
U.S. TECHNOLOGY USE GUIDE
2024
TUG
INSECT RESISTANCE MANAGEMENT GUIDE
BAYER

Helpful Apps

Climate FieldView™ Platform offers a comprehensive, connected suite of digital ag tools to help you optimize resources and maximize yield. Using real-time and historical crop and weather data, FieldView delivers customized insights that help you make important agronomic decisions with confidence.
The app is available from climate.com and itunes.apple.com

FieldView™ Cab device is a simple and powerful farm management app that enables growers to collect and understand field data through rich maps and reports. It combines the best in real-time cab monitoring with simple field data analysis into a mobile app that benefits from the portability and connectivity of the iPad®.
The app is available from climate.com and itunes.apple.com

RRXtend Spray app helps you plan sprays more effectively by providing weather forecasts that include inversion risk probability and the ability to create and retain application records. The RRXtend Spray app also provides access to valuable Roundup Ready® Xtend Technology information, educational videos, training information and other stewardship information.
The app is available from itunes.apple.com and play.google.com

Stewardship Overview

This Technology Use Guide (TUG) is a valuable source of technical information about Bayer CropScience LP's (Bayer's) current portfolio of seed products containing biotechnology-derived traits, related crop protection products, seed treatments, and single-use wheat varieties. It sets forth some of the requirements, recommendations, and Best Management Practices (BMPs) for the use of these products.

Growers planting corn or cotton seed that contains *Bacillus thuringiensis (B.t.)* traits also must read and follow the applicable 2024 Insect Resistance Management (IRM) Grower Guide. The Corn and Cotton IRM Grower Guides are included in this TUG.

This TUG is not a pesticide product label. It is intended to provide additional information and highlight approved uses allowed by certain product labels. Read and follow all precautions and requirements in the label booklet and any separately published supplemental labeling for the agricultural herbicide or any other pesticide product you are using. Nothing in this TUG should be construed as a substitute for reading and following all product labeling.

A Message About Stewardship

Bayer is committed to enhancing grower productivity through the introduction of innovative seed, trait, and crop protection products. These new technologies bring enhanced value and benefits to growers, and growers assume responsibility for the proper management of these products. Growers planting seed containing Bayer Technologies (as defined in the Technology Stewardship Agreement), such as those with biotechnology traits, single-use wheat varieties, and/or seed treatments, agree to implement all stewardship requirements, which include, but are not limited to, the following:

- Read, sign, and comply with the Technology Stewardship Agreement and obtain a grower license number from Bayer or its permitted designee before purchasing or using any product or technology covered by the Technology Stewardship Agreement. If you have not read and signed a Technology Stewardship Agreement, you can go to **AgCelerate.com** to complete the online licensing process. If you already hold a valid Technology Stewardship Agreement, this Technology Use Guide (TUG) is included in the current terms and conditions of that Technology Stewardship Agreement.
- Note that the terms of the Technology Stewardship Agreement and the TUG are updated by Bayer from time to time. The most recent version of the Technology Stewardship Agreement can be found at these links: **AgCelerate.com** and **tug.bayer.com**, and the most recent version of the TUG can be found at **tug.bayer.com**.
- Read, understand, and follow all the requirements and directions for use on all seed bags, product labels and/or tags.
- Read and understand the applicable IRM Grower Guide prior to planting seed containing insect-protected traits and comply with the specific IRM requirements for those traits as mandated by the U.S. Environmental Protection Agency (EPA).
- Cooperate and comply with any additional IRM/Integrated Pest Management (IPM) programs that Bayer communicates or makes available.
- Observe regional planting restrictions mandated by the EPA.
- Use seed containing Bayer Technologies (as defined in the Technology Stewardship Agreement) solely for planting a single commercial crop in the United States.
- Comply with any additional stewardship requirements, such as grain or feed use agreements, product marketing requirements, or geographical planting restrictions that Bayer deems appropriate or necessary for proper stewardship or to comply with regulations.
- Sell crops or material containing biotechnology traits only to grain handlers who confirm their acceptance, or who use those products on-farm.
- Do not move seed or material containing biotechnology traits across international boundaries or into nations where import is not permitted.
- Do not use, plant, apply, sell, promote, or distribute a product within a state where the product is not yet registered by the appropriate regulatory authorities.
- Follow all applicable stewardship recommendations as outlined in this TUG.
- Follow the Herbicide Resistance Management Recommendations and the Corn Rootworm BMPs to help minimize the risk of developing weed or insect resistance, respectively.
- Always read, understand, and follow pesticide label directions and requirements. The label is the law.
- It is important to only use pesticides that are approved in your state and only for the applications that are permitted on the pesticides' labels. Applying a pesticide in a manner not permitted on its label is a violation of federal laws, could subject you to fines, and may also result in adverse license effects, including, but not limited to, termination of your Technology Stewardship Agreement.
- Not all pesticide products (even if they have the same active ingredients) have the same use requirements or the same instructions for use. Do not assume that because a pesticide product is approved for use in a specific manner and at a specific time, that the same use is allowed for a different pesticide product, even with the same active ingredients.
- Follow proper disposal of unused pesticide, rinsate, treated seed and product packaging in accordance with the label and seed bag tag requirements.
- If you have questions about a Bayer pesticide product, please call **1-866-992-2937**.

Why is Stewardship Important?

1. Signing a Technology Stewardship Agreement gives a grower access to Bayer's patented germplasm, seed containing its patented traits, and other seed products, such as WestBred® single-use wheat varieties. Growers also receive limited warranties on Bayer Technology performance and the opportunity to participate, when eligible, in various Bayer programs such as Bayer PLUS Rewards.

2. Following IRM requirements helps to prevent the development of insect resistance to *B.t.* technologies, enables the long-term durability of these technologies, and meets EPA requirements.

3. Using seed containing Bayer Technologies for planting a single commercial crop encourages investment in seed innovations that help sustain long-term productivity for growers.

Crop or Material Handling Stewardship Statement

The following Excellence Through Stewardship® statement applies to Roundup Ready® Corn 2, DroughtGard® Hybrids with Roundup Ready® Corn 2, VT Double PRO® Corn, DroughtGard® Hybrids with VT Double PRO® Corn, VT Double PRO® RIB Complete® corn blend, DroughtGard® Hybrids with VT Double PRO® RIB Complete® corn blend, VT Triple PRO® Corn, DroughtGard® Hybrids with VT Triple PRO® Corn, VT Triple PRO® RIB Complete® corn blend, DroughtGard® Hybrids with VT Triple PRO® RIB Complete® corn blend, VT4PRO™ Corn, VT4PRO™ RIB Complete® corn blend, SmartStax® Corn, SmartStax® RIB Complete® corn blend, SmartStax® PRO and SmartStax® PRO RIB Complete® corn blend, Preceon™ Smart Corn System, Trecepta® Corn, Trecepta® RIB Complete® corn blend, Bollgard II® Cotton, Bollgard II® with Roundup Ready® Flex Cotton, Bollgard II® XtendFlex® Cotton, Bollgard® 3 XtendFlex® Cotton, Bollgard® 3 ThryvOn™ cotton with XtendFlex® Technology, XtendFlex® Cotton, Roundup Ready® Flex Cotton, Roundup Ready® Spring Canola, Roundup Ready® Winter Canola, TruFlex® Canola with Roundup Ready® Technology, TruFlex® Canola with Roundup Ready® and LibertyLink® Technologies, DEKALB® LibertyLink® Canola, Performance Series® Sweet Corn, Roundup Ready 2 Yield® Soybeans, Roundup Ready 2 Xtend® Soybeans, XtendFlex® Soybeans and Vistive® Gold Soybeans with Roundup Ready 2 Yield® Technology:

Bayer is a member of Excellence Through Stewardship® (ETS). Bayer products are commercialized in accordance with ETS Product Launch Stewardship Guidance, and in compliance with Bayer's Policy for Commercialization of Biotechnology-Derived Plant Products in Commodity Crops. This product has been approved for import into key export markets with functioning regulatory systems. Any crop or material produced from this product can only be exported to, or used, processed or sold in countries where all necessary regulatory approvals have been granted. It is a violation of national and international law to move material containing biotechnology traits across boundaries into nations where import is not permitted. Growers should talk to their grain handler or product purchaser to confirm their buying position for this product.

The following Excellence Through Stewardship statement applies to Roundup Ready® Alfalfa and HarvXtra® Alfalfa with Roundup Ready® Technology:

Forage Genetics International, LLC ("FGI") is a member of Excellence Through Stewardship® (ETS). FGI products are commercialized in accordance with ETS Product Launch Stewardship Guidance, and in compliance with FGI's Policy for Commercialization of Biotechnology-Derived Plant Products in Commodity Crops. Any crop or material produced from this product can only be exported to, or used, processed or sold only in countries where all necessary regulatory approvals have been granted. It is a violation of national and international law to move material containing biotechnology traits across boundaries into nations where import is not permitted. Growers should talk to their grain handler or product purchaser to confirm their buying position for this product. Growers should refer to **biotradestatus.com** for any updated information on import country approvals. Excellence Through Stewardship® is a registered trademark of Excellence Through Stewardship.

The following Excellence Through Stewardship statement applies to Roundup Ready® Sugarbeets:

KWS SAAT SE & Co. KGaA ("KWS") is a member of Excellence Through Stewardship® (ETS). KWS has imposed strict rules on itself relating to the responsible use of genetic engineering and plant materials created through its use. KWS has been a member of the industry initiative "Excellence Through Stewardship®" (ETS) since 2013. ETS is an integral component of our quality management system. KWS products are commercialized in accordance with ETS Product Launch Stewardship Guidance, and in conformance with the KWS stewardship program. This product (and any crop, material or byproduct produced or resulting from it) can only be exported to, or used, processed or sold in countries where all necessary regulatory and other legal approvals have been expressly granted. It is illegal to transfer material containing biotechnology traits into countries where import of this material is restricted or not permitted. Excellence Through Stewardship is a registered trademark of Excellence Through Stewardship.

Please see the product-specific sections of Roundup Ready® Flex Pima Cotton, Roundup Ready® Alfalfa and HarvXtra® Alfalfa with Roundup Ready® Technology for important information including material handling on those products.

Bayer is a member of the Seed Innovation and Protection Alliance (SIPA), an organization established to promote the understanding and value of seed innovations as well as to facilitate and promote the respect of intellectual property rights for the benefit of members, growers, industry associates, consumers and the agricultural community. For more information about SIPA, visit **seedipalliance.com**.

Intellectual Property Rights

If Bayer reasonably believes that a grower may have planted saved seed in violation of the terms of the Technology Stewardship Agreement and/or contrary to Bayer's intellectual property rights, Bayer or Bayer's agents will request invoices and business records to confirm that the grower has not planted saved seed and instead planted the field(s) with seed purchased from an authorized dealer. This information is to be provided within seven days after a written request. At times, Bayer may also enforce its rights to inspect, test, and sample a grower's field(s) pursuant to the terms of the Technology Stewardship Agreement.

If you have questions about the intellectual property for seed or traits or become aware of anyone who may be saving seed or otherwise planting unauthorized seed in violation of their Technology Stewardship Agreement, please speak with your Bayer representative or contact us in any of the following ways:

Phone: 1-866-992-2937

Online: cropscience.bayer.us/contact

Letter: Trait Stewardship
622 Emerson Rd, Suite 150
Creve Coeur, MO 63141

Anyone may provide anonymous or confidential information as follows:

"Anonymous" reporting occurs when a person reports information to Bayer in such a way that the identity of the person reporting the information cannot be identified. This kind of reporting includes telephone calls requesting anonymity, emails, and unsigned letters.

"Confidential" reporting occurs when a person reports information to Bayer in such a way that the reporting person's identity is known to Bayer. Every effort will be made to protect a person's identity, but it is important to understand that a court may order Bayer to reveal the identity of people who are "known" to have supplied relevant information.

For more information on seed and trait intellectual property, go to **traits.bayer.com** and select "Stewardship" at the top of the page.

Commitment to Steward Insect-Protected Traits

Bayer is committed to the success of our grower customers by providing practical, flexible, and cost-effective solutions that address on-farm challenges, contribute to grower choice and provide economic benefits to our customers. To help ensure that insect-protected traits (e.g., *B.t.* traits) remain a viable tool for growers, we are committed to ongoing conversations with the corn and cotton industries on the following IRM efforts to establish the most comprehensive approach to the stewardship of corn and cotton insect-protected traits.

Bayer's ongoing IRM efforts include:

- Continually working to increase overall awareness of the need for, and adoption of, strong IRM programs through our Bayer seed dealers as well as the academic community.
- Carefully evaluating the need for—and practicality of—updating our BMPs or agronomic recommendations as new scientific data become available. Updates may include information tailored to local growing conditions, refuge compliance, scouting techniques, the addition of soil- and seed-applied insecticides, maturity and harvest schedules, soil management practices, crop rotation and adoption of products with multiple modes of action.
- Expanding our offering of multi-trait corn hybrids and cotton varieties that provide multiple modes of action, increasing the durability of traits. We encourage growers to try these seeds with enhanced protection as the product line expands in their area.
- Researching and developing other genes in our pipeline so that we can continue to deliver products with new and increased modes of action.
- Continuing multiyear, targeted resistance monitoring of insect populations through the Agricultural Biotechnology Stewardship Technical Committee (ABSTC), a consortium of agricultural biotechnology companies.
- Actively investigating reports of insect resistance.
- Conducting thorough, generational studies on sample insect populations as appropriate to determine if stable and inherited resistance is present.
- Monitoring and studying the occasional performance issues in fields with very high insect injury levels that exceed commercial thresholds.

Insect Resistance Management Requirements

An effective insect resistance management (IRM) program is a vital part of responsible product stewardship for insect-protected biotechnology products.

Bayer is committed to implementing an effective IRM program for all its insect-protected technologies in all countries where they are commercialized. Such programs are based on available knowledge, practicality, grower acceptance and implementation of the plan.

The EPA requires that Bayer implement, and that growers who purchase insect-protected products follow, an IRM plan. IRM programs for insect-protected traits are based on an assessment of the biology of the major target pests, grower needs, agronomic practices, and appropriate pest management practices. These mandatory regulatory programs have been developed and updated in cooperation with grower and consultant organizations, including the National Corn Growers Association, the National Cotton Council, extension specialists, academic scientists and regulatory agencies.

These programs contain several important elements. One key component is a refuge. A refuge is simply a portion of the relevant crop that does not contain an insect-protected technology for the target insect pests. The lack of exposure to an insect protection protein allows susceptible insects emerging from the refuge to mate with the rare resistant insects that may emerge from the insect-protected crop. Susceptibility to the insect-protected technology would then be passed onto their offspring, helping to preserve the long-term effectiveness of that and possibly other insect-protected technologies.

Growers who purchase seeds containing an insect protection technology must plant a refuge.* Refuge size, configuration and management are described in detail in the current IRM Grower Guide and in the Corn and Cotton sections of this Technology Use Guide.

Bayer is committed to the preservation of insect-protected technologies. Please do your part to preserve insect-protected technologies by implementing the correct IRM plan on your farm. Failure to follow IRM requirements and to plant a proper refuge may result in the loss of a grower's access to Bayer insect-protected technologies.

Compliance Monitoring Program

The EPA requires Bayer to take corrective measures in response to a finding of grower IRM non-compliance. As mandated by the EPA, Bayer or an approved agent of Bayer must monitor grower compliance with IRM and refuge requirements. The Technology Stewardship Agreement signed by the grower requires that upon request by Bayer or its approved agent, a grower must provide the location of all fields planted with Bayer insect-protected technologies and the locations of all associated required refuge areas. The grower must fully cooperate with any field inspections and allow Bayer, or an agent of Bayer, to inspect all fields and refuge areas to ensure an approved IRM program has been followed. All inspections will be performed at a reasonable time and arranged in advance with the grower so that the grower can be present.

Questions? We're Here to Help.

Bayer works collaboratively to develop and implement IRM programs that strike a balance between available knowledge and practicality, with grower acceptance and implementation of the plan as critical components. Refuge requirements vary by the type of product being planted and the location of planting. Growers must plant the amount of refuge acres for a product that is required for their growing region. Please contact your seed dealer with any questions about IRM or refuge requirements and/or call **1-866-992-2937**.

Growers should monitor their fields and contact their seed dealer or Bayer at 1-866-992-2937 if performance problems are observed.

IRM Requirement

Growers must read the current IRM Grower Guide prior to planting for information on required IRM. The corn and/or cotton IRM Grower Guide is located on the seed bag tag.

Before opening a bag of seed, be sure to read, understand and accept the stewardship requirements, **including applicable refuge requirements for insect resistance management,** for the biotechnology traits expressed in the seed as set forth in the Technology/Stewardship Agreement that you sign. By opening and using a bag of seed, you are reaffirming your obligation and agreement to comply with the most recent stewardship requirements.

*In some areas, a natural refuge option is available for cotton containing Bollgard II®, Bollgard® 3, Bollgard® 3 ThryvOn™ Cotton Technologies, and Bollgard® 3 ThryvOn™ Cotton with XtendFlex® Technology. For Performance Series® Sweet Corn products, instead of planting a refuge, the crop must be destroyed no later than 30 days following harvest (but preferably within 14 days). When planted in the Corn-Growing Area, as defined on page 25, there are no requirements for a separate structured refuge for SmartStax® RIB Complete® corn blend, SmartStax® PRO RIB Complete® corn blend, Trecepta® RIB Complete® corn blend, VT Double PRO® RIB Complete® corn blend, DroughtGard® Hybrids with VT Double PRO® RIB Complete® corn blend, VT Triple PRO® RIB Complete® corn blend, DroughtGard® Hybrids with VT Triple PRO® RIB Complete® corn blend, and VT4PRO™ RIB Complete® corn blend. However, in the Cotton-Growing Area, a separate 20% structured refuge is required when planting SmartStax® RIB Complete® corn blend, SmartStax® PRO RIB Complete® corn blend, Trecepta® RIB Complete® corn blend, VT Double PRO® RIB Complete® corn blend, DroughtGard® Hybrids with VT Double PRO® RIB Complete® corn blend, VT Triple PRO® RIB Complete® corn blend, DroughtGard® Hybrids with VT Triple PRO® RIB Complete® corn blend, and VT4PRO™ RIB Complete® corn blend. See the current IRM Grower Guide on the corn and/or cotton bag tag for details.

Integrated Pest Management Recommendations

Integrated pest management (IPM) describes an effective and environmentally sustainable approach to pest management that relies on a combination of common-sense practices.

IPM programs use relevant, comprehensive information on the life cycles of pests and their interaction with the environment. This information is used to manage pests in a manner that is least impactful to people, property and the environment.

Preventing Pest Adaptation

Use BMPs in conjunction with the appropriate seed product to help obtain the greatest yield benefits.

Use seed products, seeding rates and planting technologies appropriate for each crop and geographical area. As much as possible, manage the crop to avoid plant stress. Here are some additional suggestions:

- Use proper crop rotation practices and products to control pests, making it more difficult for pests to adapt. In areas where crop rotation is not practiced, or where rotation occurs but high pest populations are observed, the use of products with multiple modes of action, such as SmartStax® RIB Complete® corn blend, is strongly recommended.
- Employ appropriate scouting techniques and treatment decisions to preserve beneficial insects that can provide additional insect pest control.
- Manage for appropriate maturity and harvest schedules.
- Use soil management practices that encourage destruction of over-wintering pests.

Monitoring Pests

Carefully monitor fields for all pests and follow regional pest management recommendations to determine the need for remedial insecticide treatments. For target pests, scouting techniques and supplemental treatment decisions should consider the fact that larvae must hatch and feed before they will be affected by the insect protection protein(s). For Lepidopteran pests, fields should be scouted regularly following periods of heavy or sustained egg lay, especially during bloom or flowering, to determine if significant larval survival has occurred.

In cotton, scouting for Lepidopteran pests should include a modified whole-plant inspection, including terminals and all stages of fruit. Larvae larger than 1/4 inch (3 to 4 days old) are generally recognized as survivors that may not be controlled by products with Bollgard II® and Bollgard® 3 Cotton Technologies.

In cotton, scouting for thrips or tarnished plant bug species should include specific insect counts for each species, along with square retention estimates for tarnished plant bug. Please reference your local state extension office for specific economic thresholds for thrips and tarnished plant bugs, as well as specific sampling techniques. Scouting is critical to determine which and how many insecticide applications are recommended to avoid economic losses greater than the pest management costs (i.e., when economic thresholds are met).

ThryvOn™ Cotton Technology does not provide complete control of tarnished plant bug or thrips species, but may reduce the number of insects present, so continue to scout and spray according to locally established economic thresholds.

Controlling Cotton Pests

Bayer recommends the use of appropriate remedial insecticide treatments to help provide desired levels of control if any cotton insect pest reaches locally established economic thresholds in products with Bollgard II®, Bollgard® 3 and ThryvOn™ Cotton Technologies.

Although products with Bollgard II®, Bollgard® 3 and ThryvOn™ Cotton Technologies may sustain less damage from some of the most troublesome lepidopteran, tarnished plant bugs and thrips pests, they will not provide protection against all pests and may require insecticide treatments of target pests under conditions of high pest pressure. Insect pests should be monitored and treated with insecticides when necessary, using recommended economic thresholds from the local state cooperative extension service, professional consultants or other qualified authorities. Whenever possible, select insecticides that are least harmful to beneficial insects.

Performance Series® Sweet Corn

Performance Series® Sweet Corn can control corn earworm under typical infestation levels, but to help ensure quality ears at harvest, supplemental insecticide applications may be required when corn earworm populations are above economic thresholds. Protection from corn earworm must be coupled with thorough scouting and spray programs to help maximize marketable yield potential. Destroy crop residue immediately after harvest to avoid regrowth and minimize selection for insect resistance in late-season infestations.

Weed Management

Bayer believes product stewardship is a fundamental component of customer service and responsible business practices.

Bayer is committed to the proper use and long-term effectiveness of its proprietary herbicide brands through a four-part stewardship program:

1) developing appropriate weed control recommendations,
2) continuing research to refine and update recommendations,
3) educating on the importance of effective weed management, and
4) promptly responding to weed control inquiries through a product performance evaluation process.

As a leader in the development and stewardship of Roundup® Brand Agricultural Herbicides, Roundup Ready® Crops, Roundup Ready® Xtend Crops and other products, Bayer invests significantly in research conducted in conjunction with academic scientists, extension specialists and crop consultants. This investment includes an evaluation of the factors that can contribute to the development of herbicide resistance and how to properly manage weeds to delay the selection for herbicide resistance. Visit the Weed Science Society of America (WSSA) at **wssa.net** and **iwilltakeaction.com** to access herbicide-resistance training lessons that provide in-depth educational information. Get rewarded for using Bayer products, including a wide range of herbicides. Visit **MyBayerPLUS.com** to sign up and learn more about this rewards program.

Herbicide Classification Group Number

Glyphosate, the active ingredient in products such as Roundup WeatherMAX®, Roundup PowerMAX® and Roundup PowerMAX® II herbicides or the more concentrated Roundup PowerMAX® 3 herbicide, is a Group 9 herbicide based on the mode of action classification system of the WSSA. Using the same system, glufosinate, the active ingredient in Liberty® brand herbicides, is a Group 10 herbicide, and dicamba, the active ingredient in XtendiMax® herbicide with VaporGrip® Technology, a restricted-use pesticide, is a Group 4 herbicide. Acetochlor, an active ingredient in Harness® and Warrant® brand herbicides, is a Group 15 herbicide. To learn more about herbicide group classification, visit or download apps at **iwilltakeaction.com** or **hracglobal.com**. Any weed population may contain plants naturally resistant to any herbicide group(s). Such resistant weed plants may not be effectively managed when using an herbicide(s) to which the weed plants are resistant. They may be effectively managed utilizing another herbicide from a different mode of action group by mixing one herbicide with herbicides from different groups and/or by using cultural or mechanical weed control practices. It is important to note that a weed plant may be resistant to more than one herbicide group. Consult your local brand representative, state cooperative extension service, professional consultants or other qualified authorities to determine appropriate actions for treating specific resistant weeds.

XtendiMax® herbicide with VaporGrip® Technology is a restricted use pesticide and must be used with VaporGrip® Xtra Agent (or an equivalent volatility reduction adjuvant). For approved tank-mix products (including VRAs and DRAs), nozzles and other important label information visit **XtendiMaxApplicationRequirements.com**. Applicators must check **XtendiMaxApplicationRequirements.com** no more than 7 days before application of this product for additional labeling, including state restrictions. Where applicable, users must comply with additional requirements found on this website.

Weed Management Recommendations

Proactively implementing diversified weed control strategies to help minimize selection for weed populations resistant to one or more herbicides is recommended. A diversified weed management program may include the use of multiple herbicides with different mechanisms of action and overlapping weed spectrum, with or without mechanical operations (e.g., tillage) and/or other cultural practices. Research has demonstrated that using the labeled rate of the herbicide and following label use directions are important steps that help delay the selection for herbicide resistance in weeds. Scouting after a herbicide application is important because it facilitates the early identification of weed shifts and/or possible herbicide-resistant weeds and thus provides direction on future weed management practices. One of the best ways to manage resistant populations is to implement measures to avoid allowing weeds to reproduce by seed or to proliferate vegetatively. Cleaning equipment between sites and avoiding movement of plant material between sites will greatly aid in reducing the spread of resistant weed seed.

It is important to start with a clean field, by using either a burndown herbicide application or tillage, and to optimize herbicide performance by controlling weeds early when they are small and actively growing.

In summary:

- Scout your fields before and after application.
- Start with a clean field, free of weeds.
- Use a diverse set of weed control tools, including residual herbicides that use a different mode of action that are effective on the target weeds.
- Add other herbicide products, at the right rate and timing for post-emergence weed control as allowed by the product label. Control weed escapes and remove weeds before they set seed.
- Clean equipment before leaving the field to prevent spread of weed seeds.

Weed Management *continued*

Bayer supports the Take Action Pesticide-Resistance Management partnership. Take Action is an industry-wide partnership between university weed scientists, major herbicide providers and organizations representing corn, cotton, sorghum, soybean and wheat growers to help prevent and manage herbicide-resistant weeds. The Take Action effort encourages the development of a proactive strategy that incorporates a diverse set of controls to manage herbicide-resistant weeds. To learn more, visit **iwilltakeaction.com/weeds**, or contact your local extension office.

What to Do When Dicamba- or Glyphosate-Resistant Weeds are Suspected or Present

Bayer investigates new claims of suspected weed resistance cases to Bayer branded herbicides. Report any incidence of repeated non-performance of Bayer branded herbicide products on a particular weed to the appropriate company representative, local retailer or county extension agent. To manage herbicide-resistant weeds, Bayer provides recommended control measures, which may include additional herbicides, label-approved tank mixes, mechanical and/or cultural practices. Bayer actively communicates all this information to growers through multiple channels, including the herbicide label, supplemental labeling, this TUG, media and written communications, **www.roundupreadyxtend.com**, **www.MyBayerPLUS.com**, **www.weedscience.org** (a database on herbicide-resistant weeds), grower meetings and Bayer-supported external programs. Bayer will report any unique case of confirmed herbicide resistance at **www.weedscience.org**.

Growers must be aware of, and proactively manage for, dicamba- or glyphosate-resistant weeds in planning their weed control program. If a weed is known to be resistant to dicamba or glyphosate, then a resistant population of that weed is, by definition, no longer controlled with labeled rates of dicamba or glyphosate herbicides. Roundup WeatherMAX®, Roundup PowerMAX® Roundup PowerMAX® II herbicides or the more concentrated Roundup PowerMAX® 3 herbicide, are not warranted to cover the failure to control glyphosate-resistant weed populations; XtendiMax® herbicide with VaporGrip® Technology is not warranted to cover the failure to control dicamba-resistant weed populations.

Recommendations for Managing Resistant Weeds in Roundup Ready® Xtend Crops

Various weed biotypes are known to be resistant to glufosinate, glyphosate and/or dicamba. For regional weed management recommendations specifically related to cotton and soybeans in Roundup Ready® Xtend Crops, refer to **roundupreadyxtend.com/weedmanagement**, and for more information on the Integrated Weed Management Program, visit **iwm.bayer.com**. In addition, visit the Weed Science Society of America at **wssa.net** to access herbicide resistance training and **iwilltakeaction.com** for additional stewardship program resources. A complete list of specimen labels is available at **www.cdms.net/Label-Database**. Approved labels, including any applicable supplemental labeling, must be in the possession of the user at the time of pesticide application and can be obtained by calling **1-866-992-2937** or by contacting your State Pesticide Lead Agency for more information.

Read and follow all product labeling before making in-crop or other applications of Bayer branded glyphosate herbicides, Bayer branded dicamba herbicides or using any other pesticide. For supplemental labels or fact sheets for Bayer products, call 1-866-992-2937. Bayer does not restrict your ability to use any herbicide so long as the product is specifically registered and labeled for in-crop use on the applicable crop. Read the product label or contact the product manufacturer if you have questions about EPA or state approvals for in-crop use. BAYER DOES NOT MAKE ANY REPRESENTATIONS, WARRANTIES OR RECOMMENDATIONS CONCERNING THE USE OF PRODUCTS MANUFACTURED OR MARKETED BY COMPANIES OTHER THAN BAYER, INCLUDING BUT NOT LIMITED TO THOSE THAT ARE LABELED FOR USE IN CROP(S) CONTAINING BAYER TECHNOLOGY. BAYER SPECIFICALLY DISCLAIMS ALL RESPONSIBILITY FOR THE USE OF THESE PRODUCTS IN CROP(S) CONTAINING BAYER TECHNOLOGY. ALL QUESTIONS AND COMPLAINTS ARISING FROM THE USE OF PRODUCTS MANUFACTURED OR MARKETED BY OTHER COMPANIES, OR THE IMPACT TO BAYER TECHNOLOGY FROM THE USE OF SUCH PRODUCTS, SHOULD BE DIRECTED TO THOSE OTHER COMPANIES.

Glyphosate Endangered Species Requirement

Before making an application of any glyphosate-based herbicide product, licensed growers of crops containing Roundup Ready® Technology must access the website **pre-serve.org** to determine whether any mitigation requirements apply to the planned application to those crops and must follow all applicable requirements. The mitigation measures described on the website are appropriate for all applications of any glyphosate-based herbicide to all croplands. If a grower does not have web access, the grower can contact their seed dealer or call 1-800-332-3111 for assistance.

Tank Mixing with Roundup® Herbicides

Roundup WeatherMAX®, Roundup PowerMAX® and Roundup PowerMAX® II herbicides, and the more concentrated Roundup PowerMAX® 3 herbicide, are products sold for in-crop use in 2024.

Roundup WeatherMAX® HERBICIDE | Roundup PowerMAX®

Roundup PowerMAX® II HERBICIDE | Roundup PowerMAX® 3 HERBICIDE

Tank mixtures of Roundup WeatherMAX®, Roundup PowerMAX®, Roundup PowerMAX® II, and Roundup PowerMAX® 3 herbicides with insecticides, fungicides, micronutrients or foliar fertilizers may result in reduced weed control, crop injury, reduced pest control or antagonism. Please refer to the product label, supplemental labeling or fact sheets published separately by Bayer for the Roundup® Brand Agricultural Herbicides tank mix recommendations.

Surfactant Use with Glyphosate Products in Glyphosate-Tolerant Crops

The addition of surfactants or additives containing surfactants to glyphosate spray solutions may increase the potential for crop injury.

When using Roundup WeatherMAX®, Roundup PowerMAX®, Roundup PowerMAX® II, or Roundup PowerMAX® 3 herbicides, NO additional surfactant is needed for optimal performance for applications in crops with Roundup Ready® Technology. Other available glyphosate products labeled for use in such crops may require the addition of surfactant or other additives to help optimize performance, except when used in Roundup Ready® Flex Cotton.

Identity Preserved Production

Some growers may choose to preserve the identity of their crops to meet specific markets. Examples of Identity Preserved (IP) corn crops include seed production, white, waxy or sweet corn, specialty oil or protein crops, food-grade crops and any other crop that meets specialty needs, including those with organic and non-biotechnology specifications. An example of an IP soybean crop is Vistive® Gold Soybeans with Roundup Ready 2 Yield® Technology. Growers of these crops assume the responsibility and receive the benefit for ensuring that their crop meets mutually agreed upon contract specifications.

Based on historical experience with a broad range of IP crops, the industry has developed generally accepted IP agricultural practices. These practices are intended to manage IP production to meet quality specifications and are established for a broad range of IP needs.

The accepted practice with IP crops is that each grower of an IP crop has the responsibility to implement any necessary processes. These processes may include sourcing seed appropriate for IP specifications; field management practices such as adequate isolation distances, buffers between crops, border rows and planned differences in maturity between adjacent fields that might cross-pollinate; and harvest and handling practices designed to prevent mixing and to maintain product integrity and quality. These extra steps associated with IP crop production are generally accompanied by incremental increases in cost of production and consequently the price of the goods sold.

General Recommendations for Management of Mechanical Mixing and Pollen Flow

For all crop hybrids or varieties that growers wish to identity preserve, or otherwise keep separated, the growers should take steps to prevent mechanical mixing. Growers should make sure all seed storage areas, transportation vehicles and planter boxes are cleaned thoroughly both before and after the storage, transportation or planting of the crop. Growers should also make sure all combines, harvesters and transportation vehicles used at harvest are cleaned thoroughly both before and after their use during harvest of the grain produced from the crop. Growers should also make sure all harvested grain is stored in clean storage areas where the identity of the grain can be preserved.

Self-pollinated crops, such as soybeans, do not present a risk of mixing by cross-pollination. If the intent is to use or market the product of a self-pollinated crop separately from general commodity use, growers should plant fields a sufficient distance from other crops to prevent mechanical mixing during harvest.

Growers planting cross-pollinating crops, such as corn or alfalfa, who desire to preserve the identity of these crops or to help minimize the potential for these crops to outcross with adjacent fields of the same crop kind, should use the same generally accepted BMPs to manage mixing that are used in any of the concurrently grown IP crops of the same kind.

It is generally recognized in the industry that a certain amount of incidental, trace-level pollen movement occurs, and it is not possible to achieve 100% purity of seed or grain in any crop production system. Several factors can influence the occurrence and extent of pollen movement. As stewards of biotechnology, growers are expected to consider these factors and talk with their neighbors about their cropping intentions.

Information that is more specific to the crop and area may be available from state extension offices.

Growers should consider the following factors that can affect the occurrence and extent of cross-pollination to or from other fields:

- **Cross-pollination potential.** Some plants are incapable of cross-pollinating, while others, like alfalfa, require cross-pollination to produce seed. Importantly, cross-pollination primarily occurs within the same species, like corn to corn, and the extent of any cross-pollination depends on distance from the source plant.
- **The amount of pollen produced within the field.** The pollen produced by the crop within a given field, known as pollen load, is typically high enough to pollinate all the plants in the field. Therefore, most of the pollen that may enter from other fields falls on plants that have already been pollinated with pollen that originated from plants within the field. In crops such as alfalfa, the hay cutting management schedule significantly limits or eliminates bloom, thereby restricting the potential for pollen and/or viable seed formation.
- **The existence and degree of overlap in the pollination period of crops in adjacent fields.** This will vary depending on the maturity of crops, planting dates and the weather. For corn, the typical pollen shed period lasts from 5 to 10 days for a particular field. Therefore, viable pollen from neighboring fields must be present when silks are receptive in the recipient field during this brief period to produce any grain with traits introduced by the out-of-field pollen.

- **Distance between fields of different varieties or hybrids of the same crop.** The greater the distance between fields, the less likely their pollen will remain viable and have an opportunity to mix and produce an outcross. For wind-pollinated crops, most cross-pollination occurs within the outermost few rows of the field. In fact, many white and waxy corn production contracts require the grower to remove the outer 12 rows (30 ft) of the field to minimize the impurities that could result from cross-pollination with nearby yellow dent corn. Furthermore, research has shown that, as fields become further separated, the incidence of wind-modulated cross-pollination drops rapidly. Essentially, in-field pollen has an advantage over the pollen coming from other fields for receptive silks because of its volume and proximity to silks.
- **The distance pollen moves.** How far pollen can travel depends on many environmental factors, including weather conditions during pollination, especially wind direction and velocity, temperature and humidity. For bee-pollinated crops, the grower's choice of pollinator species and apiary management practice may reduce field-to-field pollination potential. All these factors will vary from season to season, and some factors from day to day and from location to location.
- **For wind-pollinated crops, the orientation and width of the adjacent field in relation to the dominant wind direction.** Fields located upwind during pollination will show dramatically lower cross-pollination for wind-pollinated crops, like corn, compared to fields located downwind.

Coexistence of Biotechnology Cropping Systems with Other Agricultural Production Systems

Coexistence in agricultural production systems and supply chains is well established and well understood. A variety of agricultural systems around the world have coexisted successfully for many years.

Standards and best practices were established decades ago and have continually evolved to deliver high-purity seed and grain to support production, distribution and trade of products from various agricultural systems. For example, production of similar commodities such as field corn, sweet corn and popcorn or oilseed rape varieties with low erucic acid content for food use and high erucic acid content for industrial uses has occurred successfully in close proximity for many years.

The introduction of biotechnology crops generated renewed discussion focused on the coexistence of biotechnology cropping systems with conventional cropping systems and organic production. These discussions have primarily focused on the potential marketing impact of the introduction of biotechnology products on other systems. The health and safety of biotechnology products are not issues because their food, feed and environmental safety are demonstrated before they are allowed to enter the agricultural production system and supply chain.

The coexistence of conventional, organic and biotechnology crops has been the subject of several studies and reports. These studies and reports conclude that coexistence among biotechnology and non-biotechnology crops is readily achievable and is occurring.

It is recommended that coexistence strategies be developed on a case-by-case basis while considering the diversity of products currently in the market and under development, the agronomic and biological differences in the crops themselves and variations in regional farming practices and infrastructure. Any coexistence strategy is designed to meet market requirements and should be developed using current science-based industry standards and best management practices. Those strategies must be flexible, facilitate options and choice for the grower and the food and feed supply chain and be capable of being modified as changes in markets and products warrant.

Successful coexistence of all agricultural systems depends on communication, cooperation, flexibility and mutual respect for each system among growers. Agriculture has a history of innovation and change, and growers have generally adapted to new approaches or challenges by utilizing appropriate strategies, farm management practices and new technologies.

The responsibility for implementing best practices to satisfy specific marketing standards or certification lies with the growers who are growing a crop to satisfy a particular market. These growers are inherently agreeing to employ practices that are appropriate to ensure the integrity and marketability of their crops. In each case, the growers are seeking to produce a crop that is supported by a special market price and consequently assume responsibility for satisfying the market specifications to receive that premium. That said, each grower needs to be aware of the planting intentions of his or her neighbors to gauge the need for appropriate BMPs.

Treated Seed Best Management Practices and Requirements

The use of seed-applied treatments by growers can be an effective tool to protect seeds for a strong, healthy start. Seed treatments can be precisely applied to help shield seeds from insects and diseases that exist in the soil during a seed's early developmental stages.

Below are some recommended BMPs and requirements for the handling and planting of treated seed:

- Always follow the directions on seed bags and/or tags for proper storage, handling, planting and disposal practices, based on the specific treatments applied to the seed.
- Always follow personal protective equipment (PPE) requirements on seed bags and/or tags.
  - PPE generally includes wearing long sleeves, long pants, shoes, socks and chemical-resistant gloves of a defined material/thickness.
  - Always check the seed bag and/or tag for any additional PPE requirements and assess each activity to determine if additional PPE is appropriate to protect workers (e.g., when cleaning the planter).
- During planting, be aware of the presence of honey bee hives, or crops or weeds in the flowering stage within or adjacent to the field that could attract pollinators.
  - Eliminate flowering plants and weeds in and around the field prior to planting.
  - Fill the planter at least 10 yards inside the field to be planted.
- Minimize dust by:
  - Using advanced seed flow lubricants that minimize dust, such as Fluency Agent Advanced. Learn more at **cropscience.bayer.us/seedgrowth/fluency-agent-advanced**.
  - Avoiding off-site movement of dust from treated seeds during planting or when opening seed containers by observing wind speed and direction.
  - Avoiding shaking the bottom of the treated seed bag when filling the planter to reduce the release of dust that could have accumulated during transport.
- For pneumatic planters, direct the air exhaust downward toward the soil surface, if possible, to decrease the potential for dust drift.
- Collect and properly dispose of any spilled treated seed to minimize exposure to people, livestock, wildlife and the environment. For more information on treated seed stewardship and handling spills, please visit this site: **seed-treatment-guide.com/wp-content/uploads/2018/03/Treated-Seed-Stewardship-for-Handling-Spills.pdf**.
- Return leftover seed to its original containers if the seed is intended for storage and use at a later date.
- Completely clean any equipment that has held treated seed of remnant seed and dust and dispose of such remnant seed appropriately. There is zero tolerance for treated seed kernels in the commodity grain channel.
- Refer to seed bags and/or tags for the annual maximum amount of active ingredient(s) that can be applied to each acre. Consider all foliar, furrow, treated seed, plant back, rotational crop and seed disposal contributors that include the same active ingredient(s) and ensure they do not cumulatively exceed the maximum amount.

Planting may be an allowable option to dispose of left-over treated seeds. But when that option is chosen, a grower must follow the product guidelines and adhere to any annual maximum allowances as well as grazing and plant-back restrictions found on the seed bag and/or tag. If planting treated seed, please refer to the specific product label to determine if there are any planting restrictions. Additionally, if disposing of rinse water or applied foliar applications of the same active ingredient on the same acreage intended for over-seeding, calculate the total load of active ingredient to ensure that the maximum amount applied per year is not exceeded. Before over-seeding, confirm that it is allowed in the state and county of proposed over-seeding.

For more information, please refer to the Guide to Seed Treatment Stewardship, produced by the American Seed Trade Association (ASTA) and Crop Life America (CLA) at **seed-treatment-guide.com**.

Fluency Agent Advanced

Fluency Agent Advanced is a seed lubricant for corn and soybeans from Bayer. It is a replacement for talc, graphite and talc/ graphite blended seed lubricants.

Fluency Agent Advanced is an improved version of the original Fluency Agent. It has been optimized for easier handling, including enhanced uniformity and reduced residue buildup. These characteristics allow for improved measuring, pouring and mixing of product and less residue in the seed hopper.

Fluency Agent Advanced reduces the amount of insecticide active ingredient released in treated seed dust during planting by more than 88%[1] as compared to talc, therefore reducing the risk of exposure to non-target insects, including bees.

To ensure that grower practices help promote agricultural sustainability, we encourage growers to follow these tips:

C Communicate planting activities to neighboring beekeepers when practical and be aware of beehives adjacent to the planting area.

A Be aware of wind speed and direction during planting, particularly in areas with flowering crops.

R Reduce risk to pollinators by eliminating or reducing flowering weeds in fields when practical.

E Ensure that seed is planted correctly. To help protect the environment, clean planters and seed boxes to minimize dust release and ensure that treated seed is planted at the proper depth.

[1] When using a deflector and used in accordance with label directions.

Establishing Healthy Pollinator Habitats

Pollinators are essential to agricultural systems. By providing high-quality habitats for pollinators such as bees and monarch butterflies, you provide benefits to your farm by increasing the diversity of pollinators and other beneficial insects in your area. These benefits contribute to productive and sustainable farmscapes.

In addition, consider establishing diverse habitats that have a mixture of wildflowers, milkweed and other beneficial plants to supply nutrition and breeding areas for a variety of pollinators, including bees, butterflies and birds. Plant these habitats in non-cultivated areas such as conservation lands/buffers, ditches or roadsides. Follow label directions intended to minimize spray drift to non-target plants that provide habitat for pollinators and other non-target organisms.

Every region is different. To get started, check out the resources at **farmersformonarchs.org**.

Bayer is working with experts in biodiversity, including academics, growers, conservation groups and government agencies across the United States, to improve the habitat and ecosystem for the monarch butterfly and pollinators such as honey bees. We work with the Bee & Butterfly Habitat Fund, Monarch Watch, National Fish and Wildlife Foundation, Keystone Policy Center Monarch Collaborative, Iowa Monarch Conservation Consortium, Pheasants Forever and Missourians for Monarchs Collaborative, among others.

Honey Bee Health Information

From time to time, claims circulate that insect-protected biotechnology crops harm bees. The insecticidal proteins produced by the currently available insect-protected crops are derived from a common soil bacterium, and Bayer screens all the proteins we use for toxicity to honey bees and other non-target organisms. None of the proteins have provided any evidence of harm in either short- or long-term testing with both adult and larval honey bees. Likewise, there are no credible reports of harm caused by insect-protected biotechnology crops on honey bees.

Overwinter losses of honey bee colonies are an ongoing concern. There are many possible causes, with the Varroa mite posing the largest single threat. Additionally, parasites, diseases, poor nutrition, transportation stress and pesticides (including those used to control mites and diseases) are often cited as challenging honey bee health.

Bayer has many efforts underway to improve honey bee health:

- We established seed treatment BMPs to manage risks to beneficial insects such as bees.
- We contribute to and support stewardship outreach programs to growers and applicators to protect honeybees and other pollinators in programs. Check out the BeSure! program at **growingmatters.org**. Healthy Hives is a multiyear, $1.8 million research initiative well on its way to finding measurable and tangible solutions for improving U.S. honey bee colony health. Read more at **bayer.com/en/us/healthy-hives**.
- We actively support collaborations with the honey bee industry, USDA and university researchers, people engaged in pollinator-dependent agriculture and corn and soybean growers to identify ways to protect and improve honey bee health. In one such collaboration with the Honey Bee Health Coalition, we're joining growers, universities, conservation groups and others because the issue of honey bee health is too big, too important and too complex for one company or group—we have to work together. For more information, please visit the organization's website, **honeybeehealthcoalition.org**.

bees matter

HONEY BEE HEALTH COALITION

Bayer Carbon Program

Powered by the Climate FieldView™ Platform

ForGround by Bayer is now offering a carbon program where eligible farmers in qualifying areas can earn income for adopting strip-till, no-till and cover crops practices.

Reduced tillage and cover cropping can be powerful ways to help support your yield potential and nutrient management over time, leaving healthier soil for future generations. The Bayer Carbon Program was built to be a simple and straightforward way for farmers to take advantage of potential new income streams in the carbon market.

To learn more about this important program, or to see if your fields qualify, go to **BayerForGround.com/Carbon**. You can also learn more about additional benefits through ForGround, including agronomic planning support and discounts from input and machinery providers.

If you have any questions regarding the Bayer Carbon Program, reach out to us at **https://bayerforground.com** or call **1-833-877-7934**.

CLIMATE FIELDVIEW™

Bayer Corn Technologies for 2024

PRECEON SMART CORN SYSTEM

Short stature corn hybrids developed through traditional breeding in the Preceon™ Smart Corn System were developed to be around 1/3 shorter than traditional corn hybrids. With less height to catch wind,* the short stature corn hybrids have increased tolerance to high winds and other challenging weather conditions. Farmers can see a reduced risk of yield loss resulting from lodging, greensnap and goose-necking. Initial trials have also shown potential for greater soil exploration and depth in locations with overall robust root growth,* however the effects of this characteristic have yet to be fully understood.

SmartStax PRO with RNAi Technology

Products with SmartStax® PRO with RNAi Technology contain Cry1A.105, Cry2Ab2, Cry1F, Cry3Bb1, Cry34Ab1 and Cry35Ab1 from *Bacillus thuringiensis (B.t.)* and DvSnf7 double stranded RNA. Together this technology controls European corn borer, southwestern corn borer, southern cornstalk borer, fall armyworm, stalk borer, lesser corn stalk borer, sugarcane borer, black cutworm, western corn rootworm, northern corn rootworm and Mexican corn rootworm and controls or suppresses corn earworm. Products with SmartStax® PRO Technology also contain Roundup Ready® 2 Technology and LibertyLink® Technology that provide tolerance to in-crop applications of labeled glyphosate herbicides and glufosinate herbicides, respectively, when applied according to label directions.

SmartStax®

Products with SmartStax® Technology contain Cry1A.105, Cry2Ab2, Cry1F, Cry3Bb1, Cry34Ab1 and Cry35Ab1 from *B.t.* that together control European corn borer, southwestern corn borer, southern cornstalk borer, fall armyworm, stalk borer, lesser corn stalk borer, sugarcane borer, black cutworm, western corn rootworm, northern corn rootworm and Mexican corn rootworm and control or suppress corn earworm.[1,2] Products with SmartStax® Technology also contain Roundup Ready® 2 Technology and LibertyLink® Technology that provide tolerance to in-crop applications of labeled glyphosate herbicides and glufosinate herbicides, respectively, when applied according to label directions.

Trecepta®

Products with Trecepta® Technology contain Cry1A.105, Cry2Ab2 and Vip3Aa20 from *B.t.* that together control European corn borer, southwestern corn borer, southern cornstalk borer, corn earworm, fall armyworm, stalk borer, lesser cornstalk borer, sugarcane borer, beet armyworm, true armyworm, black cutworm, western bean cutworm, and dingy cutworm.[1] Products containing this technology also contain Roundup Ready® 2 Technology that provides tolerance to in-crop applications of labeled glyphosate herbicides when applied according to label directions.

VT4PRO™ with RNAi Technology

Products with VT4PRO™ with RNAi Technology contain Cry1A.105, Cry2Ab2, Cry3Bb1, VIP3Aa20 from *B.t.* and DvSnf7 double-stranded RNA that together control European corn borer, southwestern corn borer, southern cornstalk borer, corn earworm, fall armyworm, stalk borer, lesser cornstalk borer, sugarcane borer, beet armyworm, true armyworm, black cutworm, western bean cutworm, dingy cutworm, western corn rootworm, northern corn rootworm, and Mexican corn rootworm.[1] Products containing this technology also contain Roundup Ready® 2 Technology that provides tolerance to in-crop applications of labeled glyphosate herbicides when applied according to label directions.

Bayer Corn Technologies for 2024

Products with VT Triple PRO® Technology contain Cry1A.105, Cry2Ab2 and Cry3Bb1 from *B.t.* that together control European corn borer, southwestern corn borer, southern cornstalk borer, fall armyworm, stalk borer, lesser corn stalk borer, sugarcane borer, western corn rootworm, northern corn rootworm, and Mexican corn rootworm and control or suppress corn earworm.[1,2] Products with VT Triple PRO® Technology also contain Roundup Ready® 2 Technology that provides tolerance to in-crop applications of labeled glyphosate herbicides when applied according to label directions.

Products with VT Double PRO® Technology contain Cry1A.105 and Cry2Ab2 from *B.t.* that together control European corn borer, southwestern corn borer, sugarcane borer, southern cornstalk borer, stalk borer, lesser cornstalk borer and fall armyworm, and control or suppress corn earworm.[1] Products with VT Double PRO® Technology also contain Roundup Ready® 2 Technology that provides tolerance to in-crop applications of labeled glyphosate herbicides when applied according to label directions.

Roundup Ready® Corn 2 products and corn with Roundup Ready® 2 Technology contain in-plant tolerance to glyphosate, the active ingredient in Roundup® Brand Agricultural Herbicides: SmartStax® PRO Corn, SmartStax® PRO RIB Complete® corn blend, SmartStax® Corn, SmartStax® RIB Complete® corn blend, VT Double PRO® Corn, VT Double PRO® RIB Complete® corn blend, DroughtGard® Hybrids with VT Double PRO® Corn, DroughtGard® Hybrids with VT Double PRO® RIB Complete® corn blend, VT Triple PRO® Corn, VT Triple PRO® RIB Complete® corn blend, DroughtGard® Hybrids with VT Triple PRO® Corn, DroughtGard® Hybrids with VT Triple PRO® RIB Complete® corn blend, VT4PRO™ Corn, VT4PRO™ RIB Complete®, Trecepta® Corn, Trecepta RIB Complete® corn blend.

Products with DroughtGard® Hybrids Technology contain cold shock protein B from *Bacillus subtilis*, a protein that can mitigate the effects of drought stress: DroughtGard® Hybrids with VT Double PRO® Corn, DroughtGard® Hybrids with VT Double PRO® RIB Complete® corn blend, DroughtGard® Hybrids with VT Triple PRO® Corn, and DroughtGard® Hybrids with VT Triple PRO® RIB Complete® corn blend.

The Acceleron® portfolio delivers coverage on four fronts: fungicides, insecticides, nematicides and bio-enhancers to help protect your seed investment against diseases, insects, nematodes, as well as moisture or nutrient stress. For more information, consult your local retailer or visit cropscience.bayer.us/seedgrowth/acceleron.

RIB Complete® corn blend products have refuge seed in the bag along with traited seed, resulting in a refuge configuration that is interspersed within the field: SmartStax® PRO RIB Complete® corn blend, SmartStax® RIB Complete® corn blend, Trecepta® RIB Complete® corn blend, VT Double PRO® RIB Complete® corn blend, DroughtGard® Hybrids with VT Double PRO® RIB Complete® corn blend, VT Triple PRO® RIB Complete® corn blend, DroughtGard® Hybrids with VT Triple PRO® RIB Complete® corn blend, and VT4PRO™ RIB Complete® corn blend.

*Based upon root observations from 2016-2022 Bayer internal trials both in greenhouse and limited field environments (6 locations, 3 states) comparing limited genetics of short stature vs standard height corn products.

[1]Routine applications of insecticides to control these insects under typical growing conditions and infestation levels are usually unnecessary for these products.

[2]Applications of soil-applied insecticides (i.e., application of an insecticide to the soil surface, in furrows and/or incorporated into the soil) are not recommended for control of corn rootworm except under limited circumstances and under consultation with an extension agent, crop consultant or other local experts. Soil-applied insecticides should not be necessary for corn rootworm control with this product.

SmartStax® PRO RIB Complete® corn blend, SmartStax® RIB Complete® corn blend, Trecepta® RIB Complete® corn blend, VT Double PRO® RIB Complete® corn blend, DroughtGard® Hybrids with VT Double PRO® RIB Complete® corn blend, VT Triple PRO® RIB Complete® corn blend, DroughtGard® Hybrids with VT Triple PRO® RIB Complete® corn blend, and VT4PRO™ RIB Complete® corn blend, require a 20% planted, structured refuge in the Cotton-Growing Area. See map on page 25 of this section.

Weed Management

FOLLOW ALL PESTICIDE PRODUCT LABELING. If there is any conflict between the recommendations in this guide and the applicable pesticide product labeling, the pesticide product labeling controls. Follow the recommendations below to help minimize the risk of developing glyphosate-resistant weed populations in a Roundup Ready® 2 Technology System.

Products with Roundup Ready® 2 Technology enable flexibility, broad-spectrum weed control and proven crop safety. Growers can select the weed control program that best fits the way they farm and provides them the greatest benefit. Options include the use of a residual herbicide with Roundup® brand glyphosate agricultural herbicides and tank mixing other herbicides with Roundup® brand agricultural herbicides.

Corn yield is very sensitive to early season weed competition. Weed control systems must provide growers the opportunity to control weeds before they become competitive.

Roundup Ready® 2 Technology provides a mechanism to control weeds at planting and once they emerge. Failure to control weeds with the right rate, at the right time and with the right herbicide product can lead to increased weed competition, weed escapes, the potential for selecting herbicide-tolerant weeds and possible decreased yields. Use a diverse set of weed management tools, including multiple effective herbicides with different mechanisms of action alone or in tank mixes, as appropriate, with Roundup® brand agricultural herbicides, based on the weed spectrum in the field and according to label directions.

Additional Information

Various weed biotypes are known to be resistant to glufosinate, glyphosate and dicamba. For the current weed control recommendations for herbicide-resistant weed biotypes, please call 1-**866-992-2937**. A complete list of specimen labels can be found at **cdms.net/Label-Database**. Approved labels, including any applicable supplemental labeling, for Roundup® Brand Agricultural Herbicides must be in the possession of the user at the time of pesticide application and can be obtained by calling 1-866-992-2937 or by contacting your State Pesticide Lead Agency for more information.

Recommendations

Start clean with burndown herbicide(s), residual herbicide(s) or tillage. Early season weed control is critical to yield.

Apply pre-emergence residual herbicides such as Harness® Xtra, Degree Xtra®, TriVolt® herbicide or other residual herbicides at the application rate specified on the product label.

- Soil residual herbicides are critical to control emerging glyphosate-resistant weeds, such as pigweed.

Residual herbicides should be used multiple times during the growing season if glyphosate-resistant weeds are expected. Or, apply a pre-emergence residual herbicide at the appropriate application rate tank mixed with a minimum of 22 fl oz/acre of Roundup WeatherMAX® herbicide, Roundup PowerMAX®, or Roundup PowerMAX® II, or 20 fl oz/acre of Roundup PowerMAX® 3 herbicide in-crop before weeds exceed 4 inches in height.

Follow with a post-emergence in-crop application of Roundup PowerMAX® herbicide at a minimum of 22 fl oz/acre, or 20 fl oz/acre of Roundup PowerMAX® 3 herbicide, for additional weed flushes before they exceed 4 inches in height.

Roundup PowerMAX® and Roundup PowerMAX® 3 herbicides may be tank mixed with other herbicides for post-emergence weed control as specified on the product labels.

Equipment should be cleaned before moving from field to field to minimize the spread of weed seed.

Report any incidence of repeated non-performance of Roundup® Brand Agricultural Herbicides or other glyphosate products on a particular weed to the appropriate company representative, local retailer or county extension agent.

Integrated Pest Management (IPM)

Sustainable Agriculture

Bayer insect-protected corn products are highly compatible with the goals of IPM and sustainable agriculture. Sustainability of corn agricultural systems is enhanced when growers follow recommended IPM practices, including cultural and biological control tactics, pest sampling and appropriate use of pest thresholds for management practices. These latter measures are not only important for non-insect-protected refuge acres but are equally important for detecting and controlling non-target pests that exceed established thresholds on insect-protected crops.

Pests Not Controlled

Specific insect-protected corn products offer control against several of the key lepidopteran and coleopteran insect pests but will not control all insect pests in corn. Therefore, it is important to understand that, in some cases, severe infestations of target and/or non-target insects may require additional control measures/treatments. Fields should be scouted regularly, especially during periods of heavy or sustained pest presence. Consult local IPM monitoring guidelines to identify insects that should be routinely monitored and for recommended controls and thresholds. When insecticide treatments are required, select products that have the least impact on beneficial insects. Consult your local crop adviser or extension specialist for the most up-to-date information.

An IPM Checklist

Pest scouting:

- Use appropriate scouting techniques and treatment decisions.

Insecticide applications:

- Select insecticide treatments that have minimal negative impact on beneficial insects, whenever possible. These insects are conserved by insect-protected crops and can contribute to insect pest control.
- Rotate insecticide mode of action or use products with multiple modes of action to help reduce the risk of insect pests developing chemical resistance. For more information, visit **irac-online.org/modes-of-action/**.

Cultural practices:

- Select cultivars well-adapted to your setting, giving appropriate attention to the impact of crop maturity and timing of harvest on pest severity.
- Use recommended cultural control methods to reduce pest overwintering; destroy crop promptly after harvest and use other soil management practices to reduce overwintering insects.

Corn Refuge Requirements

Growers must read the IRM Grower Guide prior to planting for information on required IRM. The corn product IRM Grower Guide is located on the seed bag tag.

Resistance naturally evolves to many pest control tactics. The risk of insect pests developing resistance is real but may be reduced with proper planning. The best way to preserve the benefits and insect protection of this technology is to develop and implement an IRM plan.

A key component of any IRM plan is a refuge.

A refuge is a block or strip of corn that does not contain a plant-incorporated protectant such as an insect protection technology for controlling targeted insect pests, or the refuge can be included in an EPA-approved seed blend product provided by qualified seed producers/conditioners licensed by Bayer. There are no requirements for a separate structured refuge for approved seed blend products when planted in the U.S. Corn-Growing Area (as defined on page 25) because the refuge seed is contained within the bag/container. Bayer does not recommend the planting of seed blend products in the Cotton-Growing Area (as defined on page 25). If planted in a cotton area, an additional 20% separate structured refuge is required.

The primary purpose of a refuge is to maintain a population of insect pests that are not exposed to plant-incorporated protectants such as insect protection proteins.

The lack of exposure to insect protection proteins allows susceptible insects emerging from the refuge to mate with the rare resistant insects that may emerge from the insect-protected crop. Susceptibility to insect protection technology would then be passed to their offspring, helping to preserve the long-term effectiveness of insect protection technologies. To help reduce the risk of insects developing resistance, the refuge should be planted with a similar non-insect-protected product (e.g., a similar relative maturity), as close as possible and at the same time as, the crop containing insect protection technologies.

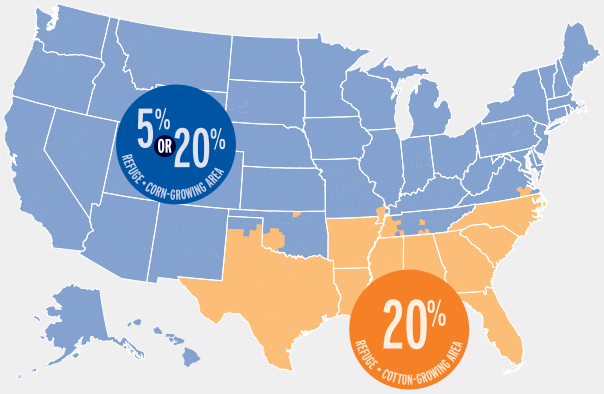
As a condition of registration for insect-protected products required by the EPA, seed companies are required to conduct IRM compliance assessments during the growing season to ensure grower compliance.

Failure to follow IRM requirements and properly plant a refuge may result in the loss of access to Bayer Crop Science insect-protected technologies. Do your part to ensure these technologies are preserved by fully cooperating in refuge management. Continued availability of insect-protected technologies depends on grower compliance with EPA product registration and label requirements. With an effective IRM plan in place, growers will continue to benefit from effective and consistent insect protection and top-yield potential found in crops containing these technologies.

Refuge Planting

- Grower mixing of non-insect-protected seed with insect-protected corn seed is not permitted. However, non-insect-protected seed can be included in an EPA-approved seed blend product if provided by qualified seed producers/conditioners licensed by Bayer.
- Plant the structured refuge at the same time as the insect-protected corn seed to help ensure that plant development is similar among products.
- To avoid inadvertent mixing of seed in the planting process, be sure to clean all seed out of hoppers when switching from non-insect-protected seed to insect-protected corn seed or vice versa.
- Adjacent and separate refuge fields must be planted and managed by the same grower.
- If insect-protected corn seeds are planted on rotated ground, then the corn refuge can be planted on either continuous corn ground or on rotated ground.
- If insect-protected corn seeds are planted on continuous corn ground, then the corn refuge also must be planted on continuous corn ground.

Requirements by Growing Area



The following states and counties are within the **Corn-Growing Area.** The blue circle structured refuge requirements apply to non-refuge in a bag insect-protected corn products grown in this area.

Alaska
Arizona
California
Colorado
Connecticut
Delaware
Hawaii
Idaho
Illinois
Indiana
Iowa
Kansas
Kentucky
Maine
Maryland
Massachusetts
Michigan
Minnesota
Missouri—*all counties except Dunklin, New Madrid, Pemiscot, Scott & Stoddard*
Montana
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*
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*
Texas—*only the counties of Carson, Dallam, Hansford, Hartley, Hutchinson, Lipscomb, Moore, Ochiltree, Roberts & Sherman*
Utah
Vermont
Virginia—*all counties except Dinwiddie, Franklin City, Greensville, Isle of Wight, Northampton, Southampton, Suffolk City, Surrey & Sussex*
Washington
West Virginia
Wisconsin
Wyoming

The following states and counties are within the **Cotton-Growing Area.** The orange circle structured refuge requirements apply to insect-protected corn products grown in this area.

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

Corn Structured Refuge Requirements

Follow all pesticide label directions. Please see page 25 for Growing Area descriptions.

Product	Corn-Growing Area Structured Refuge	Cotton-Growing Area Structured Refuge	Common or Single-Pest Configuration Options: Within	Adjacent	1/2 Mile
SmartStax®	5%	20%	●	●	*

Under typical growing conditions and infestation levels for products planted with SmartStax® Technology, routine applications of insecticides to control pests are usually unnecessary. However, the refuge can be protected from lepidopteran damage by use of non-*B.t.* insecticides if the population of one or more target lepidopteran pests in the refuge exceeds economic thresholds.[1] The refuge can also be protected from corn rootworm damage by an appropriate seed treatment or soil insecticide; but insecticides labeled for adult corn rootworm control must be avoided in the refuge during the period of corn rootworm adult emergence. If insecticides are applied to the refuge for control of corn rootworm adults, the same treatment must also be applied in the same timeframe to the SmartStax® Corn field. SmartStax® Technology contains Roundup Ready® 2 Technology and LibertyLink® herbicide-tolerance traits, but your refuge may or may not. Select an appropriate herbicide for your refuge to avoid crop damage.

SmartStax PRO RIB COMPLETE with RNAi TECHNOLOGY	NO structured refuge required	Not recommended for the Cotton-Growing Area. If planted, an additional 20% structured refuge is required.	●	●	●
SmartStax RIB COMPLETE	NO structured refuge required	Not recommended for the Cotton-Growing Area. If planted, an additional 20% structured refuge is required.	●	●	●
VT4PRO with RNAi TECHNOLOGY	5%	20%	●	●	●
Trecepta CORN	5%	20%	●	●	●

The refuge can be treated with a non-*B.t.* foliar-applied insecticide for control of lepidopteran pests (e.g., corn borer), if pest pressure reaches an economic threshold for damage.[1] Microbial *B.t.* insecticides must not be applied to the refuge corn.

VT4PRO RIB COMPLETE	NO structured refuge required	Not recommended for the Cotton-Growing Area. If planted, an additional 20% structured refuge is required.	●	●	●
Trecepta RIB COMPLETE CORN	NO structured refuge required	Not recommended for the Cotton-Growing Area. If planted, an additional 20% structured refuge is required.	●	●	●

Cotton-Growing Area: The 20% separate structured refuge can be protected from lepidopteran damage by use of non-*B.t.* insecticides if the population of one or more target pests of Trecepta® RIB Complete® corn blend exceeds economic thresholds in the refuge. Microbial *B.t.* insecticides must not be applied to the refuge corn. In addition, refuge can be protected from corn rootworm damage by appropriate seed treatment or soil insecticide.

VTTriplePRO DroughtGard HYBRIDS VTTriplePRO	20%	20%	●	●	**

The refuge can be treated with a soil-applied or seed-applied insecticide to control corn rootworm larvae and other soil pests. The refuge can also be treated with a non-*B.t.* foliar applied insecticide for control of late-season pests (e.g., corn borer), if pest pressure reaches an economic threshold for damage.[1] However, if corn rootworm adults are present at the time of foliar application, then the VT Triple PRO® corn field must be treated in a similar manner.

VTTriplePRO RIB COMPLETE DroughtGard HYBRIDS VTTriplePRO RIB COMPLETE	NO structured refuge required	Not recommended for the Cotton-Growing Area. If planted, an additional 20% structured refuge is required.	●	●	●

Cotton-Growing Area: The 20% separate structured refuge can be protected from lepidopteran damage by use of non-*B.t.* insecticides if the population of one or more target pests of Trecepta® RIB Complete® corn blend exceeds economic thresholds in the refuge. Microbial *B.t.* insecticides must not be applied to the refuge corn. In addition, refuge can be protected from corn rootworm damage by appropriate seed treatment or soil insecticide.

VTDoublePRO DroughtGard HYBRIDS VTDoublePRO	5%	20%	●	●	●

The refuge can be treated with a non-*B.t.* foliar-applied insecticide for control of lepidopteran pests (e.g., corn borer), if pest pressure reaches an economic threshold for damage.[1] Microbial *B.t.* insecticides must not be applied to the refuge corn.

VTDoublePRO RIB COMPLETE DroughtGard HYBRIDS VTDoublePRO RIB COMPLETE	NO structured refuge required	Not recommended for the Cotton-Growing Area. If planted,an additional 20% structured refuge is required.	●	●	●

Cotton-Growing Area: The 20% separate structured refuge can be protected from lepidopteran damage by use of non-*B.t.* insecticides if the population of one or more target pests of VT Double PRO® RIB Complete® corn blend exceeds economic thresholds in the refuge.[1] Microbial *B.t.* insecticides must not be applied to the refuge corn. In addition, refuge can be protected from corn rootworm damage by appropriate seed treatment or soil insecticide.

* = 1/2 mile option for SmartStax® Corn is only available to growers in the following states: AK, AL, AR, AZ, CA, CT, DE, FL, GA, HI, ID, LA, MA, MD, ME, MS, MT, NC, NH, NJ, NM, NV, NY, OR, PA, RI, SC, TN, UT, VA, VT, WA, WV, WY.

** = 1/2 mile option for VT Triple PRO® Corn is only available to growers planting separate refuge areas for corn borers (this option is not available for a separate corn rootworm refuge area).

[1] Economic thresholds will be determined using methods recommended by local or regional professionals (e.g., extension service agents and crop consultants).

Corn Structured Refuge Requirements

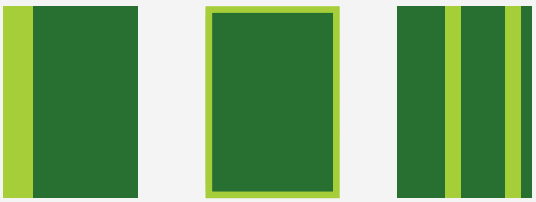
Common and Single-Pest Structured Refuge Configuration Options

- Insect-protected Technology
- Non-insect protected Refuge (i.e., Roundup Ready® Corn 2 or conventional corn)
- Designates road, ditch, path, etc.

Sample configurations shown are for a 20% refuge

The graphic depictions of refuge configurations in this overview are offered merely as examples to growers and are not necessarily drawn to scale.

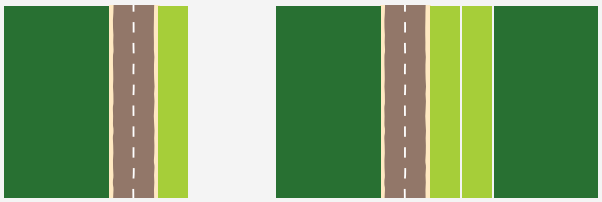
Within



Block | Perimeter | Strips

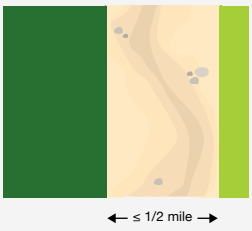
If perimeter or strips are used for the refuge, they must be at least 4 (four) contiguous rows wide.

OR Adjacent



Adjacent | Within adjacent field

OR 1/2 Mile Option



1/2 mile option available for limited products and in limited areas — *see footnotes on page 26 for details.*

How to Calculate a Separate Structured Refuge

Refer to this diagram for the example below.

- **A** **Total Corn Acres***
- **B** **Refuge Acres**
- **C** **Insect-protected Acres**
- **%** **Percent of Required Refuge—** 5% or 20%
  Based on total corn acres

As part of our commitment to enhancing grower productivity, growers can access an IRM corn refuge look-up tool at **iwilltakeaction.com/insects/bt-refuge-lookup-tool/.**

Example below is for a 20% refuge product.

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

Multiply by the **PERCENT** of refuge required for the insect-protected 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 **INSECT-PROTECTED ACRES.**

Example	A	200	–	B	40	=	C 160
Your Field			–			=	

*Includes all corn acres that are in field or adjacent to each other and will be allocated to the insect-protected product and its associated refuge.

Corn Rootworm Best Management Practices

Bayer has implemented a comprehensive program for management of corn rootworm (CRW), including a series of best management practices, to better assist growers on every field where they reported unexpected damage.

We encourage growers to follow recommended IPM practices, including cultural control tactics, scouting and the appropriate use of pest thresholds and sampling.

If you are not seeing high corn rootworm pressure in a field and you are planting a single mode of action product such as VT Triple PRO® Corn, Bayer recommends updating your IPM program to include regular scouting to determine if the addition of an insecticide or other IPM practice is necessary.

These BMPs provide practical solutions to reduce rootworm populations, limit CRW damage and enable insect resistance management.

1 Plant the required refuge

2 Rotate crops

Rotate to a crop that is not a CRW host, such as soybeans, at least every third year if any of the following are applicable:

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

In areas where rotational-resistant CRW variants exist, such as extended diapause eggs or adult beetles laying eggs in soybean, CRW management options may be needed the following year.

3 Rotate traits

- Use insect-protected products with multiple modes of action for CRW control whenever possible.
- If using a product with multiple modes of action for CRW control is not an option, rotate to a different insect-protected product that controls CRW.

4 Use non-insect-protected or non-CRW-protected corn

- Use a non-insect-protected product with insecticide.

5 Manage CRW with insecticides

Adult CRW Management Considerations

- Scout fields for CRW adults during silk 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 (~ 0.75 beetle per plant).*
- 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 insect-protected corn except under limited circumstances.
- Consult with extension, crop consultants or other local experts for recommendations when considering a combination of CRW-protected traits and soil applied insecticides.
- SAIs should not be necessary for CRW control with pyramided CRW-traited insect-protected corn.

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

Acceleron® Corn Offerings

The Acceleron® Brand portfolio helps protect your seed investment against diseases, insects, nematodes, and moisture or nutrient stress.

Fungicides

Some key diseases cost growers 225M bushels of corn per year. Our exclusive combinations of fungicides protect against these top diseases, including *Fusarium, Pythium, Rhizoctonia solani* and *Colletotrichum graminicola.*

Insecticides

Early season corn insects feed on seeds and seedlings, which can cause delayed emergence, stand loss, plant injury and stunting. Our insecticides control 15 early season pests that cause significant damage to corn crops across the U.S., including wireworm, seed corn maggot, white grub, grape colaspis and black cutworm.

Nematicides

Nematodes cost an estimated 10.2% yield loss in corn.[1] They pierce and infect roots, causing a loss of nutrients and water while opening the door for secondary issues. Poncho® Votivo® Seed Treatment has been shown to provide broad-spectrum protection against plant-parasitic nematodes for up to 60 days after planting.

New to the Acceleron offerings for 2024: Acceleron N-314 Seed Treatment,[2] the first dual mode of action chemistry and biological product for corn that provides broad spectrum efficacy protecting against yield robbing nematodes.

Bio-Enhancers

Nutrient and moisture deficiencies can impair root growth, making it even harder for plants to get the nutrients and moisture they need. Bio-enhancers for corn make nutrients available to plants, helping maximize yield potential. Although benefits vary by crop, some products can also enhance functional root volume and increase nutrient uptake, protecting plants from moisture or nutrient stress.

Additional Offerings

- The BioRise® Corn Offerings complement our lineup of fungicides, insecticides and nematicides. 2016 and newer product classes are treated with BioRise® 360 ST.[3]

For more information, please consult your local retailer or visit **cropscience.bayer.us/seedgrowth/acceleron**.

For important information related to stewardship and best management practices for seed treatments, refer to page 16 of this Technology Use Guide.

[1]Nationwide estimated loss. Ferris, Howard. "Nematodes and Plant Damage." University of California, 1 Oct. 2015. Web.

[2]Acceleron N-314 Seed Treatment will be available on all VT4PRO™ with RNAi Technology and SmartStax® PRO with RNAi Technology trait offerings on Bayer owned seed brands for the 2024 season.

[3]BioRise® Corn offerings can vary by seed company.

2024 Corn Offerings

ACCELERON® SEED APPLIED SOLUTIONS BASIC

FUNGICIDES
Two modes of action providing enhanced protection against soilborne and seedborne diseases, including *Fusarium*, *Rhizoctonia solani* and *Pythium*.

INSECTICIDES [1]
Controls over 15 corn insect pests and protects against damage from early season pests, such as wireworm, seedcorn maggot, white grub, grape colaspis and black cutworm. Standard insecticide rate of 0.50 mg a.i./seed for products containing Clothianidin.

NEMATICIDES [1]
Protection against damage from a wide range of nematode species. Refer to your 2024 seed price card for availability and pricing.

BIO-ENHANCERS
+ BioRise® Corn Offering [2]
Designed to increase functional root volume, as well as water and nutrient uptake through enhanced mycorrhizal colonization.

[1] Insecticide and nematicide offerings will vary by trait and class. Refer to price card, bag tag or bag flap for details. Clothianidin at the 1.25 mg a.i./seed rate available on select products.

[2] Class of 2016 and newer base genetics are treated with BioRise® 360 ST.

[3] Results from seven years of internal trials comparing hybrids treated with and without Enhanced Disease Control Offering + Poncho® Votivo® Seed Treatment. N=598.

ACCELERON® SEED APPLIED SOLUTIONS ELITE

FUNGICIDES
Protection against soilborne and seedborne diseases, including *Fusarium, Rhizoctonia solani* and *Pythium*.

+ ENHANCED DISEASE CONTROL OFFERING
Offers a 3.7 bu/A advantage on average[3] with enhanced early- to mid-season disease control due to the reduction of infections caused by *Fusarium, Rhizoctonia solani* and *Colletotrichum graminicola*.

INSECTICIDES [1]
Controls over 15 corn insect pests and protects against damage from early season pests, such as wireworm, seedcorn maggot, white grub, grape colaspis and black cutworm. Standard insecticide rate of 0.50 mg a.i./seed for products containing Clothianidin.

NEW MY24 ACCELERON® N-314 SEED TREATMENT NEMATICIDE OFFERING
on VT4PRO™ with RNAi Technology and SmartStax® PRO with RNAi Technology on Bayer-owned seed brands for the 2024 season.

NEMATICIDES [1]
Protection against damage from a wide range of nematode species. Refer to your 2024 seed price card for availability and pricing.

BIO-ENHANCERS
+ BioRise® Corn Offering [2]
Designed to increase functional root volume, as well as water and nutrient uptake through enhanced mycorrhizal colonization.

Before opening a bag of seed, be sure to read, understand and accept the stewardship requirements, **including applicable refuge requirements for insect resistance management,** for the biotechnology traits expressed in the seed as set forth in the Technology/Stewardship Agreement that you sign. By opening and using a bag of seed, you are reaffirming your obligation and agreement to comply with the most recent stewardship requirements.

Subject to final commercialization decisions, availability of the Preceon™ Smart Corn System is expected for the 2024 growing season. **Product Use Statement:** Enlist E3® soybeans contain the Enlist E3 trait that provides crop safety for use of labeled over-the-top applications of glyphosate, glufosinate and 2,4-D herbicides featuring Colex-D® technology when applied according to label directions. Following burndown, the only 2,4-D containing herbicide products that may be used with Enlist® crops are products that feature Colex-D technology and are expressly labeled for use on Enlist crops. 2,4-D products that do not contain Colex-D technology are not authorized for use in conjunction with Enlist E3 soybeans. **Warning:** Enlist E3 soybeans are tolerant of over-the top applications of glyphosate, glufosinate, and 2,4-D. Accidental application of incompatible herbicides to this variety could result in total crop loss. When using 2,4-D herbicides, grower agrees to only use 2,4-D products that contain Colex-D technology authorized for use in conjunction with Enlist E3 soybeans. Always read and follow herbicide label directions prior to use.

*Commercialization is dependent on multiple factors, including successful conclusion of the regulatory process. The information presented herein is provided for educational purposes only, and is not and shall not be construed as an offer to sell, or a recommendation to use, any unregistered pesticide for any purpose whatsoever. It is a violation of federal law to promote or offer to sell an unregistered pesticide.

YOU MUST SIGN A TECHNOLOGY AGREEMENT, READ THE PRODUCT USE GUIDE PRIOR TO PLANTING AND FOLLOW HERBICIDE RESISTANCE MANAGEMENT (HRM) REQUIREMENTS.

IMPORTANT: Produce Marketing and Stewardship Requirements for Performance Series® sweet corn: This product has been approved for import into key export markets with functioning regulatory systems. Any crop or material produced from this product can only be exported to, or used, processed or sold in countries where all necessary regulatory approvals have been granted. It is a violation of national and international law to move material containing biotech traits across boundaries into nations where import is not permitted. It is the grower's responsibility to talk to their produce handler or purchaser to confirm their buying position for this produce so that the marketing requirements can be met.

U.S. Herbicide Information for Performance Series® sweet corn: Roundup PowerMAX®*, Roundup PowerMAX® II* and Roundup WeatherMAX® herbicides are approved for use on Performance Series® sweet corn (containing Roundup Ready® 2 Technology) in all U.S. states, the District of Colombia and Puerto Rico. If the directions for use on sweet corn with Roundup Ready® 2 Technology (which includes Performance Series® sweet corn) are not listed in the product label that is attached to the product you purchased, contact your Bayer representative.

*Roundup PowerMAX® and Roundup PowerMAX® II are only approved for use in the U.S. Roundup PowerMAX® II is not registered in all states and may be subject to use restrictions. The distribution, sale, or use of an unregistered pesticide is a violation of federal and/or state law and is strictly prohibited. Check with your local dealer or representative for the product registration status in your state.

Bayer is a member of Excellence Through Stewardship® (ETS). Bayer products are commercialized in accordance with ETS Product Launch Stewardship Guidance, and in compliance with Bayer's Policy for Commercialization of Biotechnology-Derived Plant Products in Commodity Crops. Commercialized products have been approved for import into key export markets with functioning regulatory systems. Any crop or material produced from this product can only be exported to, or used, processed or sold in countries where all necessary regulatory approvals have been granted. It is a violation of national and international law to move material containing biotech traits across boundaries into nations where import is not permitted. Growers should talk to their grain handler or product purchaser to confirm their buying position for this product. Excellence Through Stewardship® is a registered trademark of Excellence Through Stewardship.

XtendiMax® herbicide with VaporGrip® Technology is a restricted use pesticide and must be used with VaporGrip® Xtra Agent (or an equivalent volatility reduction adjuvant). For approved tank-mix products (including VRAs and DRAs), nozzles and other important label information visit XtendiMaxApplicationRequirements.com. The transgenic soybean event in the Enlist E3® soybeans is jointly developed and owned by Corteva Agriscience and M.S. Technologies, L.L.C.®, Enlist, Enlist E3, and the Enlist E3 logo and Colex-D are trademarks of Corteva Agriscience and its affiliate companies.

All growers in Idaho and Oregon who intend to plant Performance Series® sweet corn must contact Seminis Vegetable Seeds, Inc. at 866-334-1056 to order Performance Series® sweet corn seed. Performance Series® sweet corn may only be sold into the Treasure Valley area of Idaho and Oregon (which consists of Ada, Canyon, Gem, Owyhee, Payette and Washington counties in Idaho and Malheur County in Oregon) during the time period beginning on January 1 and ending on February 15 of each calendar year. Growers must inform Seminis Vegetable Seeds, Inc. of the location(s) of their Performance Series® sweet corn field(s) to ensure pinning prior to delivery of Performance Series® sweet corn seed.

Performance Series® sweet corn Insect Resistance Management (IRM) – Post-Harvest Requirements: Crop destruction must occur no later than 30 days following harvest, but preferably within 14 days. The allowed crop destruction methods are: rotary mowing, discing, or plowing down, or, for home garden use only allowed in the U.S., by chopping up the stalks using home garden tools such as a hoe. Crop destruction methods should destroy any surviving resistant insects.

Applicators must check XtendiMaxApplicationRequirements.com no more than 7 days before application of this product for additional labeling, including state restrictions. Where applicable, users must comply with additional requirements found on this website.

ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS. It is a violation of federal and state law to use any pesticide product other than in accordance with its labeling. NOT ALL formulations of dicamba or glyphosate are approved for in-crop use with Roundup Ready 2 Xtend® soybeans. NOT ALL formulations of dicamba, glyphosate or glufosinate are approved for in-crop use with products with XtendFlex® Technology.

FOR COTTON TREATED FOR MARKET YEAR 2023, EACH ACCELERON® SEED APPLIED SOLUTIONS OFFERING is a combination of separate individually registered products containing the active ingredients: **BASIC** Offering: fluoxastrobin, prothioconazole, metalaxyl, myclobutanil, and penflufen. **STANDARD** Offering: fluoxastrobin, prothioconazole, metalaxyl, myclobutanil, penflufen, and imidacloprid. **ELITE** plus Copeo® Offering: fluoxastrobin, prothioconazole, metalaxyl, myclobutanil, penflufen, imidacloprid, and fluropyram.

ONLY USE FORMULATIONS THAT ARE SPECIFICALLY LABELED FOR SUCH USES AND APPROVED FOR SUCH USE IN THE STATE OF APPLICATION. Contact the U.S. EPA and your state pesticide regulatory agency with any questions about the approval status of dicamba herbicide products for in-crop use with products with XtendFlex® Technology.

FOR SOYBEANS SEED TREATMENT PRODUCTS APPLIED DOWNSTREAM, EACH ACCELERON® SEED APPLIED SOLUTIONS OFFERING is a combination of separate individually registered products containing the active ingredients: **BASIC** Offering: metalaxyl, penflufen and prothioconazole. **STANDARD** Offering: metalaxyl, penflufen, prothioconazole and imidacloprid. **FOR UPSTREAM TREATED SOYBEANS, EACH ACCELERON® SEED APPLIED SOLUTIONS OFFERING** is a combination of separate individually registered products containing the active ingredients: **BASIC** Offering: metalaxyl, fluxapyroxad, and pyraclostrobin. **STANDARD** Offering: metalaxyl, fluxapyroxad, pyraclostrobin and imidacloprid.

FOR CORN, EACH ACCELERON® SEED APPLIED SOLUTIONS OFFERING is a combination of separate individually registered products containing the active ingredients: **BASIC** plus Poncho®/VOTiVO® Offering for corn: metalaxyl, ethaboxam, prothioconazole, fluoxastrobin, clothianidin, *Bacillus firmus* I-1582. **ELITE** plus Poncho®/VOTiVO® Offering for corn: metalaxyl, ethaboxam, clothianidin, and *Bacillus firmus* I-1582; prothioconazole and fluoxastrobin at rates that suppress additional diseases. **BASIC** Offering for corn: metalaxyl, prothioconazole, fluoxastrobin, ethaboxam, and clothianidin. **ELITE** Offering for corn: metalaxyl, ethaboxam, and clothianidin; and prothioconazole and fluoxastrobin at rates that suppress additional diseases. BioRise® Corn Offering is the on-seed application of BioRise® 360 ST. **BioRise® Corn Offering** is included seamlessly across offerings on all class of 2017 and newer products.

Not all products are registered in all states and may be subject to use restrictions. The distribution, sale, or use of an unregistered pesticide is a violation of federal and/or state law and is strictly prohibited.

FOR COTTON TREATED FOR MARKET YEAR 2022 OR PRIOR, EACH ACCELERON® SEED APPLIED SOLUTIONS OFFERING is a combination of separate individually registered products containing the active ingredients: **BASIC** Offering: fluxapyroxad, pyraclostrobin, metalaxyl, and myclobutanil. **STANDARD** Offering: fluxapyroxad, pyraclostrobin, metalaxyl, myclobutanil, and imidacloprid. **ELITE** plus Poncho®/VOTiVO® Offering: fluxapyroxad, pyraclostrobin, metalaxyl, myclobutanil, imidacloprid, clothianidin, and *Bacillus Firmus* I-1582.

Please review each seed tag to determine active ingredients in the product offering on the seed.

The distribution, sale, or use of an unregistered pesticide is a violation of federal and/or state law and is strictly prohibited. Not all products are approved in all states.

Alloy™ and Connect™ are trademarks of M.S. Technologies, L.L.C., West Point, IA. Please read the M.S. Technologies, L.L.C. Use Restriction Agreement located at: **http://www.mstechseed.com/use-restriction-agreement/**. See the IRM/Grower Guide for additional information. Always read and follow IRM requirements.

***B.t.* products** may not yet be registered in all states. Check with your seed brand representative for the registration status in your state.

Refuge seed may not always contain the DroughtGard® trait. **Roundup Technology®** includes glyphosate-based herbicide technologies.

IMPORTANT IRM INFORMATION: Certain products are sold as RIB Complete® corn blend products, and do not require the planting of a structured refuge except in the Cotton-Growing Area where corn earworm is a significant pest. Products sold without refuge in the bag (non-RIB Complete) require the planting of a structured refuge. **See the IRM/Grower Guide for additional information. Always read and follow IRM requirements.**

Roundup Ready® Technology contains genes that confer tolerance to glyphosate. **Roundup Ready® 2 Technology** contains genes that confer tolerance to glyphosate. **LibertyLink® Technology** contains genes that confer tolerance to glufosinate. **Roundup Ready® Flex Technology** contains genes that confer tolerance to glyphosate. **Roundup Ready 2 Xtend® soybeans contain genes that confer tolerance to glyphosate and dicamba. Products with XtendFlex® Technology contains genes that confer tolerance to glyphosate, glufosinate and dicamba. Plants that are not tolerant to glyphosate, dicamba, and/or glufosinate may be damaged or killed if exposed to those herbicides.** Contact your seed brand dealer or refer to the Bayer Technology Use Guide for recommended weed control programs.