraniliprole (Besiege)	0.019 + 0.039 to 0.033 + 0.065 lb.	6.0 to 10.0 fl. oz.	21
methomyl (Lannate LV)	0.225 to 0.45 lb.	0.75 to 1.5 pt.	Forage: 3 Ears and Stover: 21
Bt Hybrids – New hybrids are available that control fall armyworm. Please check the following link for available varieties https://lubbock.tamu.edu/files/2018/01/BtTraitTableJan2018.pdf			