



Extension FactSheet

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Field Corn Insect Pest Management

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Insect pests impact corn yields by reducing corn stand; causing injury to root systems, foliage, stalks, and reproductive elements of corn plants; and enhancing corn diseases. In every corn field, one can detect signs of insect pest activity that may be contributing to a loss in stand or causing stress to the development of the crop. However, in many cases, injury due to an insect pest is marginal because the cost of preventive or corrective treatment may exceed the value of loss attributed to the pest problem.

The concept of Integrated Pest Management (IPM) emphasizes that decisions to apply preventive or corrective treatments to manage pest problems should be based on field observations, include a risk-benefit analysis of pest-management options, and consider the environmental effects of actions implemented. Given the scale of field crop production operations, perceived risk of potential losses due to insect pests, and time limitations of farm managers, corn pest-management practices tend to emphasize preventive actions that can be implemented at planting time. Corn pest management decisions often focus on:

- Use of a seed treatment.
- Need for a soil insecticide treatment at planting.
- Possible tank mixing of an insecticide with application of a pre-emergence herbicide treatment.
- Selection of a corn hybrid developed to prevent a specific pest problem.

After a crop has emerged, periodic monitoring of the crop may indicate a need for a post-emergence rescue treatment to control a specific pest problem, although the application of such treatments is relatively uncommon.

The insect pest complex of Ohio field corn includes many species that may cause injury to corn and reductions in yield (see Table 1). The risk of significant crop injury by many of the pests is generally low and the impact on yield is often of marginal economic importance. However, the potential impact of multiple pests on the corn habitat of a farm requires selection of a pest-management program of cultural practices and insecticide-use

strategies that will economically reduce pest problems over time with minimal adverse impact on the environment.

Insect pest problems of field corn can often be linked with cultural practices for a crop. In addition, it should be noted that the incidence of a pest problem will vary from season to season, and some pest problems are more common than others (see Table 2). Recognition of corn habitats that may be at risk for specific pest problems plus awareness of the incidence of a pest problem for an area enables selection of appropriate pest-management strategies.

The history of the incidence of a pest problem on a farm can only be achieved by periodic monitoring and documenting of field observations over time. As information is accumulated on crop-rotation sequence, crop development, tillage practices, and presence of alternate weed hosts that influence pest populations, the potential for a pest problem can often be predicted.

Strategic Options for Use of Corn Pest Management Products

Commercial products marketed for corn pest management may be organized into five strategic categories based on the time of application and the pests targeted (see Table 3). Strategic treatment options include the following:

- Insecticide seed treatments traditionally target pests of corn seeds. New seed treatment formulations provide protection against additional soil-borne pests and may include suppression of pests of corn seedlings and corn root systems.
- Insecticide treatments at planting generally focus on protecting the corn stand from early-season pests and protecting the root system from rootworm injury. These treatments may be applied as a cultivation treatment, if not applied at planting. Some treatments include systemic activity that will provide protection from stalk-boring insect pests.
- Pre-emergence insecticide treatments may be applied with pre-emergence herbicide treatments before or after planting to

Table 1. Insect Pest Complex of Ohio Field Corn.

| Insect Pest | Pest Abbr. | Corn Stage or Site of Pest Injury | | | | | | | | |
|-------------------|---------------|-----------------------------------|---------------|--------------|-------|------|--------|------|------------------|----------------|
| | | Seed | Pre- Whorl | Root Sys. | Stalk | | Foliar | | Silk & Tassel | Ear & Shank |
| | | | | | Early | Late | Early | Late | | |
| Seedcorn Maggot | SCM | X | | | | | | | | |
| Seedcorn Beetle | SCB | X | | | | | | | | |
| Wireworm | WW | X | X | X | | | | | | |
| Grubs | G | | X | X | | | | | | |
| Garden Symphylans | GS | | X | X | | | | | | |
| Cutworms | CW | | X | | X | | X | | | |
| Stalk Borer | CSB | | X | | X | | X | | | |
| Webworms | WbW | | X | | X | | X | | | |
| Common Armyworm | CAW | | X | | | | X | | | |
| Flea Beetle | FB | | X | | | | X | | | |
| Billbugs | BB | | X | | | | X | X | | |
| Chinch Bugs | CB | | | | X | | X | X | | |
| Rootworm Lv | RW lv | | | X | | | | | | |
| Rootworm Ad. | RW ad | | | | | | | X | X | |
| Japanese Beetle | JB | | | | | | | | X | |
| Corn Borer | ECB | | | | X | X | X | X | X | X |
| Fall Armyworm | FAW | | | | | | | X | | X |
| Corn Leaf Aphid | CLA | | | | | | | X | X | |
| Corn Earworm | CEW | | | | | | | | | X |

Pre-Whorl = Includes a combination of seeding and pre-whorl injury that may result in early stand loss.

provide protection for the corn stand from various soil pests, especially cutworms, stalk borers, and armyworms.

- Foliar rescue treatments include all products that are applied as a post-emergence treatment to control stalk-boring or foliar-feeding pests. In general, foliar treatments are applied following detection of significant pest infestation that warrants corrective treatment.

- Transgenic corn hybrids have been engineered to produce toxins specifically targeted for control of specific pest species. Current *Bt*-corn technology targets the European corn borer and other lepidopterous pests that are susceptible to *Bt* endotoxins. Transgenic *Bt*-corn hybrids are under development for control of rootworm.

Seed Treatments for Stand Protection and Rootworm Suppression

Until recently, seed treatments for prevention of stand losses were limited to products applied as planter-box treatments to control seedcorn maggot, seedcorn beetles, and wireworm causing seed injury and stand losses. The recent introduction of new treatments having systemic properties and new commercial seed treatment processes to enhance dosage levels of insecticides

applied as seed coatings have expanded the range of insect pests that may be controlled or suppressed by seed treatments (see Table 4). As a result, new seed treatments may provide protection against a full range of pests causing potential stand losses plus suppression of grub and rootworm pests causing root-system injury.

Pre-Plant and Pre-Emergence Treatment Options for Stand Protection

Prevention of stand losses due to early-season pests such as cutworms, common stalk borer, armyworm, and other soil-based pests of corn may be achieved by the broadcast application of insecticides labeled for use as pre-plant or pre-emergence treatments. Such treatments are applied as tank-mixes with pre-plant or pre-emergence herbicide treatments. In the case of cutworm and stalk borer control, the efficacy of pre-emergence treatments is equivalent to that of using soil insecticide treatments at planting and is more effective than post-emergence rescue treatments. The latter are often applied too late to achieve maximum control of infestations. However, application of preventive treatments is only warranted where the annual risk of cutworm or stalk borer is high due to a combination of winter annual weed growth and tillage practices (no-tillage or late-spring minimum tillage).

Table 2. Relative Risks and Incidence of Insect Pest Problems of Field Corn Habitats.

| Insect Pest | Abbr. | Corn Habitat at Risk | Relative Incidence |
|----------------------------------|-------|--------------------------------------|---|
| Seedcorn Maggot | SCM | Tillage of high organic matter | Variable from year to year |
| Wireworm | WW | Corn > sod or small grains | Severe problems are uncommon |
| Grubs | G | Corn > sod or soybean if JB activity | Outbreaks tend to be cyclic |
| Slugs | S | Long term no-tillage habitats | Higher in late spring no-till plantings |
| Cutworms | CW | Corn > heavy winter annuals | Depends on migratory flights in spring |
| Stalk Borer | CSB | Linked to weedy conditions | More common in no-tillage fields |
| Webworms | WbW | Corn > green manure crops | Rarely occurs |
| Common Armyworm | CAW | No-till corn into grass stands | Rare but severe when it occurs |
| Flea Beetle | FB | Corn susceptible to Stewart's wilt | Outbreaks are sporadic |
| Billbugs | BB | Linked to grassy conditions | Rarely occurs |
| Chinch Bugs | CB | Linked to adjacent small grain crops | Rarely occurs |
| Rootworm Lv | RW lv | Cont. corn & 1st Yr in NW Ohio | Depends on cont. corn abundance |
| Rootworm Ad. | RW ad | Cont. corn & 1st Yr in NW Ohio | Depends on cont. corn abundance |
| Japanese Beetle | JB | May link to JB in soybeans | Variable |
| 1 st Brood Corn Borer | ECB | Early plantings more susceptible | Varies among regions |
| 2 nd Brood Corn Borer | ECB | Late plantings more susceptible | Varies among regions |
| Fall Armyworm | FAW | Late planted corn more susceptible | Depends on migratory flights in summer |
| Corn Leaf Aphid | CLA | Severe during drought conditions | Impact influenced by climate |
| Corn Earworm | CEW | Injury to field corn usually minimal | Depends on migratory flights in summer |

">" = following

Table 3. Pest Management Strategy Options for Treatment of Field Corn Pests.

| Insect Pest | Pest Abbr. | Pest Management Treatment Strategy Options | | | | |
|-----------------|---------------|--|-------------|------------|---------------|------------|
| | | Seed Trt. | At Planting | Pre-Emerge | Foliar Rescue | Transgenic |
| Seedcorn Maggot | SCM | XXX | XX | X | | |
| Seedcorn Beetle | SCB | XXX | XX | X | | |
| Wireworm | WW | XXX | XXX | X | | |
| Grubs | G | | XXX | X | | |
| Cutworms | CW | X | XXX | XXX | XXX | EUP |
| Stalk Borer | CSB | | XX | XX | XX | |
| Webworms | WbW | | X | XXX | XXX | |
| Common Armyworm | CAW | | X | XX | XXX | |
| Flea Beetle | FB | XX | X | XX | XXX | |
| Billbugs | BB | | | X | XXX | |
| Chinch Bugs | CB | | | | XXX | |
| Rootworm Lv. | RW | X | XXX | | XX | EUP |
| Rootworm Ad. | Bs | | | | XXX | |
| Japanese Beetle | Bs | | | | XXX | |
| Corn Borer | ECB | X | X | | XXX | XXX |
| Fall Armyworm | FAW | | | | XXX | X |
| Corn Leaf Aphid | CLA | | | | XXX | |
| Corn Earworm | CEW | | | | | X |

XXX = Standard labeled target; XX = Secondary labeled target; X = Uncommon labeled target.

EUP = Experimental use permits granted to date.

Table 4. Seed Treatments for Stand Protection, Early Season Pests, and / or Rootworm.

| Active Ingredient(s) | Seed Treatment | Seedbox or Commercial | Labeled Insect Pests of Corn | | | | | | |
|----------------------|-----------------------|-----------------------|------------------------------|-----|----|---|----|----|----|
| | | | SCM | SCB | WW | G | CW | FB | RW |
| diazinon | Diazinon Seed Treater | Planter Box | X | X | | | | | |
| diazinon + lindane | Kernal Guard | Planter Box | X | X | X | | | | |
| imidacloprid | Gaucho | Commercial | X | | X | | | | X |
| | Prescribe | Commercial | X | | X | X | | | X |
| lindane | Isotox F | Planter Box | X | | X | | | | |
| | Sorghum Guard | Planter Box | | | X | | | | |
| permethrin | Kernal Guard Supreme | Planter Box | X | X | X | | | | |
| tefluthrin | Force ST | Commercial | X | | X | X | X | | X |

Listings of treatments labeled for use as pre-plant or pre-emergence treatments are given in Tables 5 and 6.

The use of preventive treatments applied as pre-plant or pre-emergence treatments is regarded as an alternative to the use of soil insecticides at planting where the perceived risk of cutworm or common stalk borer is high. Corn planted no-till into old hayfields or rye cover crops should be regarded as having a high potential for armyworm. However, armyworm can be easily controlled by the use of foliar treatments, if detected on a timely basis. Cutworms and stalk-borer infestations can also be controlled effectively by foliar treatment, if detected in the very early stages of infestation.

Planting Time Treatments for Rootworm and Prevention of Stand Losses

Corn planted after corn and corn planted after soybeans exhibiting significant levels of first-year corn-rootworm activity are subject to economic injury by rootworm. The potential for economic rootworm injury in most first-year corn and many second-year corn habitats in Ohio is often low to marginal. In many cases, the combination of preventing stand loss due to a complex of soil pests (seedcorn maggot, cutworm, etc.) plus reducing rootworm injury will justify the use of a soil insecticide at planting time. In some areas having a high potential for seed maggot and cutworm stand loss, use of a soil insecticide at a reduced rate of application may be justified. Product efficacy for control of rootworm and secondary pests varies from product to product as indicated in Table 7. Some products exhibit systemic properties that provide control or suppression of stalk borer and corn borer.

Application of soil insecticides varies from product to product. Most granular formulations of soil insecticides may be applied as either a T-band or in-furrow treatment at planting. In-furrow application reduces the risk of run-off and may improve efficacy of controlling seed maggot and other seedling pests. T-band application of products having cutworm efficacy generally

improves efficacy of cutworm control. Most granular products can be applied as a post-emergence treatment where the product may be side dressed as a cultivation treatment.

The liquid Furadan rootworm treatment is most effective if applied as a post-emergence treatment at the time of rootworm egg hatch. Application of Fortress 5G is limited to use with a Smartbox application unit. Counter and Thimet formulations are marketed in closed-system containers to minimize applicator exposure to the granule products. Liquid treatments of Regent may be applied either as an in-furrow treatment using a microtube applicator or as a band with water or liquid fertilizer. Liquid Capture may also be applied as a T-band with or without liquid fertilizer. Application methods and rates of soil insecticide products applied at planting are summarized in Table 8.

It should be emphasized that the potential for rootworm injury is often linked to the presence of corn planted after corn. Therefore, every effort should be made to rotate on an annual basis, if possible. Numerous surveys have demonstrated that adult rootworm egg-laying activity is higher in continuous corn or in first-year corn adjacent or near continuous corn than in first-year corn that is isolated from continuous corn. Potential rootworm injury can be predicted by monitoring soybean or corn habitats that will be planted to corn the following season.

Alternative products for rootworm control have recently been introduced on the market. Two seed treatments have been developed that demonstrate suppression of rootworm injury (see Table 4). In addition, the marketing of transgenic *Bt*-corn for rootworm is anticipated in the near future (see Transgenic *Bt*-Corn Hybrids on page 7).

Foliar Treatments Applicable to Corn Pest Management

The application of insecticide products as foliar rescue treatments is relatively uncommon in Ohio. Foliar treatments may be applied on significant acreage during years of black cutworm, flea beetle, or European corn borer outbreaks. But the growing

Table 5. Pre-Plant and Pre-Emergence Insecticide Treatments for Stand Protection Tank-Mixing with Herbicide Treatments.

| Active Ingredient | Product Formulation | Insect Pests of Corn Targeted | | |
|--------------------|---------------------|-------------------------------|-----|-----|
| | | BCW | CSB | CAW |
| chlorpyrifos | Lorsban 4E | X | | |
| lambda cyhalothrin | Warrior T | X | X | X |
| permethrin | Ambush 2E | X | X | X |
| | Ambush 25W | X | X | X |
| | Pounce 1.5G | X | X | |
| | Pounce 3.2EC | X | X | X |
| | Pounce 25WP | X | X | X |

Table 6. Application Rates of Pre-Plant and Pre-Emergence Treatments for Stand Protection.

| Active Ingredient | Product Formulation | Timing | Application Rate per Acre | |
|----------------------------------|---------------------|-------------------------|---------------------------|-------------------|
| | | | Formulation | Active Ingredient |
| chlorpyrifos | Lorsban 4E | Pre-plant | 2 to 4 pt | 1.0 to 2.0 lb |
| | | At planting | 1 to 2 pt | 0.5 to 1.0 lb |
| lambda cyhalothrin permethrin | Warrior T | Pre-plant or Pre-emerge | 1.92 to 3.2 fl oz | 0.015 to 0.025 lb |
| | Ambush 2E | Pre-plant or Pre-emerge | 6.4 to 12.8 fl oz | 0.1 to 0.2 lb |
| | Ambush 25W | Pre-plant or Pre-emerge | 6.4 to 12.8 oz | 0.1 to 0.2 lb |
| | Pounce 1.5G | Pre-plant or Pre-emerge | 6.7 to 13.3 lb | 0.1 to 0.2 lb |
| | Pounce 3.2EC | Pre-plant or Pre-emerge | 4 to 8 fl oz | 0.1 to 0.2 lb |
| | Pounce 25WP | Pre-plant or Pre-emerge | 6.4 to 12.8 oz | 0.1 to 0.2 lb |

use of preventive seed or soil treatments at planting plus the advent of transgenic *Bt*-corn hybrids have significantly reduced the use of foliar treatments. In general, foliar treatments are applied as rescue treatments following detection, sampling, and assessment of a significant insect pest infestation. Methodology for sampling and assessment of post-emergence insect pests can be found in a series of corn pest management fact sheets (see the listing at the end of this fact sheet).

Effective control of economic infestations of insect pests depends on early detection and timely application of rescue treatments. Key stages of corn development that should be monitored include the following:

- Timely detection and assessment of black cutworm infestations require weekly inspection of a stand starting with the first signs of plant emergence.
- No-tillage corn planted in old stands of hay or rye cover crops should be monitored weekly until the mid-whorl stage.
- Bi-weekly inspection of corn in the mid-whorl stage will enable detection of first-brood corn-borer outbreaks.
- Root systems of corn in the late whorl stage (July) should

be inspected to determine the prevailing levels of rootworm injury to evaluate future need for soil insecticide treatments.

- Corn in the tassel and early silk stage should be inspected bi-weekly for outbreaks of corn leaf aphid and silk-feeding beetles (adult rootworms or Japanese beetles) that may interfere with pollination. Visual observations of adult rootworm activity and use of yellow sticky traps at this point in time will indicate future need for soil insecticide treatments.

- Mature corn should be sampled prior to harvest to determine the annual impact of corn-borer injury on stalks and ears to determine future need for using transgenic *Bt*-corn.

Biopesticide Products Applicable to Corn Pest Management

Biopesticides applicable to field-corn pest management include product formulations of natural ingredients having a limited range of target pests. In the case of *Bt* products, target pests are primarily the European corn borer or other Lepidopteran pests that are susceptible to foliar treatments of *Bt*. Use of these products is generally limited to production of organic corn when

Table 7. At-Planting and Post-Emergence Treatments for Rootworm.

| Active Ingredient | Product Formulation | Labeled Insect Pests of Corn | | | | | | | | |
|-------------------------------|---------------------|------------------------------|----|---|-----|-----|----|----|-----|-----|
| | | RW | WW | G | SCM | SCB | GS | CW | CSB | ECB |
| bifenthrin | Capture 2EC | X | X | X | X | X | | X | | |
| carbofuran | Furadan 4F | X | X | X | X | | | | | |
| chlorpyrifos | Lorsban 15G | X | X | X | X | X | X | X | | |
| | Lorsban 4E | X | X | X | X | X | X | X | | |
| chlorethoxyfos | Fortress 5G | X | X | X | X | | X | X | | |
| ethoprop | Mocap 10G | X | X | | | | | | | |
| | Mocap EC | X | X | | | | | | | |
| fipronil | Regent 4SC | X | X | | X | X | X | | X | X |
| phorate | Thimet 20G | X | X | | | | | | | |
| tebupirimphos plus cyfluthrin | Aztec 2.1G | X | X | X | X | X | | X | | |
| teflurthrin | Force 3G | X | X | X | X | X | | X | | |
| terbufos | Counter 20G | X | X | X | X | X | X | | | |

Table 8. Application Rates of Soil Insecticides at Planting or as Post-Emergence Treatments.

| Active Ingredient | Product Formulation | Application | | Application Rate | |
|--------------------------------|---------------------|------------------|--------------|--------------------------|----------------------------|
| | | Timing | Method | Formulation | lb a.i. per acre |
| bifenthrin | Capture 2EC | At Planting | T-band | 0.3 fl oz / 1,000 row ft | 0.067 |
| carbofuran | Furadan 4F | At Planting | Band | 2.5 fl oz / 1,000 row ft | 1.13 |
| | | At Planting | Broadcast | 1 qt / acre | 1.00 |
| | | Post | Band | 2.5 fl oz / 1,000 row ft | 1.13 |
| | | Post | Broadcast | 1 qt / acre | 1.00 |
| chlorpyrifos | Lorsban 15G | At Plt. or cult. | T-band | 8 oz / 1,000 row ft | 1.09 |
| | Lorsban 4E | At Planting | T-band | 2.4 fl oz / 1,000 row ft | 1.09 |
| | | At Cultivation | Side-dress | 2.4 fl oz / 1,000 row ft | 1.09 |
| chlorethoxyfos | Fortress 5G | At Planting | Smartbox | 3 oz / 1,000 row ft | 0.136 |
| ethoprop | Mocap 10G | At Plt or cult. | Band > wheel | 12 oz / 1,000 row ft | 1.09 |
| | Mocap EC | At Planting | Band > wheel | 1.67 fl oz/1,000 row ft | 1.09 |
| fipronil | Regent 4SC | At Planting | In-furrow | 0.24 fl oz /1,000 row ft | 0.109 |
| phorate | Thimet 20G | At Planting | T-band | 6 oz / 1,000 row ft | 1.09 |
| tebupirimphos plus cyflurthrin | Aztec 2.1G | At Planting | TB or IF | 6.7 oz / 1,000 row ft | 0.122 (teb) 0.006 (cyf) |
| teflurthrin | Force 3G | At Planting | TB or IF | 4 oz / 1,000 row ft | 0.109 |
| terbufos | Counter 20G | At Plt or cult. | TB or IF | 6 oz / 1,000 row ft | 1.09 |

Cult = post-emergence cultivation side-dress; IF = in-furrow; TB = T-band.

A.i. rates based on 36-inch row spacing where formulation rate cited per row ft.

a treatment for corn borer is needed but use of synthetic pesticide products is not an option.

Transgenic *Bt*-Corn Hybrids

A transgenic corn product is based on a specific event that has introduced a genetic package into a corn plant to produce a desired trait (such as production of a toxin to control specific pests). A transgenic product is registered with EPA as a biological plant pesticide. The registration process is similar to the registration of traditional chemical pesticides, but a label equivalent to that of synthetic pesticide products is not generated.

Prior to the year 2001, transgenic corn products were primarily limited to production of Cry proteins generated by *Bacillus thuringiensis* variety *kurstaki*. Transgenic corn hybrids developed to produce the endotoxin of *Bt kurstaki* target control of European corn borer and other lepidopteran pests of corn, such as the southwestern corn borer or corn earworm. To date, such corn hybrids have been commonly referred to as *Bt*-corn. In the near future, it is anticipated that *Bt*-corn hybrids will be marketed for control of rootworm or the control of both corn borer and

rootworm where genetic traits of endotoxin production are stacked within a given corn hybrid.

Bt-corn hybrids producing endotoxins derived from *Bt* varieties *kurstaki*, *tolworthi*, or *aizawai* are very effective in controlling European corn borer and reducing stalk diseases that may be enhanced by corn-borer injury. Economic benefits of growing transgenic *Bt*-corn hybrids depend on the prevention of significant corn-borer infestations over time. As a result, in areas where economic injury by the target pest is marginal, payment of a premium for a *Bt*-corn hybrid may not be warranted if pest injury prevented does not generate a significant increase in average yield over time. However, in areas where significant yield losses are periodically attributed to the target pest and related diseases, prevention of such losses over time may justify production of transgenic *Bt*-corn hybrids.

Where transgenic-plant pesticide-producing corn hybrids are used, recommended resistant management practices must be followed to minimize the potential of the development of target pest populations that would be resistant to the plant pesticide. To date, resistant management stewardship programs require planting non-*Bt* corn on 20% of corn acreage within an area that includes transgenic *Bt*-corn.

Continued.

Table 9. Post-Emergence Insecticide Products Applied as Foliar Treatments.

| Active Ingredient | Product Formulation | Labeled Insect Pests of Corn | | | | | | | | | | |
|--------------------|---------------------|------------------------------|-------------|--------|-------------|--------|-------------|-------------|--------|-------------|---|--------|
| | | C W | W b W | F B | C S B | B B | C A W | F A W | C B | E C B | A | B s |
| bifenthrin | Capture 2EC | X | X | X | X | | | X | X | X | X | X |
| carbaryl | Sevin XLR | X | | X | X | | X | X | X | X | | X |
| | Sevin 4F | X | | X | X | | X | X | X | X | | X |
| | Sevin 80S | X | | X | X | | X | X | X | X | | X |
| | Furadan 4F | | X | X | | | | | | X | | |
| chlorpyrifos | Lorsban 4E | X | X | X | X | X | X | | | X | X | X |
| dimethoate | Dimethoate 2.67EC | | | | | | | | | | X | X |
| | Dimethoate 4.0EC | | | | | | | | | | X | X |
| | Dimethoate 5 | | | | | | | | | | X | X |
| esfenvalerate | Asana XL | X | | X | X | | X | | | X | X | X |
| lambda cyhalothrin | Warrior T | | X | X | X | X | X | | | X | X | X |
| malathion | Malathion ULV | | | | | | | | | | | X |
| methomyl | Lannate SP | | | X | | | X | | | | X | X |
| | Lannate LV | | | X | | | X | | | | X | X |
| permethrin | Ambush 2E | X | | X | X | | X | | | X | | X |
| | Ambush 25WP | X | | X | X | | X | | | X | | X |
| | Pounce 3.2EC | X | | X | X | | X | | | X | | X |
| | Pounce 25WP | X | | X | X | | X | | | X | | X |

Table 10. Post-Emergence Foliar Treatment Application Rates and Pre-Harvest Limitations.

| Active Ingredient | Product Formulation | Application Rate per Acre | | Pre-Harvest Limitations Conditions | Days |
|--------------------|---------------------|---------------------------|----------------|------------------------------------|------|
| | | Formulation | lb a.i. | | |
| bifenthrin | Capture 2EC | 2.1 to 6.4 oz | 0.033 to 0.10 | | 30 |
| carbaryl | Sevin XLR | 1 to 2 qt | 1.0 to 2.0 | Grain corn | 48 |
| | Sevin 4F | 1 to 2 qt | 1.0 to 2.0 | Forage corn | 14 |
| | Sevin 80S | 1.25 to 2.5 lb | 1.0 to 2.0 | | |
| | Furadan 4F | 0.25 to 2.0 pt | 0.125 to 1.0 | | 30 |
| chlorpyrifos | Lorsban 4E | 0.50 to 3 pt | 0.25 to 1.5 | Grain corn | 35 |
| | | | | Forage corn | 14 |
| dimethoate | Dimethoate 2.67EC | 1.0 to 1.5 pt | 0.33 to 0.5 | Grain corn | 42 |
| | Dimethoate 4.0EC | 0.67 to 1.0 pt | 0.33 to 0.5 | Forage corn | 14 |
| | Dimethoate 5 | 12.8 oz | 0.31 | | |
| esfenvalerate | Asana XL | 5.8 to 9.6 fl oz | 0.03 to 0.05 | | 21 |
| lambda cyhalothrin | Warrior T | 1.92 to 3.20 fl oz | 0.015 to 0.025 | | 21 |
| malathion | Malathion ULV | 4 fl oz | 0.31 lb | | 5 |
| methomyl | Lannate SP | 0.25 to 0.5 lb | 0.225 to 0.45 | Grain corn | 21 |
| | Lannate LV | 0.75 to 1.5 pt | 0.225 to 0.45 | Forage corn | 3 |
| permethrin | Ambush 2E | 6.4 to 12.8 fl oz | 0.1 to 0.2 | | 30 |
| | Ambush 25WP | 6.4 to 12.8 fl oz | 0.1 to 0.2 | | 30 |
| | Pounce 3.2EC | 4 to 8 fl oz | 0.1 to 0.2 | | 30 |
| | Pounce 25WP | 6.4 to 12.8 fl oz | 0.1 to 0.2 | | 30 |

Table 11. Biopesticide Products Labeled for Control of Corn Borer on Corn.

| Active Ingredient | Formulation | Rate per Acre | Pre-Harvest Limitation | |
|------------------------------------|--------------------|------------------|---------------------------|---------|
| | | | Condition | Days |
| <i>Bacillus thuringiensis (Bt)</i> | Biobit 3.2% WP | 1 to 3 lb | | |
| | Biobit 1.6% WP | 2 to 5.5 lb | | |
| | Dipel 10G | 5 to 10 lb | | |
| | Dipel ES | 1.5 to 2.5 pt | | |
| | Javelin WG | 1 to 1.5 lb | | |
| | MVP Bioinsecticide | 1 to 4 qts | | |
| Spinosad | Tracer | 1.0 to 3.0 fl oz | Grain or Fodder Forage | 28 7 |

Table 12. Transgenic Plant Pesticide Products Applicable to Field-Corn Pest Management.

| Protein Source | Cry Protein | Event | Brand Name | Target Pest | Expression in Corn and Use Restrictions |
|---------------------------------------|-------------|--------|------------|-------------|---|
| <i>Registered Transgenic Products</i> | | | | | |
| <i>Bt var. kurstaki</i> | Cry1Ab | 176 | Knockout | ECB | Foliage and pollen |
| <i>Bt var. kurstaki</i> | Cry1Ab | 176 | NatureGard | ECB | Foliage and pollen |
| <i>Bt var. kurstaki</i> | Cry1Ab | BT11 | YieldGard | ECB | Entire plant |
| <i>Bt var. kurstaki</i> | Cry1Ab | MON810 | YieldGard | ECB | Entire plant |
| <i>Bt var. kurstaki</i> | Cry1Ac | DB418 | BtXtra | ECB | Entire plant |
| <i>Bt var. tolworthi</i> | Cry9C | CBH351 | StarLink | ECB plus | Limited to livestock feed |
| <i>Registration Process Initiated</i> | | | | | |
| <i>Bt var. aizawai</i> | Cry1F | TC1507 | n.a. | ECB plus | |
| <i>Bt var. tenebriensis</i> | Cry3Bb | | MaxGard | CRW | |

Field-Corn Pest Management Fact Sheets

This fact sheet has focused on a general compilation of information relevant to the use of commercial products currently available for use in field-corn pest management. Given the scope of pests, products, and pest-management strategies reviewed in this publication, limited attention has been attributed to the biology, assessment, and management of the specific pests of corn. This pest-specific information is included in additional fact sheets, which currently include the following:

| Number | Title | Pages |
|----------------|--|-------|
| FC-ENT-0011-01 | Field Corn Insect Pest Management | 9 |
| FC-ENT-0012-01 | Early-Season Pests of Field Corn | 7 |
| FC-ENT-0015-01 | European Corn Borer | 3 |
| FC-ENT-0016-01 | Corn Rootworm Management | 3 |
| FC-ENT-0017-01 | Monitoring Western Corn Activity in Soybeans | 8 |

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