



Dow AgroSciences

CORN PRODUCT USE GUIDE

Refuge Advanced™ | SmartStax® | PowerCore™ | Herculex™

CANADA EDITION



This Product Use Guide (Guide) sets forth the requirements for growing corn hybrids with *Bacillus thuringiensis* (*Bt*) traits, including Herculex™ I *Insect Protection*, Herculex XTRA *Insect Protection*, SmartStax®, PowerCore™, Dow AgroSciences SmartStax Refuge Advanced™ and PowerCore Refuge Advanced. It is important you read this Guide thoroughly and follow the Insect Resistance Management (IRM) practices contained herein.

Insect Protection Technologies From Dow AgroSciences

	Primary Pest Controlled	SmartStax Refuge Advanced	SmartStax	PowerCore	Herculex I	Herculex XTRA
Above-ground Pests	European Corn Borer	•••	•••	•••	•	•
	Corn Earworm ^{1,2}	••	••	••		
	Fall Armyworm ²	•••	•••	•••	•	•
	Western Bean Cutworm ²	•	•	•	•	•
	Black Cutworm	•	•	•	•	•
Below-ground Pests	Western Corn Rootworm ²	••	••			•
	Northern Corn Rootworm	••	••			•
	Separate Refuge	0%	5%	5%	20%	20%

• Single Mode Activity •• Dual Mode Activity ••• Triple Mode Activity ¹Herculex I and Herculex XTRA provide suppression of corn earworm.

²For these pests, decreased efficacy of some *Bt* traits has been reported under certain circumstances. Please consult with your sales representative, agronomist or seed dealer to understand and plan to use best management practices (BMPs) for your area. Visit www.traitstewardship.com for more information.

TECHNOLOGY USE AGREEMENT

You must have a valid, executed Technology Use Agreement on file with Dow AgroSciences to legally obtain, plant and grow hybrids that contain *Bt* technology from Dow AgroSciences. **(Failure to comply with the terms of the Technology Use Agreement or this Guide, including any refuge requirements, can result in losing the privilege to utilize Dow AgroSciences Technology.)** You must communicate all applicable terms, conditions and restrictions applicable to the technology to all persons and entities possessing or taking an interest in your corn crop and/or the grain therefrom. A Technology Use Agreement and related information can be found online at www.traitstewardship.com. For further details, call 877-4-TRAITS (877-487-2487) or contact your seed provider. Signing a Technology Use Agreement with Dow AgroSciences entitles you to receive the most current Product Use Guide and other periodic updates relating to Dow AgroSciences Technology.

INSECT RESISTANCE MANAGEMENT (IRM)

The Canadian Food Inspection Agency (CFIA) requires a refuge consisting of non-*Bt* corn be planted within or adjacent to each *Bt* cornfield. A refuge provides an area where insects susceptible to the *Bt* proteins can survive to mate with any rare resistant individuals that may survive, passing *Bt*-susceptibility on to the next generation. A non-*Bt* refuge planted within each *Bt* cornfield provides an effective refuge for corn borers and corn rootworms while ensuring the distance requirement is met. Dow AgroSciences, the CFIA and university experts agree refuges help prevent or delay development of resistance to the *Bt* trait in target pest populations. SmartStax Refuge Advanced and PowerCore Refuge Advanced contain a minimum 5% non-*Bt* seed and satisfies the refuge requirements for Canada.

If you observe unexpected target pest feeding damage to your fields planted with Herculex, PowerCore or SmartStax, you should immediately contact your seed provider or sales representative. To contact Dow AgroSciences Canada, email solutions@dow.com or call The Solutions Center at 1-800-667-3852.

REFUGE REQUIREMENTS

Refuge Size and Distance		Corn Growing Areas — Separate Refuge		
		Refuge Icon	Refuge Size Requirement	Refuge Distance Requirement
	Refuge Advanced		0%	None
	SmartStax		5%	Within or adjacent
	PowerCore		5%	Within, adjacent or up to 400 meters away from <i>Bt</i> corn
	Herculex XTRA		20%	Within or adjacent
	Herculex I		20%	Within, adjacent or up to 400 meters away from the <i>Bt</i> corn

Refuge Size Examples

 equals 5 **acres** of non-*Bt* corn for every 95 acres of SmartStax planted; or 2 **hectares** of non-*Bt* corn for every 38 hectares of SmartStax planted

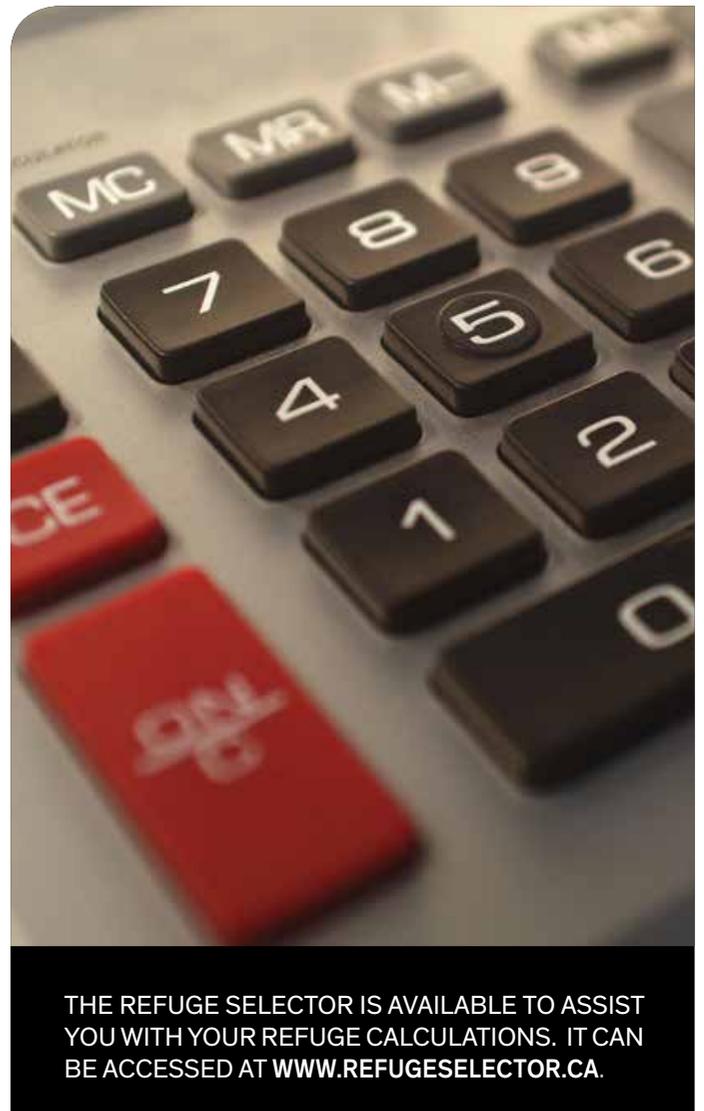
 equals 20 **acres** of non-*Bt* corn for every 80 acres of *Bt* corn planted; or 8 **hectares** of non-*Bt* corn for every 32 hectares of *Bt* corn planted

REFUGE PLANTING

The refuge must be planted with corn hybrids that do not contain *Bt* technologies for the control of corn borer or corn rootworm. The refuge can be planted with herbicide-tolerant or conventional corn. The refuge and *Bt* corn should be sown on the same day or within the shortest window possible between planting dates to ensure corn development is similar among varieties. Growers are encouraged to plant the refuge corn in the same location each year to maintain corn rootworm populations that are expected to extend the durability of the *Bt* technology.

If the refuge is planted on rotated ground, then the *Bt* corn also must be planted on rotated ground. If the refuge is planted on land used continuously for corn, the *Bt* field may be planted on either continuous or rotated land. This option is encouraged where western corn rootworm rotation-resistant biotype (soybean variant) may be present. This requirement does not apply to Herculex I and PowerCore.

Ensure you plant sufficient refuge to meet the size requirement for each of your *Bt* corn products and fields. The Canadian Corn Refuge Hybrid Selector (www.refugeselector.ca) can assist in calculating total refuge required for your *Bt* corn.



THE REFUGE SELECTOR IS AVAILABLE TO ASSIST YOU WITH YOUR REFUGE CALCULATIONS. IT CAN BE ACCESSED AT WWW.REFUGESELECTOR.CA.

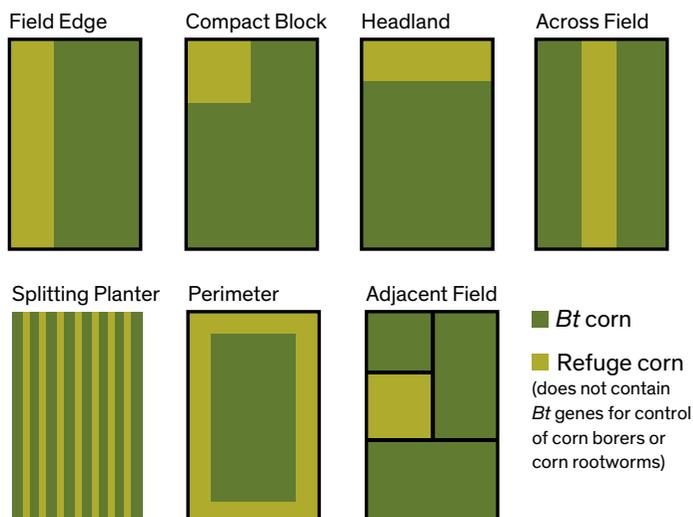
REFUGE LOCATION AND CONFIGURATION

The structured refuge may be planted as an in-field refuge or an adjacent (e.g., across the road) refuge. Corn borer refuge may also be planted as a separate block that is within 400 meters of the *Bt* field. In-field refuge options include blocks, perimeter strips (i.e., strips around the field) or in-field strips.

In-field blocks or strips must be at least four consecutive rows wide. Seed mixtures of *Bt* and non-*Bt* corn (other than the mixture provided as Refuge Advanced) are not permitted.

When switching between *Bt* hybrids and the seed to be planted in the refuge, planter boxes should be cleaned out to avoid inadvertent mixing of seed. Growers should calculate the hectares/acres required for refuge and plant the appropriate amount of refuge seed for the configuration option selected. For example, in choosing to plant in-field strips, a grower must calculate how much refuge seed is needed to meet the minimum refuge requirement and fill the refuge planter boxes with that amount. Strips should be planted until the minimum refuge seed is completely used. Then the remainder of the field can be planted with *Bt* seed in all planter boxes.

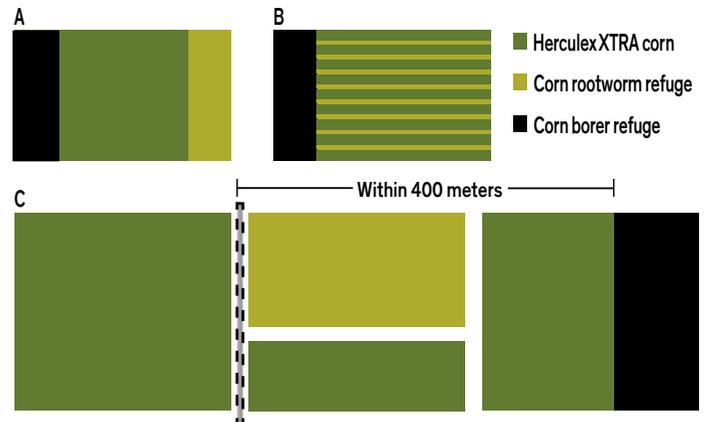
Common Refuge Options



Illustrations are not a representation of refuge size requirements. Please see “Refuge Size and Distance” section for minimum refuge requirements by product and region.

Separate Refuge Option For Herculex XTRA

When planting Herculex XTRA *Insect Protection*, separate refuges may be independently planted for corn borers and corn rootworms, respectively. For example, a refuge can be planted for corn borers that contains a trait providing corn rootworm protection but not corn borer protection, while a second refuge is planted for corn rootworms that could contain a trait for corn borer protection but not corn rootworm protection.



- (A) Corn borer and corn rootworm refuge blocks within the same field (e.g., sixty percent (60%) *Bt*, twenty percent (20%) corn rootworm refuge and twenty percent (20%) corn borer refuge (non-*Bt*)).
- (B) Corn rootworm refuge strips (minimum four rows wide) and corn borer refuge block within the same field.
- (C) Adjacent field corn rootworm refuge block and corn borer refuge within 400 meters of farthest *Bt* field.

Illustrations are not a representation of refuge size requirements. Please see “Refuge Size and Distance” section for minimum refuge requirements by product.



REFUGE PEST MANAGEMENT

Refuge acres provide an area where *Bt*-susceptible insects can feed and breed with potentially resistant insects of the same type, thus helping to ensure resistance does not occur. Growers are strongly encouraged to scout refuge areas for all pest damage and may apply insecticides in accordance with the following refuge pest management requirements.

Corn Borer Refuge

Insecticide treatments for control of European corn borer, corn earworm and other lepidopteran target pests may be applied only if economic thresholds are reached for one or more of these target pests. The same treatment also must be applied at the same time to the corn-borer-protected *Bt* corn. Consult your local or provincial professionals (e.g., extension service agents, crop consultants) to determine economic thresholds and registered product treatment options. Microbial *Bt* insecticides must not be applied.

Corn Rootworm Refuge

Soil-applied insecticides or seed treatments may be used to provide corn rootworm protection in the refuge. However, the same treatment also must be applied at the same time to the corn-rootworm-protected *Bt* corn.

Herbicide Tolerance

Corn hybrids are available with the Enlist™, Roundup Ready® or LibertyLink® herbicide tolerance traits, making them tolerant to over-the-top applications of Enlist Duo® herbicide (Enlist), glyphosate (Roundup Ready) or glufosinate-ammonium (LibertyLink) herbicides.



Verify the weed control system before making over-the-top herbicide applications. Always read and follow label directions. Use of a herbicide over-the-top of a corn hybrid that does not contain the tolerance trait for the herbicide will cause crop damage.



CROP EXPORT INFORMATION

Crops and other material produced from *Bt* seed can only be exported to, used in, processed in and/or sold in countries where necessary regulatory approvals are in place for the biotechnology traits contained in the seed. Talk to your grain handler or product purchaser in advance to facilitate appropriate crop handling and marketing.

For more information about your crop marketing options, you can contact Dow AgroSciences at: 877-4-TRAITS (877-487-2487).

Before selecting hybrids for your crop plan, Dow AgroSciences recommends you know and understand the traits contained in the varieties, and if the traits are approved for export. Consult your seed retailer or Seed Product Guide to understand the traits contained in the hybrids you are considering.

POLLEN MOVEMENT

Corn is a naturally cross-pollinated crop, and a small amount of corn pollen movement to nearby fields is common. Growers can take steps to reduce the occurrence and extent of undesired pollen movement.

These steps include: maintaining a non-corn buffer between *Bt* cornfields and non-*Bt* cornfields; not growing *Bt* corn upwind (based on the prevailing wind directions) of non-*Bt* cornfields; and discussing your cropping plans with your neighbours in advance.

Additionally, planting the IRM refuge as non-*Bt* corn in border/headland blocks may reduce the possibility *Bt* corn pollen will reach non-*Bt* corn outside the field.

IRM VERIFICATION PROGRAM

The Canadian Food Inspection Agency (CFIA) and the Canadian Corn Pest Coalition (CCPC) have instituted an Insect Resistance Management (IRM) Verification Program to verify compliance with IRM requirements detailed in this Guide. The IRM Verification Program requires all registrants of *Bt* corn products (including Dow AgroSciences) to evaluate growers' adherence

to the IRM requirements. Growers that do not adhere to the IRM requirements will be denied access to their *Bt* corn hybrids if found to be non-compliant two years in a row.



STEWARDSHIP AND YOU

By opening a bag of seed, you agree that you have 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 this Guide, the Dow AgroSciences Technology Use Agreement that you sign and on the bag of seed that you purchase.

Carefully review this Guide, the Technology Use Agreement and the seed bag and seed tag for important limitation of warranty information.

Always consult your trait provider's technical guides before planting or go to www.cornpest.ca for more information. Please direct any questions about this Guide or *Bt* products to your seed provider or to Dow AgroSciences at: 877-4-TRAITS (877-487-2487).

Dow AgroSciences has a long-standing commitment to product stewardship and is a proud member of:



EXCELLENCE THROUGH
STEWARDSHIP®

Advancing Best Practices in Agricultural Biotechnology

stewardshipfirst™
working responsibly to protect
people and the environment



Solutions for the Growing World