EARLY APPLICATION IMPROVES PLANT HEALTH AND OPTIMIZES YIELD.
Hero – Soybeans

Plant health is critical for optimized yields—and it starts with prevention.

The Dual-Action™ Technology found in Hero insecticide provides fast knockdown and longer control by combining the best of two pyrethroid families.
Manage Your Yields: Factors Affecting Profit Losses in Soybeans

- **Insect pressure is increasing**
  - Wider variety of insects
  - Yield losses from direct feeding, and also from disease transmission
  - No current, reliable multi-pest thresholds

- **Foliar fungicide or herbicide applications are standard**
  - No additional application cost for insecticide when mixed with fungicides or herbicides

- **Today, insecticide costs are lower**
  - When thresholds were first established, traditional costs were $10-12/A
  - Current insecticide costs of $5-7/A and higher soybean prices impact thresholds
Scouting for Some Key Soybean Insects:

- Soybean aphids
- Bean leaf beetle
- Stink bugs
- Bean leaf beetle, stink bugs, soybean stem borer, podworms
- Stink bugs, soybean stem borer, three-cornered alfalfa hopper, podworms

Tomorrow’s Yield Protection:
Treat for foliage feeders, stem feeders, bloom feeders, pod feeders, bean feeders and disease transmitters
What’s Invading Your Soybean Fields?

Are these Insects in your Soybeans?
Missouri Field, 20 Sweeps – July 4, 2009

Some will affect your corn next year
Control insects to maximize yield potential, applied alone or in combination with your herbicide or fungicide programs.
Soybean Insect Control

**Economic Threshold:** When a treatment must be applied to avoid economic loss that would be greater than the cost of the treatment. Will a half bushel cost gain more than a half bushel yield?

<table>
<thead>
<tr>
<th>Insect</th>
<th>General Facts</th>
<th>Threshold</th>
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| Potato Leafhopper        | - Overwinters near the Gulf  
- Adult females insert eggs into soybean plants 2-3 per day  
- Feed on phloem  
- Cause distorted leaf veins, yellow-brown leaves (hopper burn) and may stunt the plant | 5 leafhoppers/plant |
| Corn Earworm (Podworm)   | - Moths lay eggs in the upper canopy, 1 female can lay up to 1,800 eggs  
- Caterpillars (4 pairs of prolegs) feed on leaves, blossoms, and pods | 6 per 25 sweeps |
| Soybean Stem Borer       | - Overwinters as a larva in the base of the stem  
- Adults emerge in late June and lay eggs through August  
- Control is difficult – the larva are in the stem and cause lodging, proper timing is key to adult control | 2 per 25 sweeps |
| Japanese Beetle          | - Adults emerge in early June and feed most of the summer  
- They group feed and stay exposed to sunlight making them easier to control  
- Grubs from these adults can cause problems next year in field corn | 30% defoliation at pre-bloom stage  
15% defoliation from bloom to pod-fill |
| Bean Leaf Beetle         | - Overwinters as an adult  
- Three in-season generations per year  
- Direct damage from feeding on leaves and pods  
- Indirect damage from spread of bean pod mottle virus | Difficult to determine depending on direct or indirect damage. Scout earliest planted soybeans first.  
- 6-9 beetles per 25 sweeps |
| Stink Bugs               | - Move into the north from the south on weather fronts  
- Females lay 10-30 eggs per cluster  
- Depending on species, it takes 23 days to 2 months from egg to adult | 6-9 per 25 sweeps |
Soybean Insect Control

Two-Spotted Spider Mite

- General Facts:
  - During drought conditions they will move to soybeans
  - Foliar coverage is critical
  - Assess mite movement into fields along corners and edges to prevent heavy infestations within the field

- Threshold:
  - None, easier to manage the population than rescue a heavy infestation
  - 5.1 oz/A of Hero for mite management, or 5.1 oz/A + dimethoate for control, or 10.2 oz/A of Hero for control

Soybean Aphid

- General Facts:
  - Overwinters as an egg on buckthorn
  - Multiple generations per year
  - Damage from feeding on sap
  - Indirect damage from spread of soybean mosaic virus and alfalfa mosaic virus

- Threshold:
  - Varies with several factors – insecticide cost, application cost, infestation timing, current timing, expected yield and price of soybeans. Roughly 100 per plant.

Three-Cornered Alfalfa Hopper

- General Facts:
  - Generally cause problems on beans less than 12” tall
  - Feed on main stem near the soil line
  - Seedling plants my be girdled and die, larger damaged plants may lodge
  - Later feeding on pod petiole will cause pod abortion

- Threshold:
  - 25 per 25 sweeps

Soybean Mosaic Virus/Bean Pod Mottle Virus Disease
transmitted by bean leaf beetle and other species.
May cause significant yield impacts.

Photo courtesy of Iowa State University
Multi-Pest Soybean Insect Thresholds

Soybean insect pest complexes, pressures and thresholds differ significantly from locality to locality. Soybean insect pest thresholds are based upon one insect and do not address multiple pests.

Generally, fields have more than one species of insect. At times, while waiting for the threshold to occur on one pest, yield is being lost from the entire complex. Listed below are multiple pest thresholds based on three insect groups: Stink Bugs, Defoliators, and Corn Earworms.

<table>
<thead>
<tr>
<th>Multiple Soybean Insect Pest Thresholds</th>
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<tbody>
<tr>
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<tr>
<td><strong>Defoliation &gt;20% (# Insects/25 sweeps)</strong></td>
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<tr>
<td>Stink Bugs</td>
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<tr>
<td>Defoliators</td>
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<tr>
<td>Corn Earworms</td>
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<tr>
<td><strong>Threshold Total</strong></td>
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</tbody>
</table>

**Stink bugs**: brown, green, Southern green  
**Defoliators**: salt marsh caterpillar, bean leaf beetle, green cloverworm, grasshopper, Mexican bean beetle, cabbage looper, Japanese beetle
Hero® - Superior Performance

2008 Hero Soybean Aphid Control
University of Minnesota (Check 930 aphids/plant)

![Graph showing aphid control effectiveness over time]

- **Untreated**
- Cobalt® 15 oz/A
- Hero 5.1 oz/A
- Baythroid® + Lorsban 2 oz/A + 8 oz/A

- **Warrior® 3.2 oz/A**
- Endigo® 2.75 oz/A
- Lorsban® Advanced 1 pt

Plus, Hero reduces the risk of flaring spider mite populations in soybeans.

![Graph showing mite control effectiveness over time]

- **Untreated**
- Cobalt® 13.5 oz/A
- Baythroid 2.0 oz/A
- Cruiser® (seed)

- **Cruiser/fb Endigo 2.74 oz/A**

**Hero Two-Spotted Mite Control**
South Dakota State University (30 DAT)
Proven Performance for Effective Stink Bug Management in Soybeans

2009 Hero – Stink Bug Control
Indiana Commercial Trials

Yield (bu/A)

Sullivan County (1)
Tippecanoe County

Untreated
Hero

Hero Commercial Field Trial – Missouri
Stink Bugs (2 per Sweep in June)

53 bu/A with Hero
46 bu/A Untreated Check

Hero - Stink Bug Control
Louisiana State University

Yield (bu/A)

- Hero 5.0 oz/A
- Orthene® 8.9 oz/A
- Karate® Z 1.7 oz/A
More than just insect protection and prevention…it’s the final yield results that count.

2006 Hero Yield Data
University of Minnesota

2007 Hero Yield Data
University of Minnesota

2008 Hero Yield Data
University of Minnesota

2007 Hero Yield Data
University of Illinois

Hero Consistently Out-Yields Other Insect Control Options

![Graphs showing yield data for different insect control options.](Image)
Hero provides Dual-Action™ Technology for fast knockdown and longer control. It combines the best of two pyrethroid families for pest prevention and healthy, vigorous, yield-producing plants.
Why Treat Corn?

- **Non-GMO and specialty corns**
  - Need protection from cutworm, armyworm, corn borer, corn earworm, aphid, various beetles, grasshoppers

- **GMO corn**
  - Doesn’t protect against all insects
  - Needs protection from aphids, grasshoppers, various beetles

- **Quality Issues**
  - Small feeding damage can cause entry sites for diseases and affect germ on seed corn

- **Aflatoxin Issues**
  - Growing concern with aflatoxin levels for feed

- **Insect pressure is increasing**
  - Wider variety of insects
  - Not only feeding, but disease transmission
  - No good multi-pest thresholds

- **Foliar fungicide or herbicide applications are standard**
  - No additional application cost for insecticide when mixed with fungicides or herbicides

- **Today, insecticide costs are lower**
  - When thresholds were first established, traditional costs were $10-12/A
  - Current insecticide costs of $5-7/A and higher corn prices impact thresholds
Hero Protects All Corn Yields
Seed, Sweet, Specialty, GMO, Pop, Ethanol, Yellow #2

Hero controls a wide spectrum of late-season insects that attack silks, ears, stalks, and the upper leaves of the plants. Optimal application timing is from pre-tassel through silking.

2nd Generation European Corn Borer
Corn Rootworm Adults
Japanese Beetle
Corn Earworm
Fall Armyworm
Southwestern Corn Borer
Western Bean Cutworm
Spider Mites
Hero helps to control the threat of aflatoxins in corn.

- Hero can be an effective means of controlling dangerous aflatoxins produced by Aspergillus fungi that can be transmitted by insects. These carcinogens are one of the most common types of grain molds and can cause liver poisoning in ruminant and non-ruminant livestock, as well as humans. Insect injury to ears/kernels create wounds for easy entry of pathogen. Insects can also transport Aspergillus spores to silks and kernels.

- Other causes of Aspergillus growth
  - High temperatures, high humidity during pollination
  - Dry soil (drought conditions) increase spores in air
  - Drought, nitrogen, other stresses increase chances of plant infection

- Tolerance levels in grain vary by species and age of end user
  - Human consumption, lactating dairy, immature livestock – 20 parts per billion (ppb) maximum
  - Breeding cattle, swine, mature poultry – 100 ppb
  - Finishing swine – 200 ppb
  - Finishing beef – 300 ppb
  - Ethanol by-products can increase concentration of aflatoxins by estimates of 3-4X compared to the parent grain

Aflatoxin Research with Hero

South Dakota State University

- 300 ppb - Max limit for finishing beef cattle.
- 200 ppb - Max limit for finishing swine (over 100 lbs)
- 100 ppb - Max limit for breeding livestock, mature poultry

University of Arkansas Trials – Two Locations

- 100 ppb - Max limit for breeding livestock, mature poultry
- 200 ppb - Max limit for finishing swine (over 100 lbs)
- 300 ppb - Max limit for finishing beef cattle
### Corn Leaf Aphids

**General Facts:**
- Disease transmitters
- Fungal disease – sooty mold

**Threshold:**
- 10-30% infestation
- 25 per plant

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### Corn Earworm

**General Facts:**
- Moths lay eggs near the ear or on the silks
- Usually 1-2 larvae per ear

**Threshold:**
- 10 moths per night, per trap
- 1 larva per plant
- 3 per sweep

*Photo courtesy of NCSU*

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### Western Bean Cutworm

**General Facts:**
- New pest across the eastern Midwest
- Now occurring in Michigan, Indiana, and Ohio

**Approximate Threshold:**
- 8 plants infested per 100 at 95% tassel

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### Japanese Beetle

**General Facts:**
- Adults emerge in early June and feed most of the summer
- Grubs from these adults can cause problems next year in field corn
- Mating and feeding attraction causes them to clump

**Threshold:**
- One-half inch or less silk clipping or tassel feeding

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### Corn Rootworm Adults

**General Facts:**
- Silk clippers
- Adults will lay eggs that cause problems in corn the following year
- Damaged kernels are disease entry points

**Threshold:**
- One-half inch or less silk clipping
- 1 adult per plant is threshold for rootworm treatment next year
- Manage population in fall to help larval control next spring

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### Grasshoppers

**General Facts:**
- General feeders on leaves, silks or ears
- Wide variety of species

**Approximate Threshold:**
- 5-8 per square yard

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### Economic Threshold:

In simple terms, when pests reach a population level where the cost of control is equal to or less than the dollar value of yield benefits. Will a two bushel cost gain more than a two bushel yield?
Multi-Pest Corn Insect Thresholds

**Ear/Silk Feeders**
- Western Bean Cutworm
- Corn Rootworm Adults
- Corn Earworms
- Japanese Beetles
- Grasshoppers
- Fall Armyworms

**Foliage Feeders**
- Corn Leaf Aphids
- Armyworms
- Cutworms

**Stalk Feeders**
- European Corn Borer
- Southwestern Corn Borer

How many insects does it take to lose two bushels?
Generally, you always have more than one insect species in your field at any given time.
Hero Improves Corn Yields

2009 Hero Yield Data
Tennessee Trials

Yield (bu/A)

Fungicide
Fungicide + Hero
Check

2009 Hero Yield Data
Georgia Trials

Yield (bu/A)

Fungicide
Fungicide + Hero
Check

Hero Independent Corn Yield Trials (including GMO hybrids)

Yield (bu/A)

Hero
Check

Tamms, IL Evansville, IN Fairfield, IL Nebo, KY Harvard, IL SDSU NC Iowa Average
Studies Prove that Hero Belongs in Your Corn Plant Health Program

2009 Hero Yield Data
Arkansas Trials

2009 Hero Yield Data
Nebraska Trials

2009 Hero Yield Data
Kentucky Trials

2009 Hero Yield Data
Georgia Trials

Yield (bu/A)

Fungicide | Fungicide + Hero | Check
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Fungicide | Fungicide + Hero

Yield (bu/A)

Fungicide + Hero | Check

Yield (bu/A)

Fungicide + Hero | Hero | Check

Yield (bu/A)
Hero: Fast-Acting, Long-Lasting Prevention and Control

- Combines strengths of zeta-cypermethrin (quick knockdown, insect agitation) and bifenthrin (residual control) into a single, broad-spectrum, patented product offering.
- Creates a more efficacious product on all insect pests (e.g., corn earworm, Western bean cutworm, corn leaf aphids, rootworm adults, stem borers) plus spider mites.
- More yield protection for the cost per acre spent
- Long residual activity provides quick knockdown with long pyrethroid residual and repellency
- Flexible application allows for Hero to be be applied alone or in tank mixes with fungicides, post herbicides, and foliar fertilizers, via ground or aerial application
- Caution signal word with a short REI of only 12 hours and a 21 day PHI in soybeans, 30 day PHI in corn
- Fungicides protect plants from disease while Hero protects plants from insects that may have been controlled by fungal diseases

Protects Profits

**Corn Foliar**
- Aphids, western bean cutworm, beetles, and others
- 10 bu x $5 = $50 - $6 = $44,000 profit on 1,000 acres

**Soybeans Foliar**
- Stink bugs, bean leaf beetle, aphids, and others
- 8 bu x $12 = $96 - $6 = $90,000 profit on 1,000 acres

*Approximate profit based on current market and chemical prices.*
Fast-Acting, Long-Lasting Insect Prevention and Control to Protect Your Corn & Soybean Investment and Optimize Yields

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