

# YOUR ROLE IN RESISTANCE MANAGEMENT

With the help of EPA officials, university scientists and others in the seed industry, Syngenta Seeds has developed the following insect resistance management practices for ATTRIBUTE sweet corn hybrids. As a grower, you play a critical role in this process. By following these simple steps, you can help prevent the development of resistant insect populations.

**1. Sign the Grower Stewardship Agreement.**

The Grower Stewardship agreement is our way of insuring that you received the information that you need to use ATTRIBUTE sweet corn hybrids. This also confirms that you agree to follow the simple, but necessary, steps to keep ATTRIBUTE hybrids as an effective IPM tool for many years to come. You may not purchase ATTRIBUTE sweet corn varieties without signing this agreement and following the guidelines. Failure to follow the guidelines will preclude the future purchase of ATTRIBUTE sweet corn varieties.

**2. Scout for non-target pests and use IPM strategies.**

ATTRIBUTE sweet corn fields will not be insect free, so regular scouting for insects not controlled by ATTRIBUTE sweet corn will still be required. Judiciously use conventional insecticides to control other pests before economic loss occurs.

**3. Scout for resistant corn borers and corn earworms.**

Routine inspection throughout the season is critical for successful IPM. During this routine scouting process inspect your Bt sweet corn fields for higher than expected levels of European corn borer and corn earworm damage. Evaluate your ATTRIBUTE fields during the mid to late whorl stage, looking for leaf and mid rib feeding damage by corn borers. Prior to harvest, look for damaged ears or evidence of corn borers feeding on ears, ear shanks and stalks. Some damage from corn earworms may be present on the ear under some environmental conditions, inspect for corn earworm damage extending beyond the first inch of the ear or larva, which are larger than the third instar. Contact Syngenta Seeds at 1-800-600-8056 if you observe any unexpected damage.

**4. Destroy any ATTRIBUTE sweet corn stalks that are remaining in your fields no later than 30 days following harvest, but preferably within 14 days.** This will reduce the possibility of larvae surviving to produce the next generation of target insects.

**5. Destruction of the stalks must be accomplished by rotary mowing, discing or plowdown.**

**6. Do not double crop ATTRIBUTE sweet corn hybrids.**

In areas where there are two crops of sweet corn in a year, do not plant ATTRIBUTE hybrids in the same field in back to back growing seasons.



## ATTRIBUTE® GROWER STEWARDSHIP AGREEMENT

PLEASE PRINT

Dealer Name: \_\_\_\_\_

Farm Operation Name: \_\_\_\_\_

Contact Name: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Telephone: \_\_\_\_\_ E-Mail: \_\_\_\_\_

UNIT SIZE	# OF UNITS	VARIETY	ACRES	COUNTY AND STATE WHERE PLANTED
<input type="checkbox"/> 25KS <input type="checkbox"/> 100KS				
<input type="checkbox"/> 25KS <input type="checkbox"/> 100KS				
<input type="checkbox"/> 25KS <input type="checkbox"/> 100KS				
<input type="checkbox"/> 25KS <input type="checkbox"/> 100KS				

**My signature below confirms that:**

1. I have read the Grower Guide and understand the requirements to grow ATTRIBUTE sweet corn varieties.
2. I agree not to resell ATTRIBUTE sweet corn seed.
3. I agree to destroy the ATTRIBUTE sweet corn field within 30 days of harvest, preferably within 14 days, using either a rotary mowing, discing or plowdown process.
4. I understand failure to follow these procedures and/or complete the Stewardship Agreement may preclude my ability to purchase ATTRIBUTE sweet corn varieties in the future.

GROWER SIGNATURE

X \_\_\_\_\_

MONTH / DAY / YEAR

\_\_\_\_\_

If you plant Bt corn you are required by the EPA to sign a Stewardship Agreement for your farm.

Return completed form to the dealership when you order your ATTRIBUTE seed. (fax acceptable)

Thank you for being a good steward of Bt technology.

Syngenta Seeds, Inc.  
P.O. Box 4188  
Boise, ID 83711-4100  
March 2006

# GROWER GUIDE FOR ATTRIBUTE® INSECT PROTECTED SWEET CORN

ATTRIBUTE insect protected sweet corn varieties from Syngenta Seeds, Inc. are an exciting advancement for sweet corn growers. These Rogers brand hybrids provide a high level of built-in protection against European corn borer and corn earworm throughout the growing season. By using ATTRIBUTE sweet corn, you can reduce ear damage and yield loss due to European corn borers and corn earworms, and reduce your dependency on insecticides required to control these pests. If properly managed, these hybrids can be a valuable part of your Integrated Pest Management (IPM) program for many years.

## HOW ATTRIBUTE SWEET CORN WORKS

The European corn borer and corn earworm control found in ATTRIBUTE sweet corn hybrids is based on an insect control protein found in *Bacillus thuringiensis* (Bt), a naturally occurring soil organism that many growers spray on their fields to control pests. A gene that produces this protein has been incorporated into ATTRIBUTE hybrids, so that when certain insects feed on their leaves, stalks, silks, or ears, they ingest this protein and die. The protein helps control European corn borers and corn earworms but is harmless to beneficial insects, birds, fish, reptiles and mammals, including humans.

The gene in ATTRIBUTE hybrids is licensed from Monsanto Company under the YieldGard, trademark. Syngenta Seeds' scientists employed unique, exclusive technologies to incorporate the YieldGard Bt gene into their elite germplasm. The result has been high yielding, high quality, sweet corn hybrids with European corn borer and corn earworm protection throughout the plant, throughout the growing season.

## ATTRIBUTE SWEET CORN PERFORMANCE

Syngenta Seeds has conducted numerous field trials of ATTRIBUTE insect protected sweet corn in the U.S. Results from these trials indicate ATTRIBUTE hybrids can provide an effective addition to your IPM program for the control of European corn borer and corn earworm. While the non-ATTRIBUTE plants in many of the field trials suffered extensive damage from corn borers and earworms, the ATTRIBUTE hybrids showed almost no damage.

European corn borers and corn earworms cannot distinguish between Bt and non-Bt hybrids. Consequently, egg masses may be found on ATTRIBUTE sweet corn hybrids. However, once small larvae begin feeding on the insect-protected plants, they quickly ingest the Bt protein and die.

Results to date indicate that under most conditions, more than 95 percent of ATTRIBUTE plants remain substantially free of European corn borer and economic corn earworm damage throughout the growing season, although the expected level of protection varies depending on environmental factors and seed purity. Corn borers and earworms can migrate from non-Bt plants to Bt plants, so some corn borer and earworm larvae may be seen on ATTRIBUTE plants that border non-Bt fields.

ATTRIBUTE sweet corn hybrids can also provide some control of some other lepidopteran corn pests including fall armyworm. However, you should continue to scout your fields for outbreaks of these pests, and use chemical insecticides as necessary to prevent economic loss. Other insect pests not controlled by this Bt protein include corn rootworms, cutworms, common stalk borers, silk fly larvae, sap beetles, aphids and flea beetles. Consult your pest management specialist or local extension agent for information on other pests to watch for in your area.

## IPM STRATEGIES

ATTRIBUTE sweet corn is a significant IPM tool that can reduce the need for chemical pest control. Unlike broad-spectrum insecticides, which can destroy beneficial insect populations, ATTRIBUTE hybrids are not harmful to ladybird beetles, lacewings, and other beneficial insects. So these populations continue to provide some control of corn borers, corn earworms and other crop pests.

While ATTRIBUTE sweet corn can be a powerful IPM tool to control European corn borers and corn earworms, it is not an end-all solution for pest control. Years of IPM

experience have shown that using multiple control tactics over time is the best way to preserve ecological diversity.

Under high corn earworm pressure, such as found in late season plantings and the Southern half of the US, some damage may be present in ATTRIBUTE hybrids. If the market requires close to zero insect damage some chemical control methods will be necessary. The number of applications and timing of these applications is dependent on the European corn borer and corn earworm pressure and environmental conditions.

Continue to use conventional chemical insecticides judiciously to control economic infestations of pests that are not controlled by ATTRIBUTE sweet corn. Practices such as crop rotation and tillage will continue to be important elements of your IPM strategy. A multi-faceted approach will simultaneously enhance control of pests and preserve the effectiveness of insect controls such as ATTRIBUTE sweet corn.

## INSECT RESISTANCE

Every pest management strategy must address the possibility that target insects could develop resistance to the pest control measures. So it is important to understand how resistant insect populations occur.

Genes for resisting virtually anything may exist in nature, due to random genetic variability and the constant shuffling of thousands of genes through mating. Insects do not develop resistance genes through exposure to an insecticide. However, the insecticide does select the resistant insects that exist in the population by eliminating the non-resistant insects.

As the insecticide kills the insects that don't have resistance genes, the survivors begin to dominate the breeding process. They pass their resistance genes to future generations, and as these populations increase, they eventually become predominant and the insecticide becomes ineffective.

## WHAT TO DO IF YOU OBSERVE UNEXPECTED DAMAGE

If you observe unexpected damage from target pests call this toll free number and report what you have observed.

**1-800-600-8056**  
**(8 am – 5 pm Mountain Time)**

A Syngenta Seeds representative will investigate the situation. After ruling out other possible causes and testing to verify that the plants carry the proprietary Bt gene, the representative will collect European corn borers or corn earworms for laboratory assay tests. If resistance is suspected, Syngenta Seeds will inform customers and extension agents in the affected area – as well as EPA officials. Insect monitoring programs will be increased, and alternative control measures will be recommended.

## PARTNERS IN RESISTANCE PREVENTION

Insect resistance is a real possibility and should be taken very seriously. Failure to follow resistance management measures could lead to the development of resistant populations. To combat the possibility of resistance, all levels of the production chain, from the grower to the seed industry, must work together. Each of us has a responsibility to manage this exciting new technology carefully and preserve its long-term value for growers, consumers, and the environment.

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