Delivering Value to Corn Growers through Advances in Pest Control

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Notes

Certain statements contained in this presentation are "forward-looking statements," such as statements concerning the company's anticipated financial results, current and future product performance, regulatory approvals, business and financial plans and other non-historical facts. These statements are based on current expectations and currently available information. However, since these statements are based on factors that involve risks and uncertainties, the company's actual performance and results may differ materially from those described or implied by such forward-looking statements. Factors that could cause or contribute to such differences include, among others: continued competition in seeds, traits and agricultural chemicals; the company's exposure to various contingencies, including those related to intellectual property protection, regulatory compliance and the speed with which approvals are received, and public acceptance of biotechnology products; the success of the company's research and development activities; the outcomes of major lawsuits; developments related to foreign currencies and economies; successful operation of recent acquisitions; fluctuations in commodity prices; compliance with regulations affecting our manufacturing; the accuracy of the company's estimates related to distribution inventory levels; the company's ability to fund its short-term financing needs and to obtain payment for the products that it sells; the effect of weather conditions, natural disasters and accidents on the agriculture business or the company's facilities; and other risks and factors detailed in the company's most recent reports on Forms 10-Q and 10-K. Undue reliance should not be placed on these forward-looking statements, which are current only as of the date of this presentation. The company disclaims any current intention or obligation to update any forward-looking statements or any of the factors that may affect actual results.

RR = Roundup Ready; YGCB = YieldGard Corn Borer; RR2 = Roundup Ready Corn 2; YGVT = YieldGard VT; YGRW = YieldGard Rootworm; RR2Y = Roundup Ready 2 Yield; RRF = Roundup Ready Flex

A History of Multi-Gene Insect Control Products at Monsanto

YieldGard Plus Maximum Insect Protection

YieldGard VT Triple

genuity VT Triple PRO

2004

- Combined Lepidopteran control with corn rootworm (CRW) control

2007

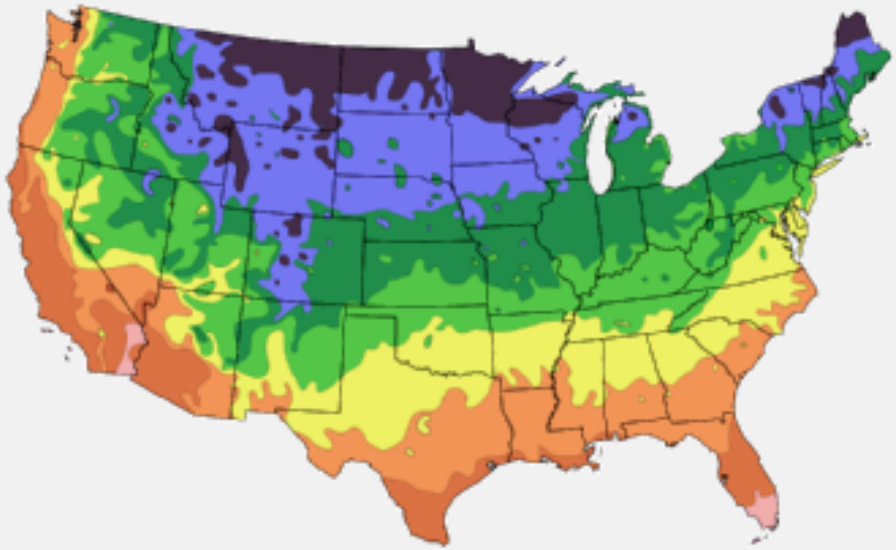
- Vector stack of Lepidopteran control with improved CRW control

2009

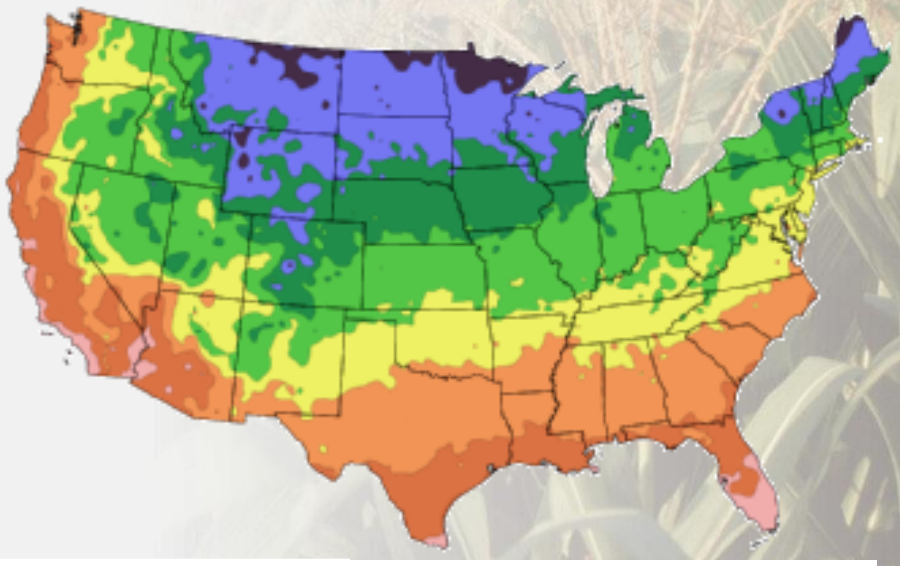
- Improved Lepidopteran control
- Dual mode above-ground insect protection
  - Broader spectrum & improved consistency: corn borer, corn earworm & fall armyworm protection

Planting Zone Shifts Already Seen in the US

1990 Map

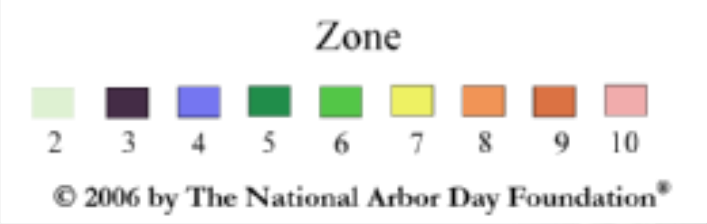


2006 Map



After USDA Plant Hardiness Zone Maps, USDA Miscellaneous Publication No. 1475, Issued Jan 1990

National Arbor Day Foundation Plant Hardiness Zone Map published in 2006



Potential Impacts of Climate Change on Crop Pests

Weeds

- Range and reproductive increases
- Pathogen and insect host implications

Insects

- Lepidopteran and Coleopteran range expands
- Insect-vectored mycotoxin increases
- Potential new pest targets (aphids, spider mites)

Diseases/Nematodes

- Nematode populations increase under hot dry conditions
- Foliar and stalk diseases under hot and wet conditions

General

- Increased pest resistance pressure

Genuity™ SmartStax™ Delivers Multiple Modes of Action Against Key Pests

PRIMARY PESTS	genuity SmartStax
European Corn Borer (*Ostrinia nubilalis*)	✓✓✓
Southwestern Corn Borer (*Diatraea grandiosella*)	✓✓✓
Northern Corn Rootworm (*Diabrotica barberi*)	✓✓
Western Corn Rootworm (*Diabrotica virgifera virgifera*)	✓✓
Corn Earworm (*Helicoverpa zea*)	✓✓
Fall Armyworm (*Spodoptera frugiperda*)	✓✓✓
Western Bean Cutworm (*Richia albicosta*)	✓
Black Cutworm (*Agrotis ipsilion*)	✓
Herbicide Tolerance	✓✓
Refuge (Corn Belt)	5%

✓ Single mode activity

✓✓ Dual mode activity

✓✓✓ Triple mode activity

Durability

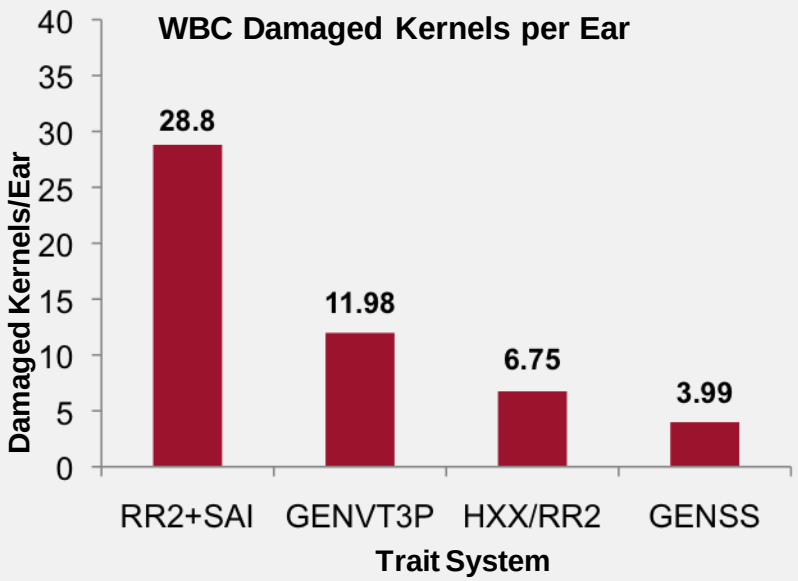
- Combining multiple traits in single seed can help to sustain insect protection and weed control year after year:
  - Combined modes-of-action for insect protection
  - Combined herbicide tolerant traits

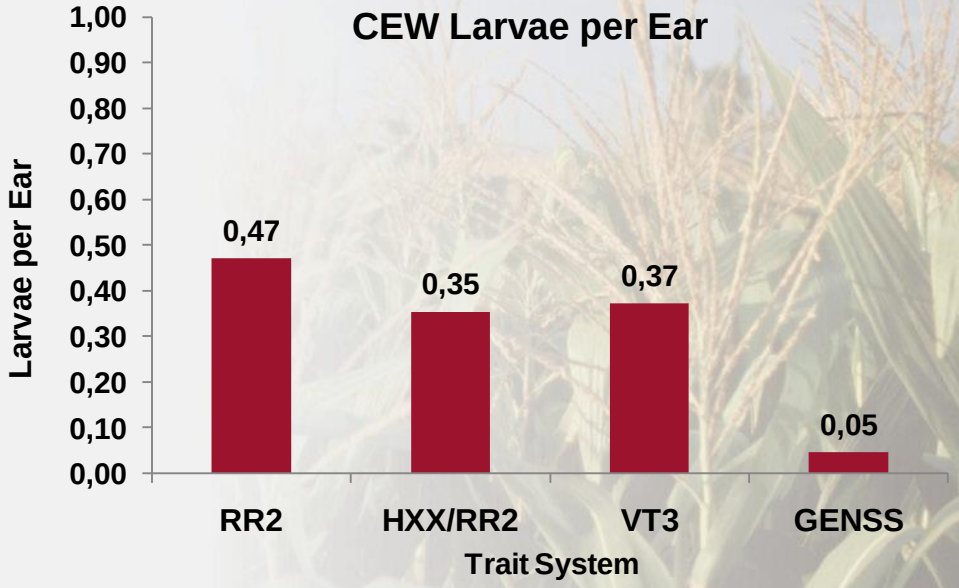
Performance

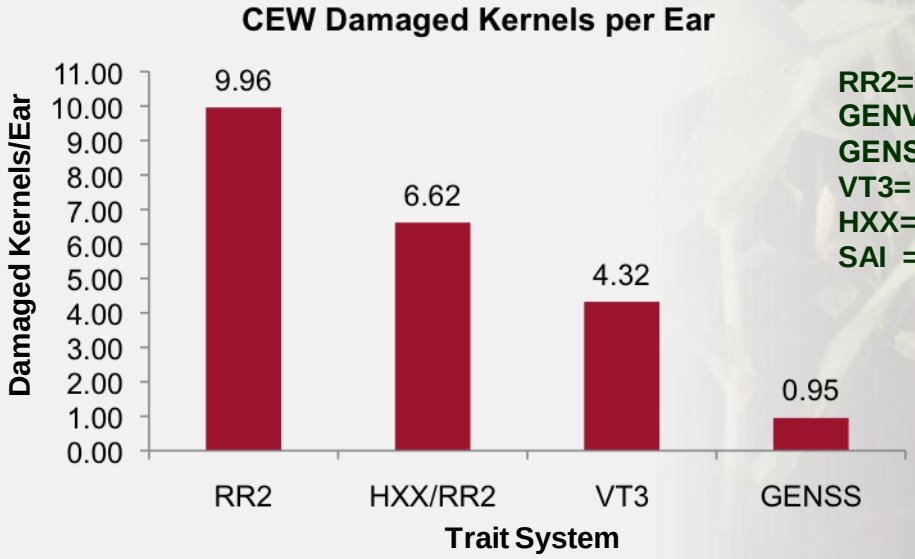
- Research is demonstrating that complementary trait platforms can offer excellent, season-long performance, notably:
  - Enhanced control of a broader spectrum of insects
  - Comprehensive protection against established, emerging secondary pests
  - Excellent weed control system

2009 Genuity™ SmartStax™ Efficacy against Key Corn Pests

Data from Northern Geography as of 1-24-10



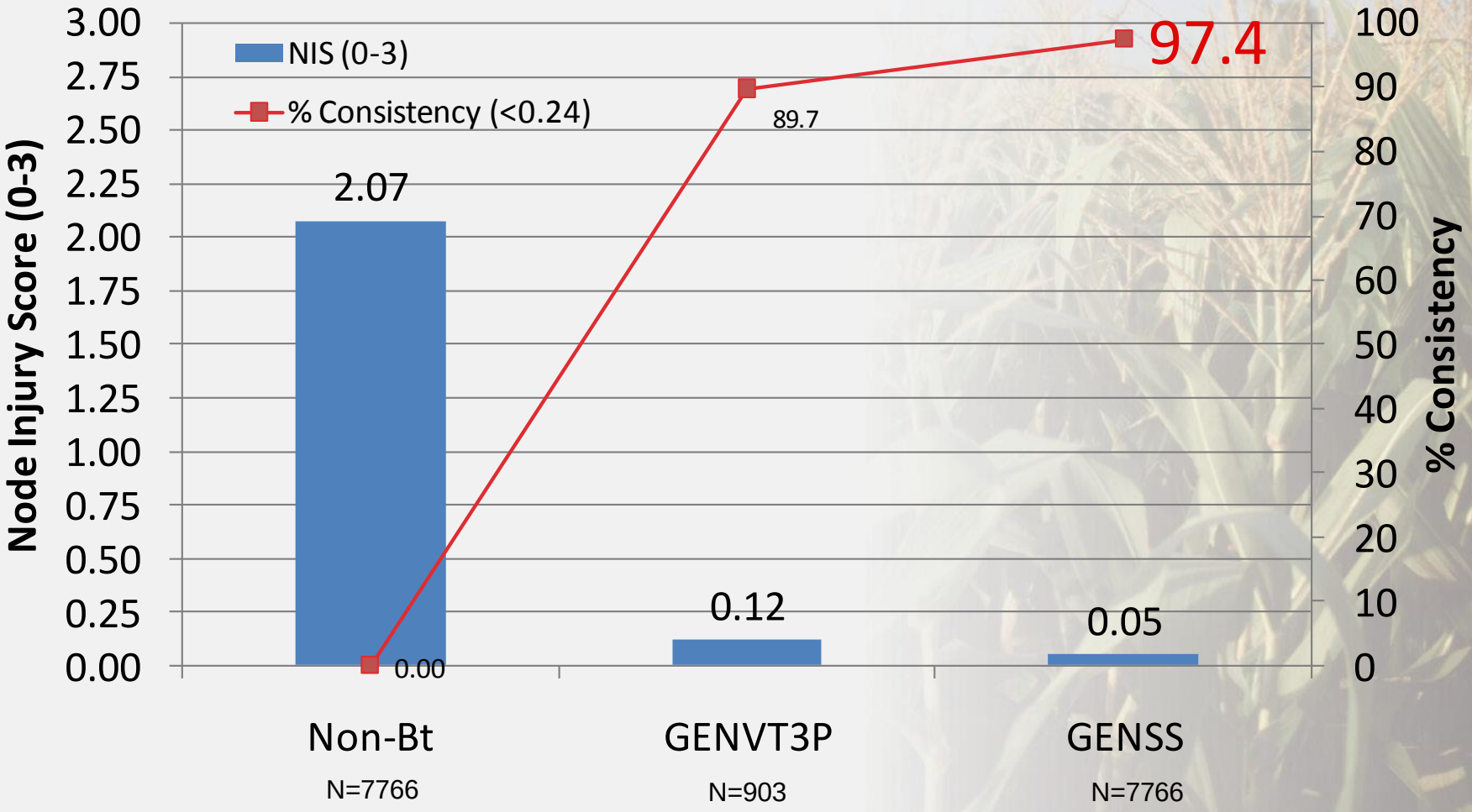




RR2= Roundup Ready® Corn 2
GENVT3P= Genuity™ VT Triple PRO™
GENSS = Genuity™ SmartStax™
VT3= YieldGard VT Triple®
HXX= Herculex® Xtra
SAI = Soil-applied insecticide

2009 Corn Rootworm Damage Ratings

Data from Trait Integration



GENVT3P= Genuity™ VT Triple PRO™
GENSS = Genuity™ SmartStax™

Genuity™ SmartStax™ Corn Increases Yield Potential through Better Weed and Insect Control

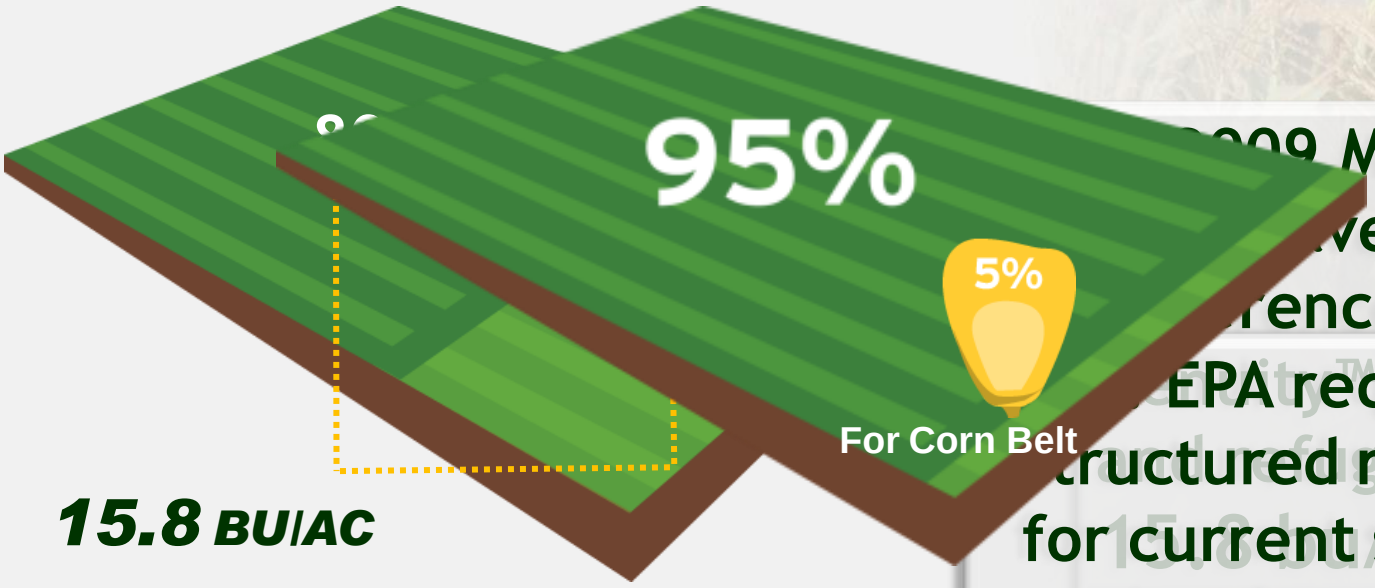
Monsanto Learning Center, Scott, MS 2008

Anatomy of a Combined Insect Resistance Trait Product

	MON 89034	x MON 88017	x TC1507 (Herculex® I)	x DAS-59122-7 (Herculex® Rootworm)
TRAITS	Cry1A.105 Cry2Ab2	Cry3Bb1 EPSPS	Cry1F PAT	Cry34/35Ab1 PAT
FUNCTION	Broad-spectrum Lep control - Dual Effective Dose (high dose)	Corn Rootworm control - Moderate dose Glyphosate tolerance	Broad-spectrum Lep control - High dose Glufosinate tolerance	Corn Rootworm control - Moderate dose Glufosinate tolerance

Refuge Acres Can Significantly Impact Whole Farm Yield Potential

Refuge Reduction with Genuity™ SmartStax™ Corn



15.8 BU/AC

Yield Differential

2009 Monsanto average yield difference between EPA requires structured refuge acres for current single mode-of-action insect-protected traits in corn

- Insect resistance management around key target pests:

  European corn borer, southwestern corn borer, corn earworm, Western corn rootworm

* Results from 2009 Monsanto trials, Roundup Ready® isoline refuge hybrid with soil applied insecticide averaged 15.8 bushel yield loss compared to Genuity™ SmartStax™ hybrid in > 200 comparisons

Obtaining Approval for Reduced Refuge for Genuity™ SmartStax™

- Demonstrated that Genuity™ SmartStax™ met Dual Effective Dose (DED) criteria for key Lepidoptera and rootworms
  - DED = two distinct modes of action and ≥95% control by each protein for superior IRM value
- By meeting DED criteria, reduced refuge (compared to current single-trait products) is justifiable for both traits

- MON 89034 shown to meet DED criteria for key lepidopteran pests
  - To obtain approval, research focus shifted to demonstrate that the rootworm component also met the DED criteria

Genuity™ SmartStax™ Dose Estimation

Treatment	Mean # adults emerged	Reduction in adult emergence	Estimated Larval Mortality
Control	1032.8		Actual larval mortality expected to be at least as high as adult mortality
DAS-59122-7	35.0	96.61%	
MON 88017	17.1	98.34%	
SmartStax	11.1	98.93%	

6 locations across 5 states, 4 – 8 reps per location
3300 eggs per row meter
Cages 4 m x 3 rows or 3.7 m x 4 rows
80 or 100 plants per cage

Probability of Cross-Resistance

Cry3Bb1 and Cry34Ab1/35Ab1 (corn rootworms):

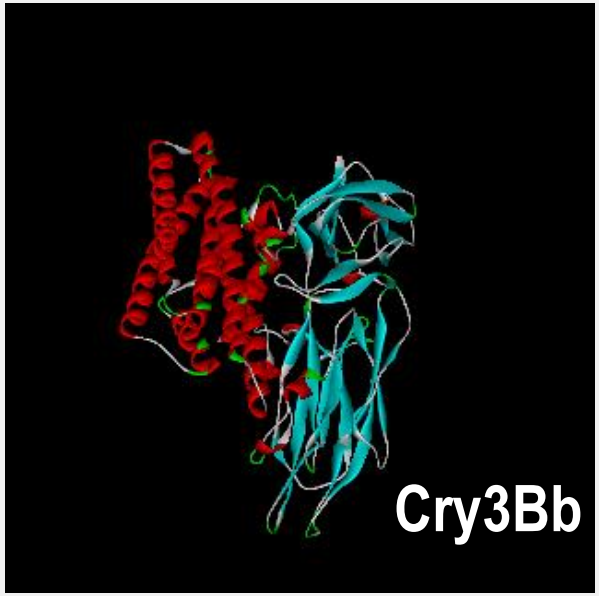
- Substantial sequence and structural differences
- Differences in binding patterns in CRW midgut
- Additive efficacy against CRW *in vitro* and *in planta*

Cry1A.105, Cry2Ab2 and Cry1F (Lepidoptera):

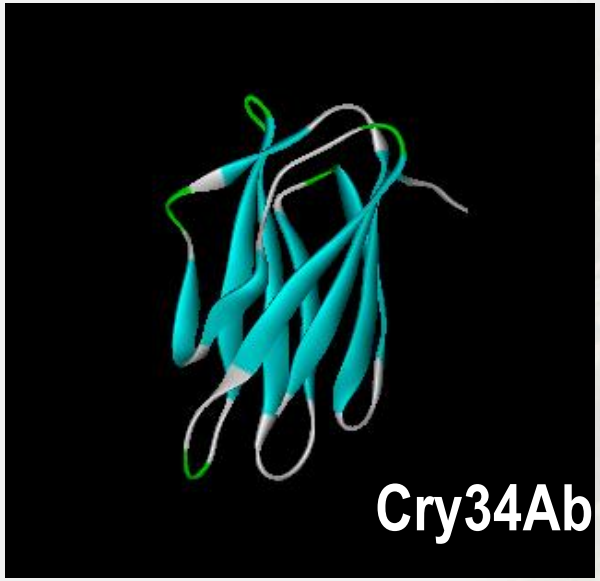
- Differences in binding patterns in Lep midgut
- Little or no cross-resistance in Bt-resistant insects
- Additive efficacy against targets *in vitro* and *in planta*

➢ **In both cases, all data indicate differences in mode of action and therefore low likelihood of cross-resistance**

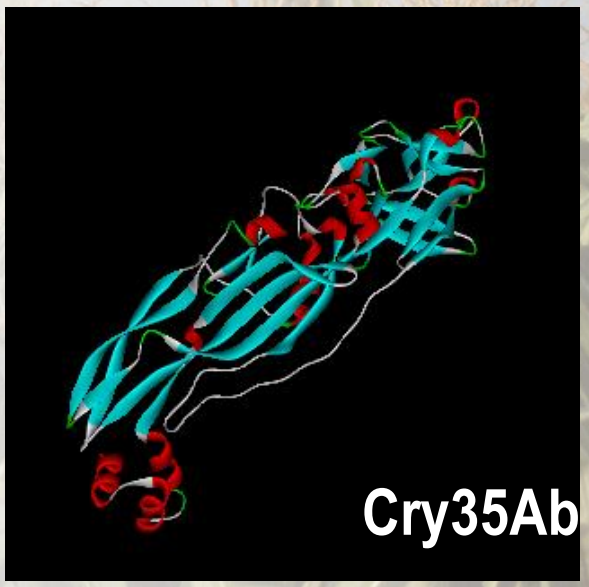
Different Protein Structures Indicate a Low Probability of Cross Resistance



- Single polypeptide
- MW 65 kDa
- Sequence related to other Bts
- Pfam: Typical 3 domain Bt



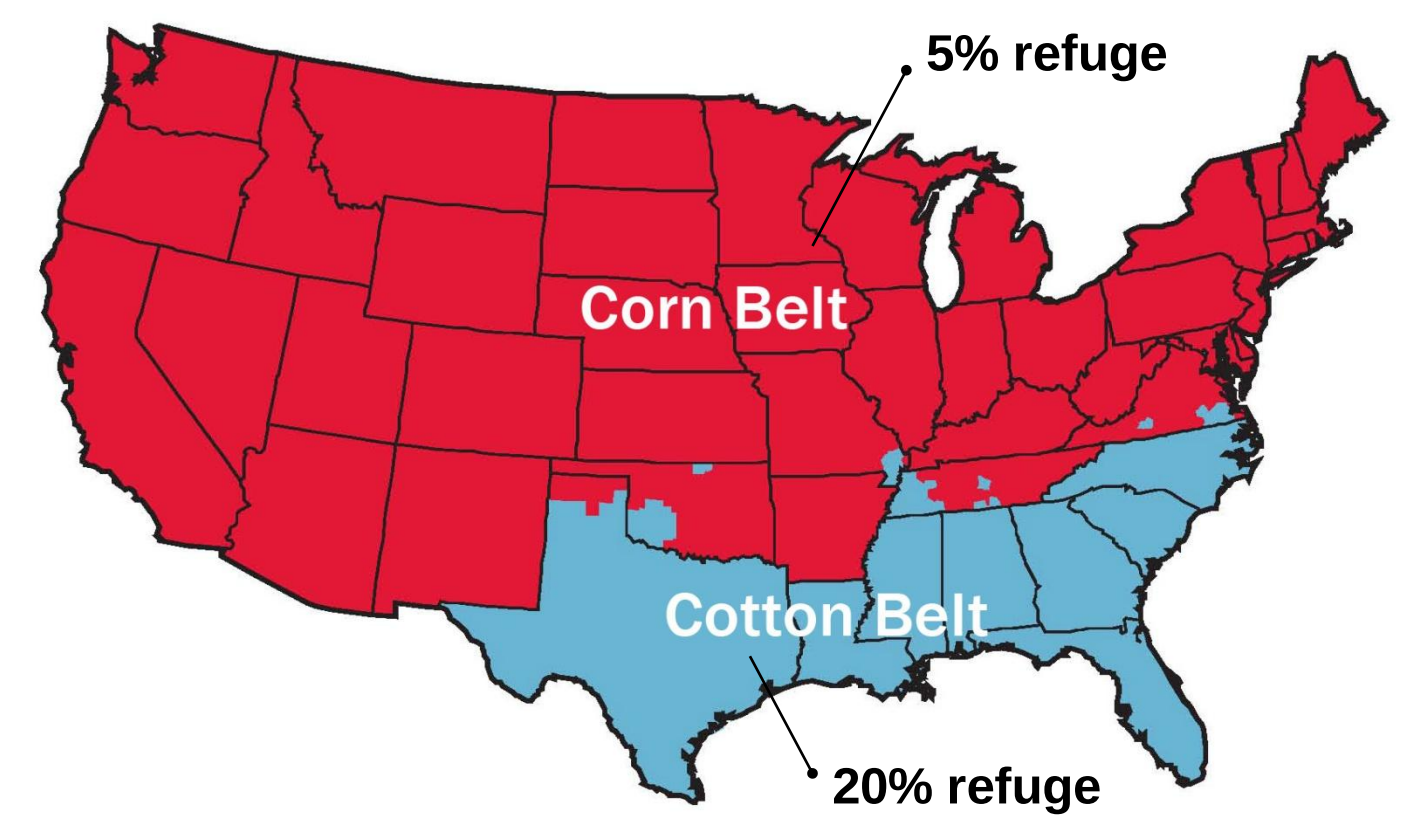
- Binary toxin
- MW 14 kDa
- Sequence similarity to other Cry34 proteins
- Pfam: aegerolysins



- Binary toxin
- MW 44 kDa
- Sequence similarity to other Cry35 and *B. sphaericus* toxins
- Pfam: lectin domain and Bin proteins

Sources: Galitsky et al. (2001), U.S. Patent Applications 2009/0205087(A1) and 2008/085856(A1)

Approved Insect Resistance Management Plan for Genuity™ SmartStax™



Required refuge area in-field or adjacent to area planted with Genuity™ SmartStax™

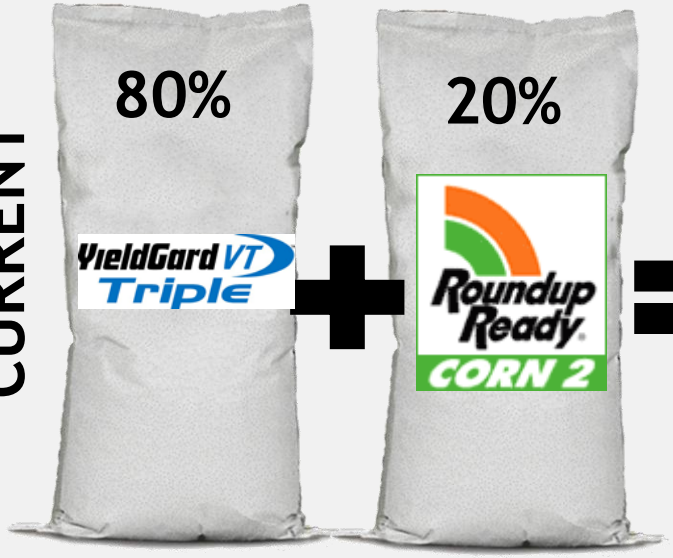
The Value of Genuity™ SmartStax™ is More than Just a Reduced Refuge

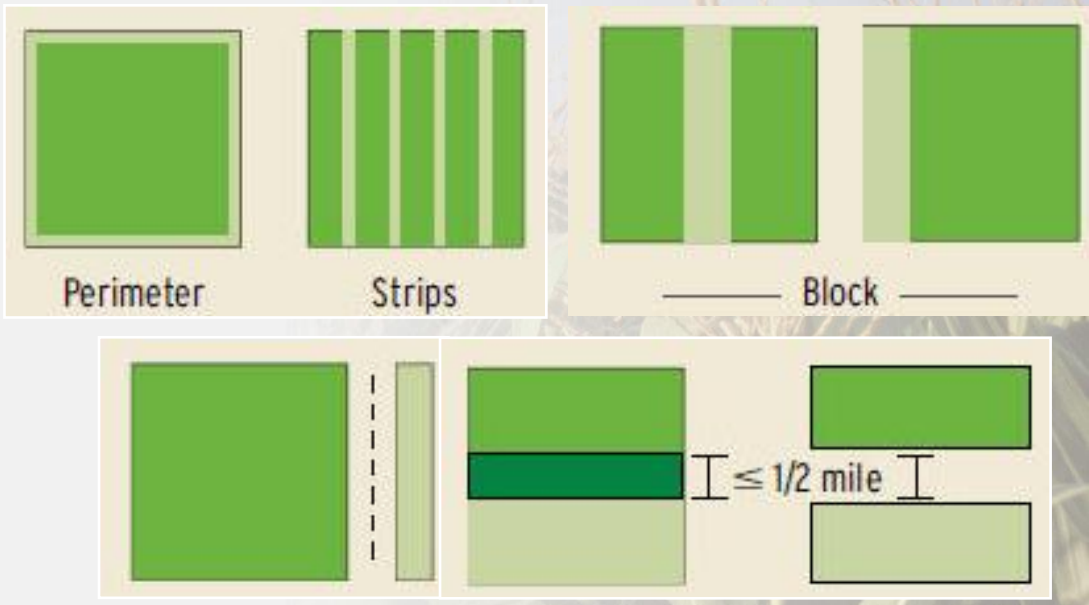
Genuity™ SmartStax™ delivers value by…

- Increased yield opportunity from:
  - Improved Genetics and Better Trait Integration
  - Trait Advantage (broader spectrum, multiple modes of action)
  - Acceleron™ Seed Treatment Products
- Increased yield opportunity from reduced refuge
  - 15% more acres are insect protected by traits (in the Corn Belt)
  - Savings from less soil applied insecticide
- Total Peace of Mind
  - Risk Reduction/Yield Stability
  - Crop Insurance Savings through the Biotechnology Endorsement
  - Convenience
  - Maximum protection available in the market today
- Respect the Refuge®

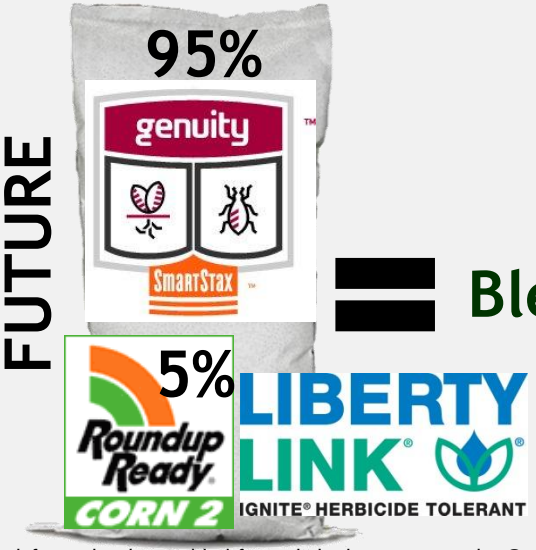
Next Step: Refuge In a Bag

CURRENT

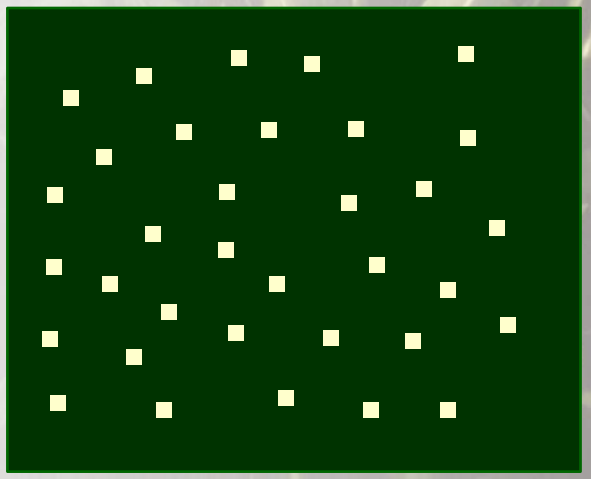




FUTURE



Blended in the Bag



This information is provided for technical purposes only. Genuity SmartStax with RIB is not yet registered by the U.S. EPA and is not available for sale. Growers of Genuity™ SmartStax™ are required to plant a structured refuge as mandated by the EPA. See the IRM Guide for details Commercialization is dependent on many factors, including successful conclusion of the regulatory process. Ignite, Liberty Link and the Water Droplet logo are registered trademarks of Bayer CropScience AG.

Genuity™ SmartStax™ Refuge In a Bag (RIB) Submission Completed

GENUITY™ SMARTSTAX ™- REFUGE IN A BAG (RIB)	
STATUS:	ADVANCED: PHASE 4

OVER 12 YEARS OF RIB TESTING

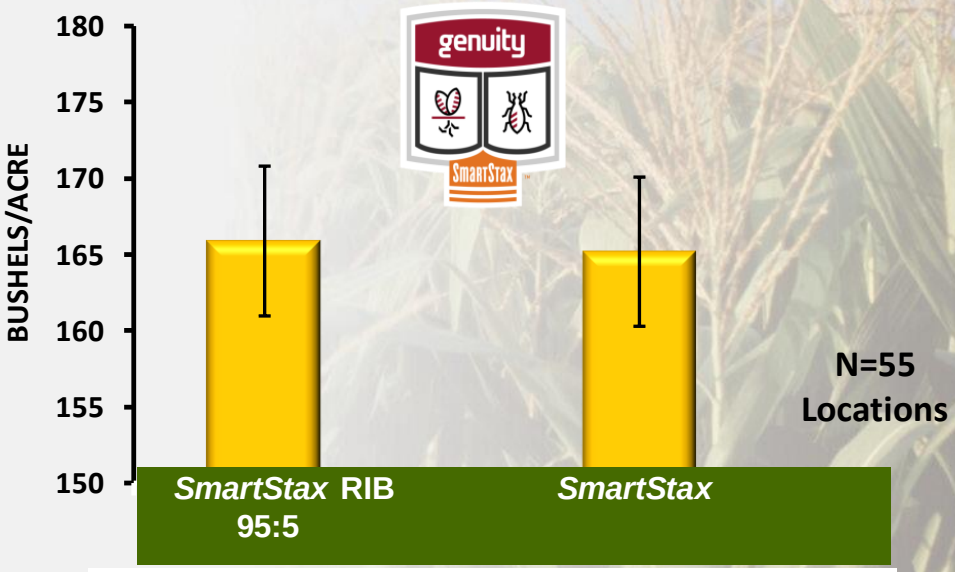
- 5 percent refuge is preferred acceptable level for yield parity

GROWER BENEFITS OF 5 PERCENT RIB REFUGE IN CORN BELT:

- Grower convenience – one field, one bag of seed
- Competitive yield with greater protection
- Ease of compliance with Insect-Resistance Management (IRM) requirement
- Improved stand, ease of harvest

In collaboration with Dow AgroSciences, completed U.S. regulatory submission filed 12/09

Trial Data Confirms 5 Percent RIB Concept



95:5 RIB – AUBURN, ILLINOIS – 2009

Herbicide (which is not a Roundup® agricultural herbicide) screen used to identify refuge plants

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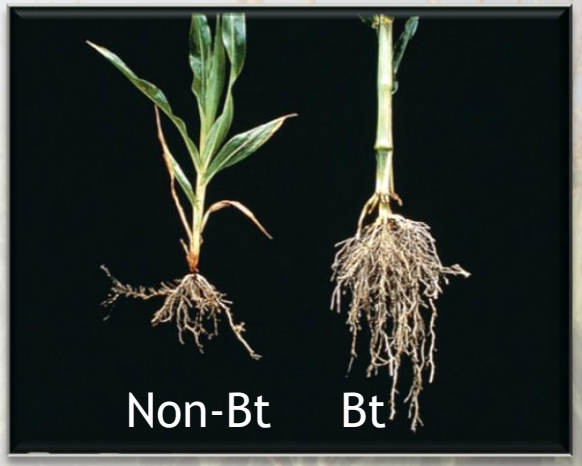
Structural & Functional Genomics Create New Opportunities in Pest Control

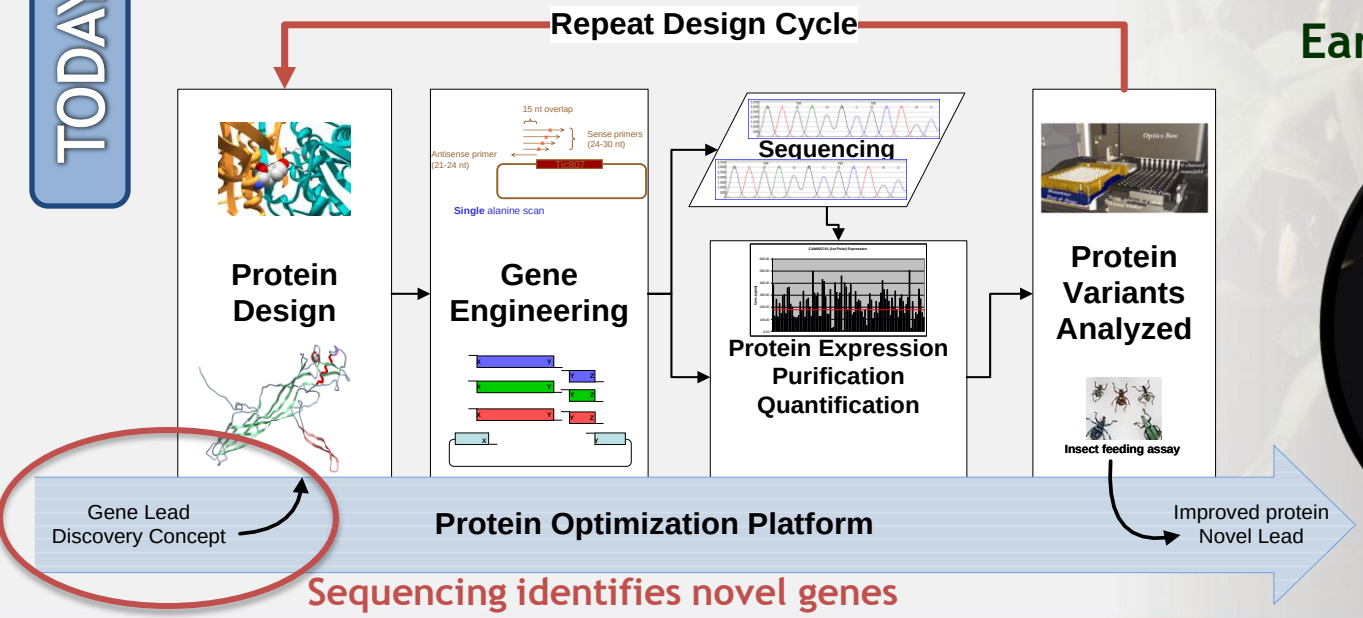
PAST

Early products developed through cloning of microbial genes with insecticidal activity



TODAY

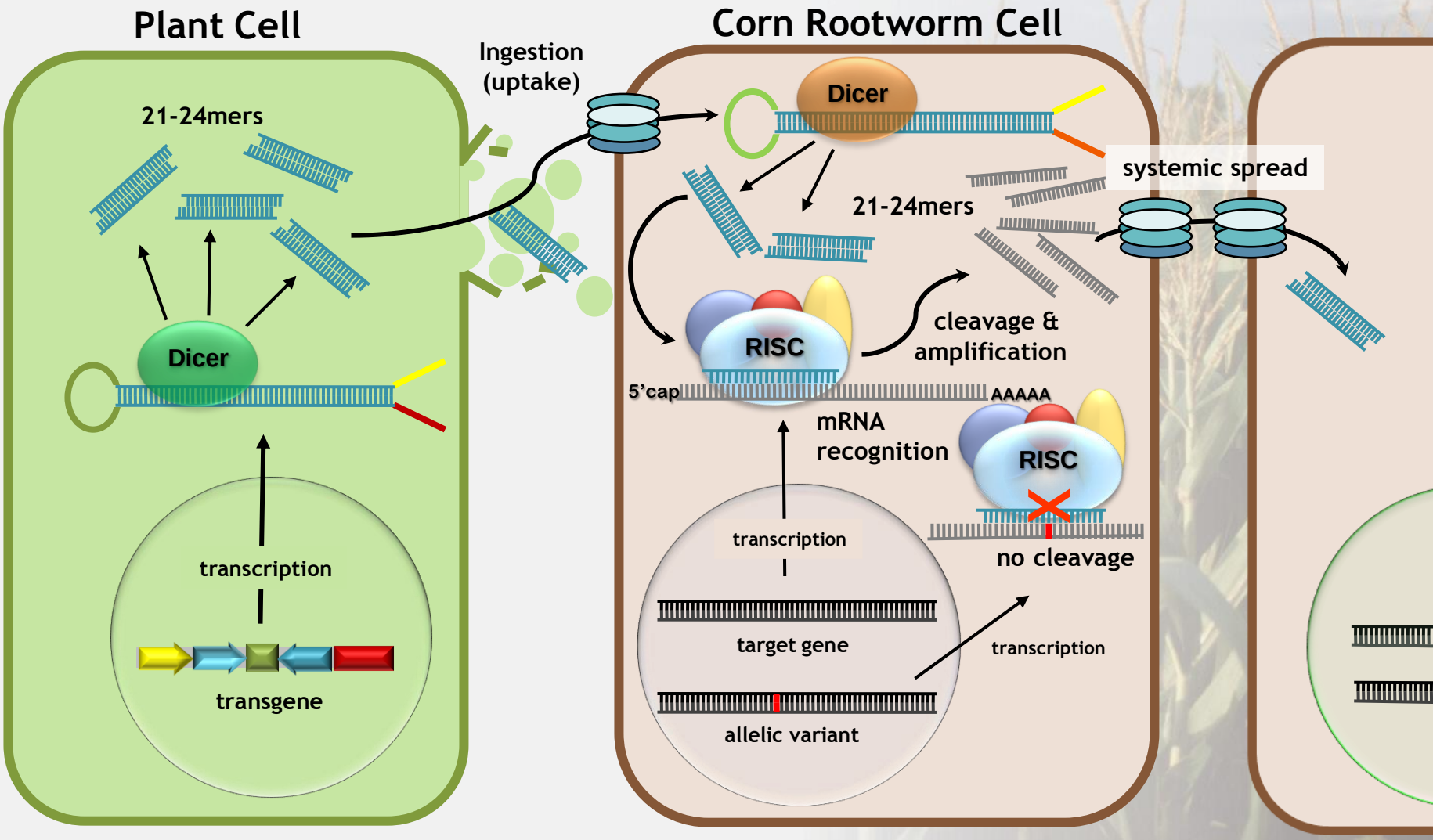
Sequence data are inputs for protein design and engineering to create 'designer toxins' that will target new pests, crops and geographies



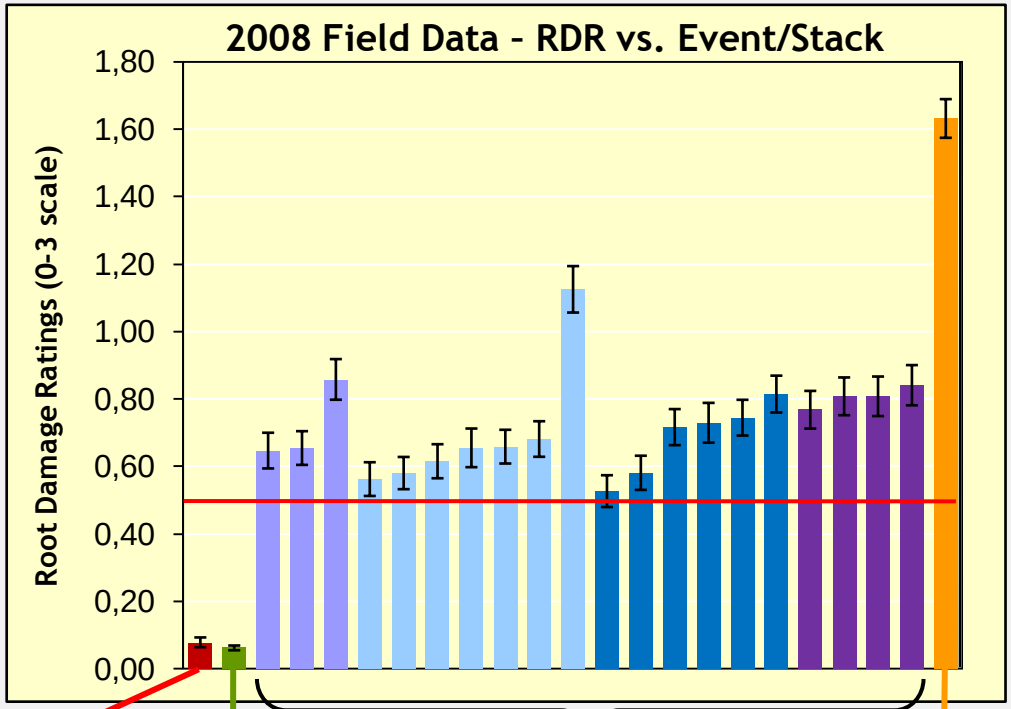
Sequencing identifies novel genes

Ear and Root Protection

Pest Control from RNAi



Cry3Bb Stacked with RNAi Offers Root Protection and Reduced Adult Emergence

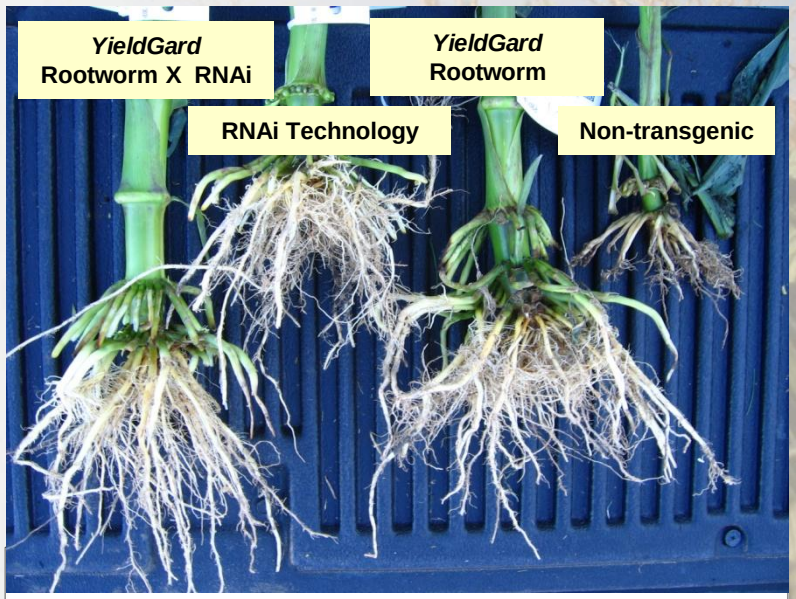


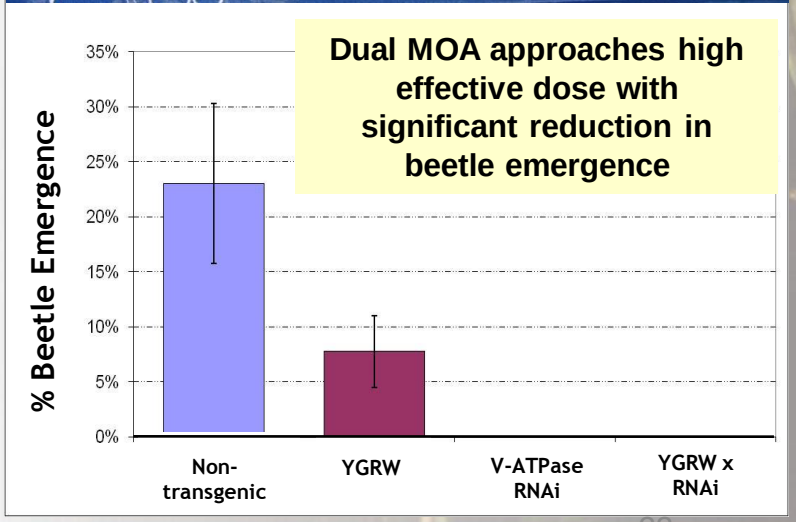
YieldGard® Rootworm

YieldGard® Rootworm x V-ATPase RNAi

V-ATPase RNAi events

Non-transgenic





Providing Our Customers with the Tools to Sustainably Double Yields by 2030

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