



INSECT RESISTANCE MANAGEMENT STEWARDSHIP GUIDE

U.S. CORN AND COTTON-GROWING AREAS



syngenta.

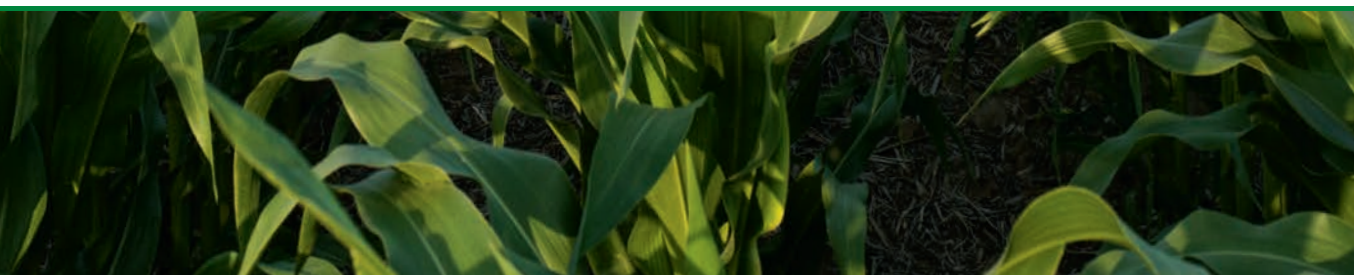




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Updated 02/2022

SYNGENTA OVERVIEW

A strong stewardship program is essential for protecting and preserving the long-term value of insect-protected trait technology. Syngenta provides responsible agriculture programs and information regarding the safe handling and storage of product.





GROWER STEWARDSHIP AGREEMENT

A strong stewardship program is essential for helping to protect and preserve the long-term value of change to Agrisure® trait technology. Embracing this responsibility provides growers with ongoing choices and helps to ensure they remain good stewards of the land.

Prior to planting corn hybrids with Agrisure traits, you are required to sign a Syngenta Seeds, LLC Stewardship Agreement. This agreement outlines the terms and conditions of growing hybrids with Agrisure traits, including the terms of a limited license under Syngenta's intellectual property, compliance with Environmental Protection Agency (EPA)-mandated IRM programs and grain channeling requirements. *Deadline to have all completed agreements to Syngenta is August 15th, annually.*

Agreements may be sent using the following four methods:

AgCelerate
Simplifying Management of Seed Technology Use Agreements

Sign and easily manage your Seed Technology Use Agreements

Your passion is farming. To be successful, you have to take care of all the details that protect you and your business. AgCelerate can help by streamlining paperwork and providing anytime access to all of your records.

Growers
AgCelerate helps to create, store and protect your business and your personal identification information. Provides a simple registration process that enables you to sign Seed Technology Use Agreements for multiple trait providers. Passes your agreement and license information to those seed suppliers that you do business with. Gives you more time to manage your farm operations and focus on building with administrative paperwork.

Suppliers
AgCelerate reduces time and money spent putting grower signatures on paper technology agreements. Provides a simple, easy to access (web & mobile) tool to look up customer license status for multiple trait providers. Enables efficient pre-season planning process for managing agreement compliance. Safely and securely handles your grower's personal information.

AGDATA

ONLINE WWW.AGCELERATE.COM

Click on Register or Login
For support using the AgCelerate tool, please call AgCelerate Customer Service at 1-866-784-4630

- ▶ Easy to sign and use
- ▶ Reduces paperwork
- ▶ Simple way for growers to manage their technology agreements across all trait providers

ELECTRONIC STATEMENT

Electronic signatures will only be accepted through agcelerate.com. Any other forms of electronic signatures will be rejected.

EMAIL GLG@KONNERTHCONSULTING.COM

FAX 800-643-8350

MAIL
Your Local Supplier or
Konnerth Consulting Attn: Stewardship
PO Box 316
New Melle, MO 63365



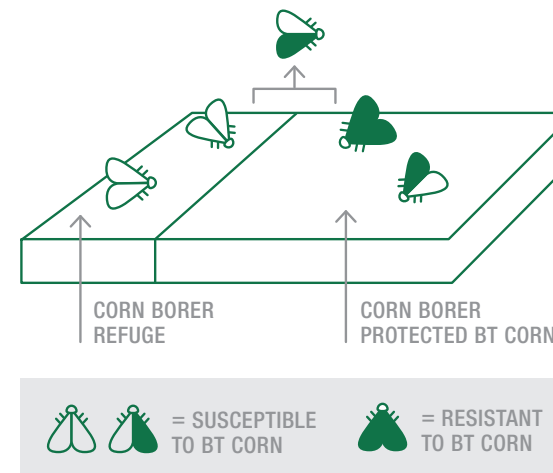
Only use one method; originals are not required. It is important that you keep a copy of the Syngenta Seeds, LLC Stewardship Agreement for your records.
If you have questions regarding the Stewardship Agreement or how to submit the form, please call 877-GRO-CORN (877-476-2676).



WHY PLANT A REFUGE?

Bacillus thuringiensis (Bt) proteins are toxic to specific pests such as the European corn borer (ECB or CB) and the corn rootworm (CRW or RW). As the number of acres exposed to these Bt products increases, so does the potential for target insect pests to develop a resistance to Bt traits. Therefore, in order to preserve this technology now and into the future, an Insect Resistance Management (IRM) plan was developed.

A major component of an IRM plan is to plant a refuge. The EPA requires a refuge on every farm that plants Bt corn hybrids. The EPA requires companies that market Bt corn hybrids to have structured refuge requirements and conduct a grower compliance program. IRM education and compliance are uniform across the U.S. corn industry to ensure a consistent IRM message.



REFUGE STRATEGY – HOW IT WORKS

The refuge maintains a population of insect pests susceptible to the Bt proteins produced in insect-protected Bt corn. These susceptible pests mate with any insect pests that are resistant to the Bt proteins. Susceptibility is then passed on to offspring, helping preserve the long-term effectiveness of insect-protected Bt corn products.



The U.S. Environmental Protection Agency (EPA) requires a refuge on every farm that plants insect-protected corn hybrids. Failure to plant the appropriate refuge jeopardizes your continued access to Agrisure technology.



INSECT RESISTANCE MANAGEMENT (IRM)

IRM COMPLIANCE ASSURANCE PROGRAM

Syngenta and other industry registrants have cooperatively developed the EPA-mandated IRM Compliance Assurance Program. This program requires corn seed companies to evaluate the extent to which growers are adhering to the IRM requirements and ensure that those who do not are brought back into compliance. Growers who do not meet IRM requirements for two years within a five-year period will be denied access to hybrids with Agrisure® insect-protected traits in the third year as mandated by the EPA.

ON-FARM ASSESSMENTS

As part of the product registration with the EPA, Syngenta and other seed companies are required to conduct IRM assessments to help ensure growers are planting the correct refuge on their farms. Growers are selected using a set of risk-based criteria, and assessed with a series of questions that must be conducted in person with the grower or their representative. Following each on-farm assessment, it will be determined if the grower is in compliance.

All trait providers are required to participate and contract a third-party company to complete all assessments during the growing season (June – September).

Growers found to be out of compliance with the refuge requirements jeopardize their access to Bt corn products. They will receive a letter informing them of their compliance infraction, reminding them of their compliance obligations and the consequences of not adhering to the requirements. Included in each letter will be further information on how to develop and implement a suitable IRM program for their farm. Additionally, any grower found to be out of compliance will receive a follow-up IRM assessment the next growing season.

IRM TIP LINE

If you have any seed stewardship questions or become aware of individuals not following proper IRM practices as noted in this guide, please call the tips and complaints toll-free phone line at 1-877-GRO-CORN (1-877-476-2676).

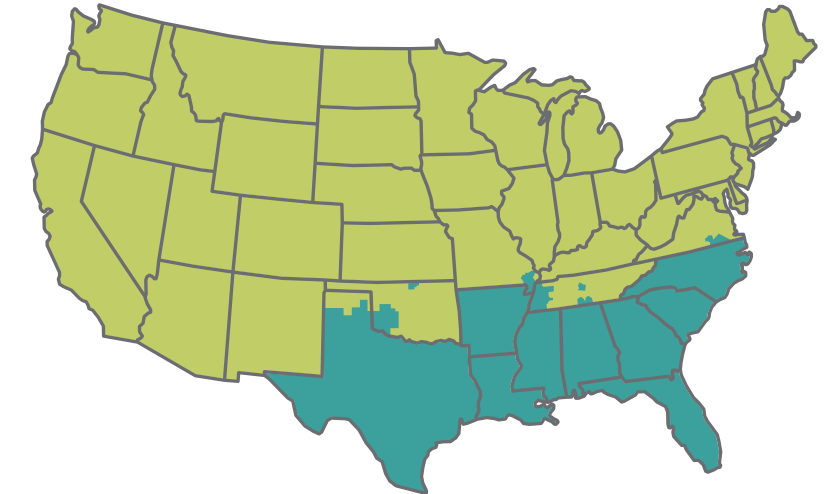
Growers are encouraged to scout their fields. If unexpected damage is observed, please contact your seed reseller or company representative.



CORN REFUGE REQUIREMENTS

SIZE REQUIREMENTS ARE BASED ON GEOGRAPHY AND PRODUCT

- 5% OR 20% REFUGE - CORN GROWING AREAS
- 20% OR 50% REFUGE - COTTON GROWING AREAS



THE FOLLOWING STATES AND COUNTIES ARE CONSIDERED CORN-GROWING AREAS. REPRESENTED BY LIGHT GREEN SHADING.

- | | | | | | |
|---|--|---|--|---|---|
| <p>Alaska
Arizona
California
Colorado
Connecticut
Delaware
Hawaii
Idaho
Illinois
Indiana
Iowa</p> | <p>Kansas
Kentucky
Maine
Maryland
Massachusetts
Michigan
Minnesota
Missouri (all counties except Dunklin, New Madrid, Pemiscot, Scott, & Stoddard)
Montana</p> | <p>Nebraska
Nevada
New Hampshire
New Jersey
New Mexico
New York
North Dakota
Ohio
Oklahoma (all counties except Beckham, Caddo, Comanche, Custer, Greer, Harmon, Jackson, Kay, Kiowa, Tillman, & Washita)</p> | <p>Oregon
Pennsylvania
Rhode Island
South Dakota
Tennessee (all counties except Carroll, Chester, Crockett, Dyer, Fayette, Franklin, Gibson, Hardeman, Hardin, Haywood, Lake, Lauderdale, Lincoln, Madison, Obion, Rutherford, Shelby, & Tipton)</p> | <p>Texas (only the counties of Carson, Dallam, Hanford, Hartley, Hutchinson, Lipscomb, Moore, Ochiltree, Roberts, & Sherman)
Utah
Vermont
Virginia (all counties except Dinwiddie, Franklin City, Greenville, Isle of Wright, Northampton, Southampton, Suffolk City, Surrey, & Sussex)</p> | <p>Washington
West Virginia
Wisconsin
Wyoming</p> |
|---|--|---|--|---|---|

THE FOLLOWING STATES AND COUNTIES ARE CONSIDERED COTTON-GROWING AREAS. REPRESENTED BY BLUE SHADING.

- | | | | | |
|--|---|---|---|---|
| <p>Alabama
Arkansas
Florida
Georgia
Louisiana
Mississippi
Missouri (only the counties of Dunklin, New Madrid, Pemiscot, Scott, & Stoddard)</p> | <p>North Carolina
Oklahoma (only the counties of Beckham, Caddo, Comanche, Custer, Greer, Harmon, Jackson, Kay, Kiowa, Tillman, & Washita)
South Carolina</p> | <p>Tennessee (only the counties of Carroll, Chester, Crockett, Dyer, Fayette, Franklin, Gibson, Hardeman, Hardin, Haywood, Lake, Lauderdale, Lincoln, Madison, Obion, Rutherford, Shelby, & Tipton)</p> | <p>Texas (all counties except Carson, Dallam, Hanford, Hartley, Hutchinson, Lipscomb, Moore, Ochiltree, Roberts, & Sherman)</p> | <p>Virginia (only the counties of Dinwiddie, Franklin City, Greenville, Isle of Wright, Northampton, Southampton, Suffolk City, Surrey, & Sussex)</p> |
|--|---|---|---|---|



CORN REFUGE REQUIREMENTS

*Only required for non E-Z Refuge products

SINGLE PEST REFUGE

A single pest refuge is a field that serves solely as a refuge for above-ground pests (e.g., European corn borer) or below-ground pests (e.g., corn rootworm), but not both. The single pest refuge approach can be used for both single Bt corn products and stacked Bt corn products (also known as the Separate Refuge option).

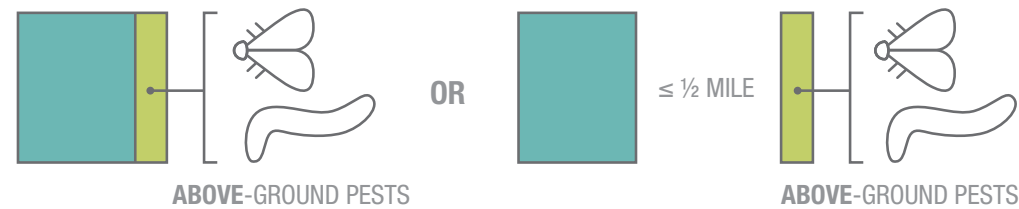
KEY

INSECT-PROTECTED BT CORN

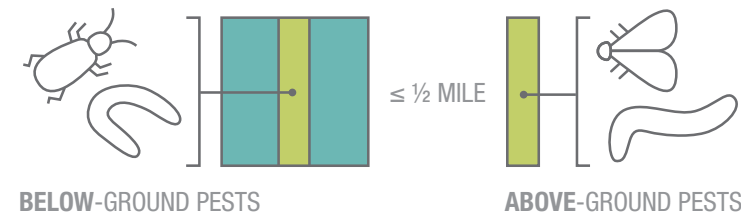
BELOW-GROUND PEST REFUGE (RW)
OR
ABOVE-GROUND PEST REFUGE (CB)

BELOW-GROUND AND ABOVE-GROUND PEST REFUGE (RW/CB)

SINGLE BT CORN PRODUCTS (E.G., AGRISURE VIPTERA® 3110)



STACKED BT CORN PRODUCTS (E.G., AGRISURE VIPTERA 3111)



COMMON REFUGE

A common refuge is a field or area of corn that serves as a refuge for both above-ground pests (e.g., European corn borer) and below-ground pests (e.g., corn rootworm) at the same time. The refuge can be within the Bt field or immediately adjacent to it.

STACKED BT CORN PRODUCTS (E.G., AGRISURE® 3000GT)



	PRODUCT	SIZE REQUIREMENT (CORN-GROWING REGION)	SIZE REQUIREMENT (COTTON-GROWING REGION)	DISTANCE REQUIREMENTS
ABOVE-AND-BELOW GROUND TRAIT STACKS	Agrisure Duracade [®] 5332 E-Z Refuge [®]	No additional refuge required	20% supplemental refuge ²	Within or adjacent ¹
	Agrisure Duracade [®] 5332 Refuge Renew [®]	5%	20%	Within or adjacent ²
	Agrisure Duracade [®] 5222 E-Z Refuge [®]	No additional refuge required	20% supplemental refuge ²	Within or adjacent ¹
	Agrisure Duracade [®] 5222 Refuge Renew [®]	5%	20%	Within or adjacent ²
	Agrisure Duracade [®] 5122 E-Z Refuge [®]	No additional refuge required	20% supplemental refuge ²	Within or adjacent ¹
	Agrisure Duracade [®] 5122 Refuge Renew [®]	5%	20%	Within or adjacent ²
	Agrisure 3122 E-Z Refuge [®]	No additional refuge required	20% supplemental refuge ²	Within or adjacent ¹
	Agrisure 3122 Refuge Renew [®]	5%	20%	Within or adjacent ²
	Agrisure Viptera [®] 3111	20%	20%	Within or adjacent ²
	Agrisure Artesian [®] 3011A	20%	50%	Within or adjacent ²
Agrisure 3000GT	20%	50%	Within or adjacent ²	
ABOVE-GROUND TRAIT STACKS	Agrisure Viptera [®] 3330 E-Z Refuge [®]	No additional refuge required	20% supplemental refuge	Within, adjacent, or up to 1/2 mile away ¹
	Agrisure Viptera [®] 3330 Refuge Renew [®]	5%	20%	Within, adjacent, or up to 1/2 mile away
	Agrisure Viptera [®] 3220 E-Z Refuge [®]	No additional refuge required	20% supplemental refuge	Within, adjacent, or up to 1/2 mile away ¹
	Agrisure Viptera [®] 3220 Refuge Renew [®]	5%	20%	Within, adjacent, or up to 1/2 mile away
	Agrisure 3120 E-Z Refuge [®]	No additional refuge required	20% supplemental refuge	Within, adjacent, or up to 1/2 mile away ¹
	Agrisure 3120 Refuge Renew [®]	5%	20%	Within, adjacent, or up to 1/2 mile away
	Agrisure Viptera [®] 3110	20%	20%	Within, adjacent, or up to 1/2 mile away
	Agrisure Artesian [®] 3010A	20%	50%	Within, adjacent, or up to 1/2 mile away
	Agrisure 3010	20%	50%	Within, adjacent, or up to 1/2 mile away

Refuge size is calculated by applying the appropriate percentage (e.g., 20%, 50%) to the TOTAL CORN ACRES. ¹ Only applicable in the cotton-growing region where a supplemental 20% refuge is required for this product. ² Assumes a common corn borer and rootworm refuge. Alternatively, a separate rootworm refuge within or adjacent to the Bt field and a corn borer refuge up to 1/2 mile away could be planted.

The Agrisure® 3010 trait stack was previously sold as Agrisure® GT/CB/LL.

Important: Always read and follow label and bag tag instructions; only those labeled as tolerant to glufosinate may be sprayed with glufosinate ammonium-based herbicides. Under federal and local laws, only dicamba-containing herbicides registered for use on dicamba-tolerant varieties may be applied. See product labels for details and tank mix partners. LibertyLink®, Liberty® and the Water Droplet logo are registered trademarks of BASF Corporation. HERCULEX® and the HERCULEX Shield are trademarks of Corteva Agriscience LLC. HERCULEX Insect Protection technology by Corteva Agriscience LLC. YieldGard VT Pro® is a registered trademark used under license from the Bayer Group. The Liberty Link® trait may be protected under numerous United States patents. More information about Agrisure Duracade is available at <http://www.biotradestatus.com/>.





CORN REFUGE REQUIREMENTS

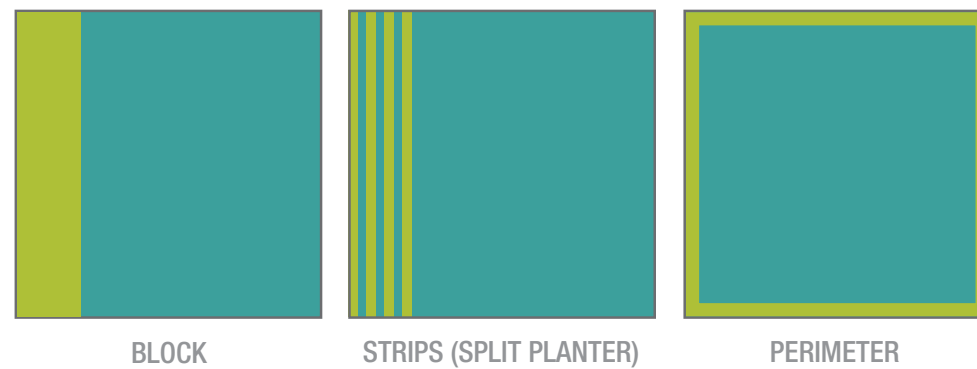
*Only required for non E-Z Refuge products

REFUGE PLANTING OPTIONS

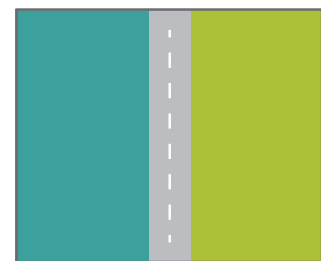
Refuge can be planted as a block, strips within the field, perimeter around the field, adjacent or a separate block within 1/2 mile of the field.

- ▶ 1/2 mile option may only be used for corn borer refuge
- ▶ A neighbor's field does NOT meet the refuge requirements

WITHIN

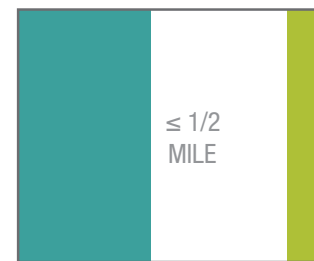


ADJACENT



CAN BE SEPARATED BY A ROAD, PATH, DITCH, ETC., BUT NOT BY ANOTHER FIELD

1/2 MILE OPTION



CORN BORER REFUGE OPTION ONLY

Reminder: When calculating a refuge, the calculation must be based on total corn acres.



CORN REFUGE REQUIREMENTS

STRIP REFUGE

Four Row Minimum – Strips, blocks, or perimeter refuges must be a minimum of four contiguous rows wide to provide ample space for bug mating.

TREATMENT

Corn Borer Treatment – Non-Bt foliar insecticide treatments for corn borer control may be applied only if economic thresholds are reached for one or more pests. Economic thresholds will be determined using methods recommended by local or regional professionals (e.g., Extension Service agents, crop consultants).

Corn Rootworm Treatment – Insecticide treatments for control of corn rootworm larvae may be applied. If rootworm adults are present at time of foliar applications, then corn fields with the Agrisure® trait must be treated in a similar manner as the refuge.

REFUGE MANAGEMENT

Refuge should be planted with a hybrid that is agronomically similar to and managed similar to your corn with Agrisure® traits.

If a rootworm refuge is planted in a field that is in a crop rotation system, the corn hybrids with Agrisure traits must also be planted in a field that is in a crop rotation system.

If the rootworm refuge is planted on continuous corn, the corn hybrids with Agrisure traits may be planted on either continuous or in a crop rotation system.



BAG TAG LABELING

Before filling your planter, always check the bag tag to ensure you know the refuge size requirement.

Important grower information.
This hybrid requires you to plant:

20%
refuge

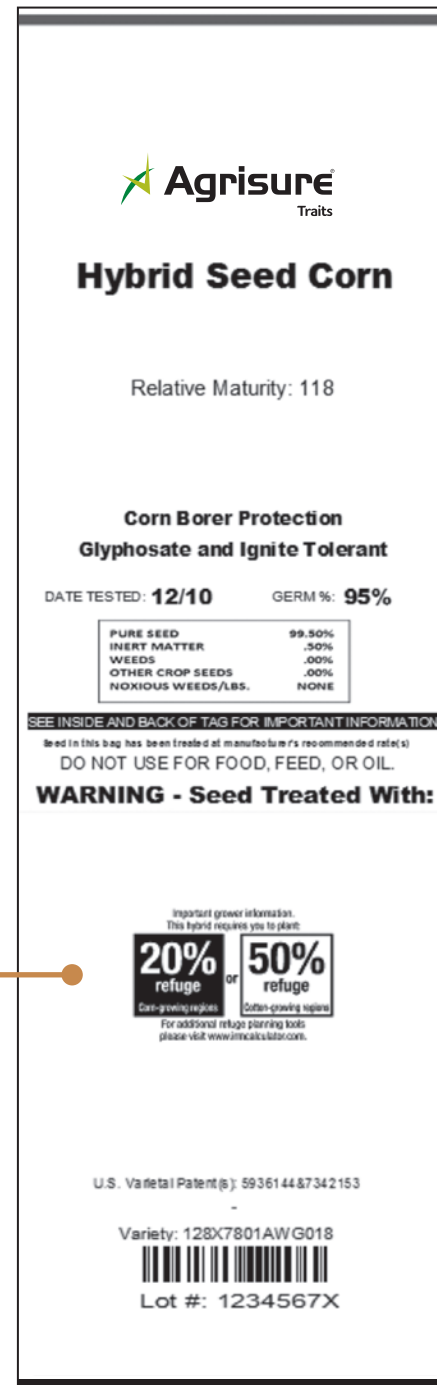
Corn-growing regions

or

50%
refuge

Cotton-growing regions

For additional refuge planning tools please visit www.irmcalculator.com.



TAKE ACTION PROGRAM AND REFUGE LOOKUP

Take Action Insect-Resistance Management is a farmer-focused educational platform designed to help farmers implement Bt stewardship practices. Take Action is an industry-wide partnership between university scientists, seed biotech companies, including Syngenta, commodity organizations and National Corn Growers Association (NCGA) to create resources and tools to help our growers plan how to meet the minimum refuge requirements and how to implement best management practices on their farm.

To find out more about how you can take action, visit www.iwilltakeaction.com/insects



The Agricultural Biotechnology Stewardship Technical Committee, National Corn Growers Association and all other Take Action partners neither recommend nor discourage the implementation of any advice contained herein, and are not liable for the use or misuse of the information provided.

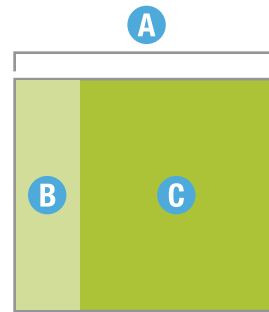


CALCULATING YOUR CORN REFUGE

Reminder: when calculating a refuge, the calculation must be based on total corn acres. This section outlines the right and wrong way to calculate a refuge.

Refer to this diagram for the examples provided on below.

- A** Total Corn Acres*
- B** Refuge Acres
- C** Bt Acres
- %** Percent of Required Refuge (Based on total corn acres)
*Includes all corn acres that are infield or adjacent to each other and will be allocated to the Bt product and its associated refuge



THE WRONG WAY TO CALCULATE (Example shown is for a 20% refuge product where the grower plans to plant 160 acres of Bt corn)

Do **NOT** multiply the amount of Bt acres or seed by the percent of refuge required.

This is **NOT** the correct minimum refuge size.

Example **C** 160 X **%** 20% = **B** ~~32~~

THE CORRECT WAY TO CALCULATE (Example shown is for a 20% refuge product where the grower plans to plant 200 acres of total corn)

START with the **TOTAL** number of corn acres you want to plant in an area.

Multiply by the **PERCENT** of refuge required for the *Bt* trait.

This is your minimum **REFUGE ACRES.**

Example **A** 200 X **%** 20% = **B** 40

Your Field X =

NEXT subtract your refuge acres from your total corn acres.

This is your maximum **Bt ACRES.**

Example **A** 200 - **B** 40 = **C** 160

Your Field - =



CORN ROOTWORM BEST MANAGEMENT PRACTICES

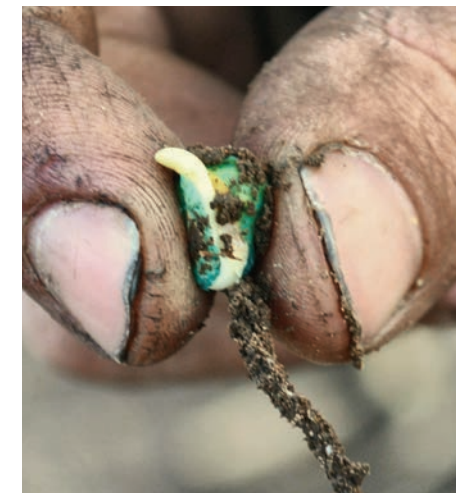
To effectively manage corn rootworm (CRW), implement a multiyear plan that includes a variety of tactics.



CROP ROTATION



PRODUCTS WITH MULTIPLE CRW BT TRAITS



SEED, SOIL OR FOLIAR-APPLIED INSECTICIDES

ASSESS RISK

- ▶ Did you plant the same CRW traits for consecutive years in the same fields?
- ▶ Did you notice large populations of CRW beetles?
- ▶ Did you observe root injury from CRW larvae?
- ▶ Are your fields planted to continuous corn?



CORN ROOTWORM BEST MANAGEMENT PRACTICES

1. PLANT THE REQUIRED REFUGE

2. ROTATE CROPS

Rotate at least every third year if any of the following apply:

- ▶ In long-term continuous corn system
- ▶ CRW populations are high
- ▶ Experiencing problems with CRW trait performance

Corn rootworm management options may be needed the year following corn in areas where northern CRW extended diapause or western CRW variant are present.

3. ROTATE TRAITS

Use Bt hybrids with multiple modes of action for CRW control whenever possible.

If using a hybrid with multiple modes of action for CRW control is not an option, rotate to a different Bt-traited hybrid that controls CRW.

Use a non-Bt-traited hybrid with insecticide.

MANAGE CRW WITH INSECTICIDES

Adult CRW Management Considerations

Scout fields for CRW adults during silking stage (typically July and August) as adult CRW beetles feed on corn silks and may reduce yield.

Foliar sprays may be an option if CRW beetle populations reach an economic threshold for damage (~1 beetle per plant).¹

Follow university extension service or local crop consultant recommendations for products, rates and proper timing of adult spray applications for reducing CRW beetle populations.

Multiple sprays may be necessary.

Larval CRW Management Considerations

The application of an insecticide to the soil surface, in furrows, and/or incorporated into the soil (referred to as “soil-applied insecticide,” “soil insecticide” or “SAI”) is not recommended for control of CRW in Bt-traited corn hybrids except under limited circumstances.

Consult with extension, consultants or other local experts for recommendations when considering a combination of CRW traits and soil-applied insecticides.

SAIs should not be necessary for CRW control with pyramided CRW-traited Bt corn hybrids.

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¹Culy, Edwards & Cornelius. 1992. *Journal of Economic Entomology* 85: 2440-2446.

www.IWillTakeAction.com

FURTHER ASSISTANCE

Stewardship Information

www.greenleafgenetics.com and click under Stewardship

Stewardship Support and IRM Tips Line

1-877-GRO-CORN (1-877-476-2676)

Stewardship Support and Agreement Submission

glg@konnerthconsulting.com

Regulatory and Market Status of Agricultural Biotechnology Products

www.biotradestatus.com

Take Action Education Platform

www.IWillTakeAction.com

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Under federal and local laws, only dicamba-containing herbicides registered for use on dicamba-tolerant varieties may be applied. See product labels for details and tank mix partners. Golden Harvest® and NK® soybean varieties are protected under granted or pending U.S. variety patents and other intellectual property rights, regardless of the trait(s) within the seed. The Enlist E3® soybean, LibertyLink®, LibertyLink® GT27®, Roundup Ready 2 Xtend®, Roundup Ready 2 Yield® and XtendFlex® soybean traits may be protected under numerous United States patents. It is unlawful to save soybeans containing these traits for planting or transfer to others for use as a planting seed. Only dicamba formulations that employ VaporGrip® Technology are approved for use with Roundup Ready 2 Xtend® and XtendFlex® soybeans. Only 2,4-D choline formulations with Colex-D® Technology are approved for use with Enlist E3® soybeans. The trademarks or service marks displayed or otherwise used herein are the property of a Syngenta Group Company. ENLIST E3® soybean technology is jointly developed with Corteva Agriscience LLC and M.S. Technologies, L.L.C. The ENLIST trait and ENLIST Weed Control System are technologies owned and developed by Corteva Agriscience LLC. ENLIST® and ENLIST E3® are trademarks of Corteva Agriscience LLC. GT27® is a trademark of M.S. Technologies, L.L.C. and BASF. Roundup Ready 2 Xtend®, Roundup Ready 2 Yield®, XtendFlex® and YieldGard VT Pro® are registered trademarks used under license from the Bayer Group.

All other trademarks are the property of their respective owners. More information about Agrisure Duracade® is available

