Using Microbial Technology as a Complement to Traditional Crop Technology

NewLeaf symbiotics

Exceed the Seed

December 3, 2018

Global Trends Drive New Demands on Agriculture

Demands on Agriculture

Increase of Water and Nutrient Use Efficiency	Yield and Productivity Increase	Addressing Sustainability Demands

Complex Farming Environment

Pests	Labor	Weeds	Weather	Commodity Prices	Water	Regulations	Environment

Accepted Utilization of New Tools (Culture/Risk) to Meet Yield Challenges

Seed	Crop Protection	Crop Care

Crop Input Market

- Crop protection averaged 6.9% annual value growth rate 2008-2014
- Trait seed averaged annual value growth of 17.7%; genetic seed 4.8% prior to 2014
- 2012 bio-pesticides 15% annual value growth and projected growth 12.5%* by 2021

- Global traited seed, crop protection, and crop care leaders are engaged at some level with the use of biological crop products in support of traditional crop production.
- … but in 2015 crop protection value fell from 2014 by 9.0% and seed fell 8.2% … trend continues.

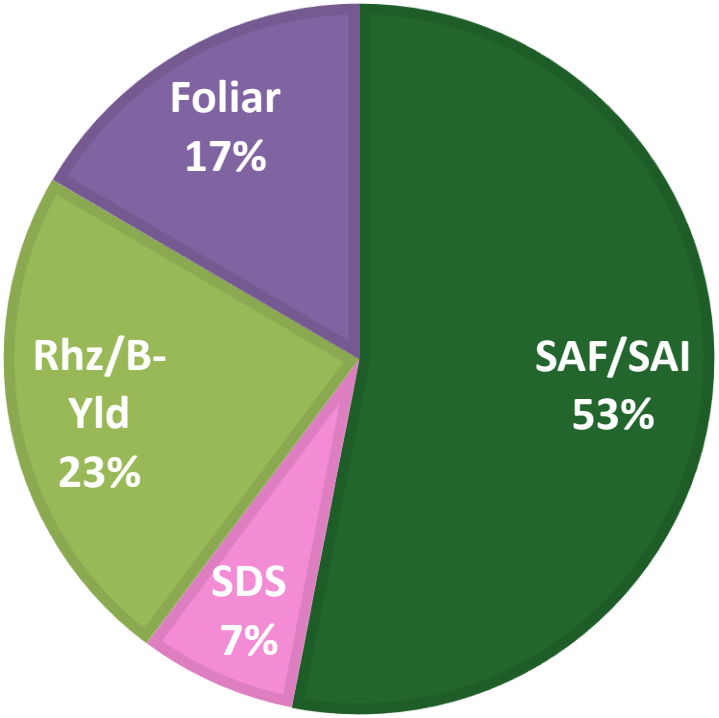
* CAGR 2016 – 2021

The Market Evolution Enhances the Role of Microbials

- *Bacillus thuringiensis* first discovered in 1901 by a Japanese biologist and then again in1911 by a German biologist
- Strong commercialization in 1987 by Abbott (Valent Biosciences)
- The cost of new “traditional” pesticides: 10 years at $250 MM ($120 MM, discovery, $112 development, $18 registration)
- Seed and genetic suppliers broadening their reach to protect the plant (prevention versus curative) and solidify the business opportunity.
- Generic crop protection products drive the need for differentiation and biological crop input products (microbials) provide a differentiating opportunity (efficacy and value)

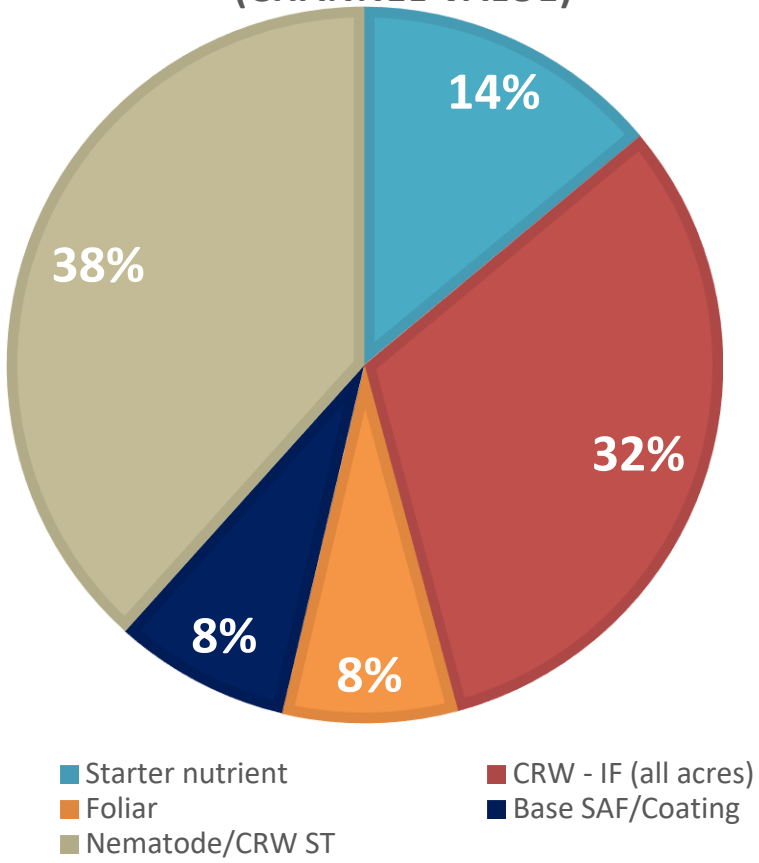
Addressable US Markets

SOYBEAN CROP INPUT MARKET
$754 MM* (CHANNEL VALUE)



*Assume 89 MM acres

CORN CROP INPUT MARKET
$2,008 MM*
(CHANNEL VALUE)



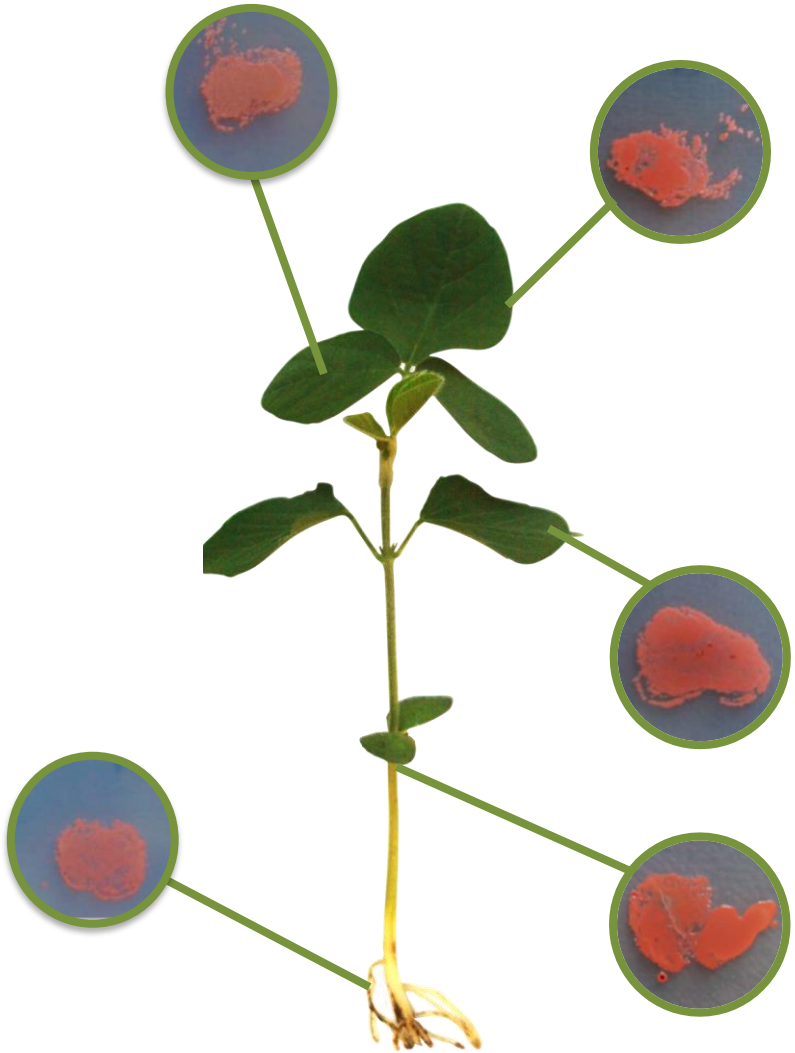
*Assume 88 MM acres

Why Microbials?

- Twelve years and $250 MM to register a pesticide
- GM crop 10 years $150 MM to register
- Challenges globally with regional registration impediments
- Accelerated path to market
- Environmentally responsible
- Changing climate requires management of stress biotic and abiotic in a prompt and sustainable way.

NewLeaf symbiotics

Why M-troph Focus?



Robust and ubiquitous colonizers of plants

No energy cost to plants

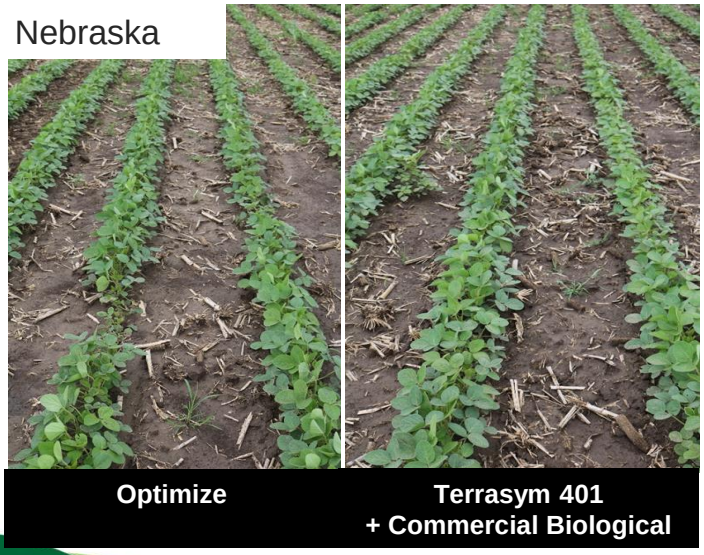
Rich in plant enhancing “traits”

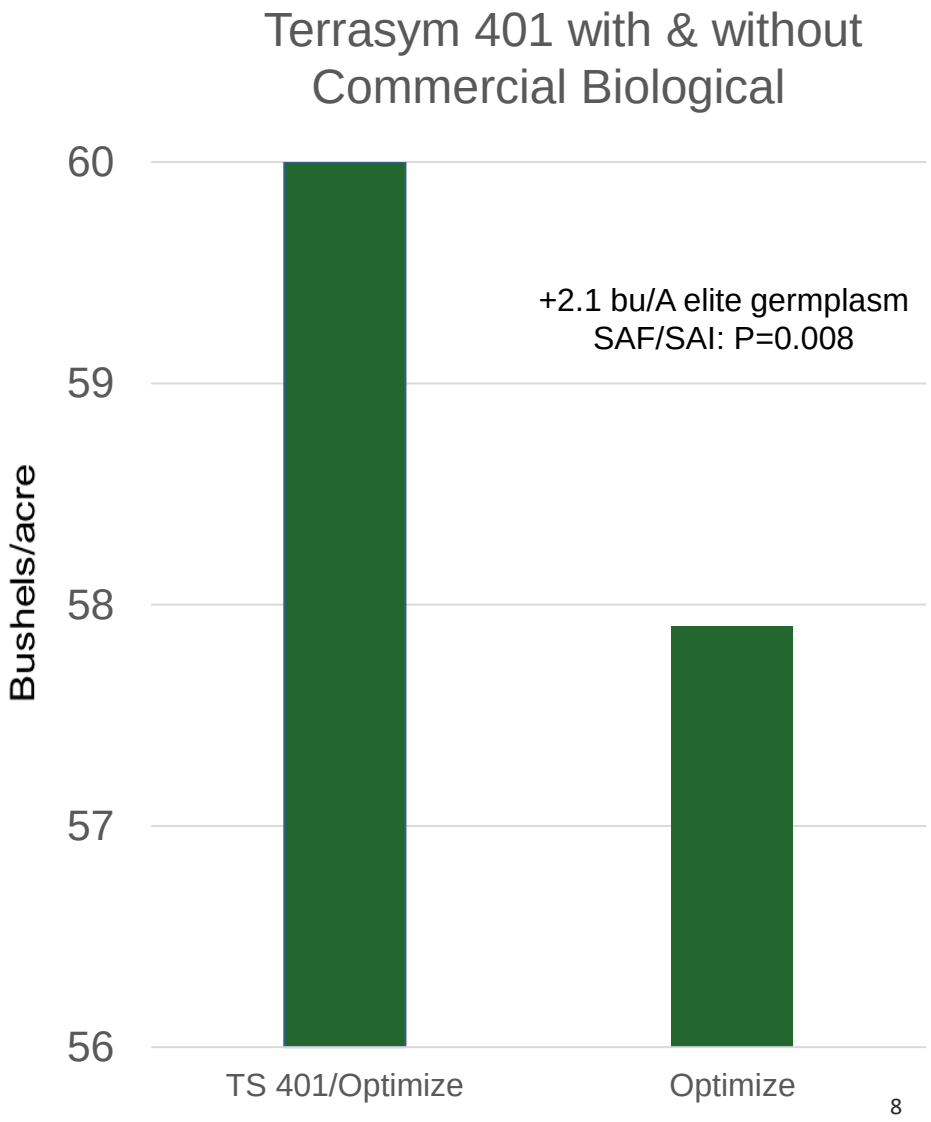
Highly productizable with our proprietary methods

Terrasym 401 Launched

Iowa

Nebraska





Grey Leaf Spot Suppression in the Field

Untreated check (UTC)

NLS D/R

Central Missouri
(*Cercospora zeae-maydis*)

NLS B/T

Pythium Evaluations, Wheat 2018

Metalaxyl in Wheat 2018

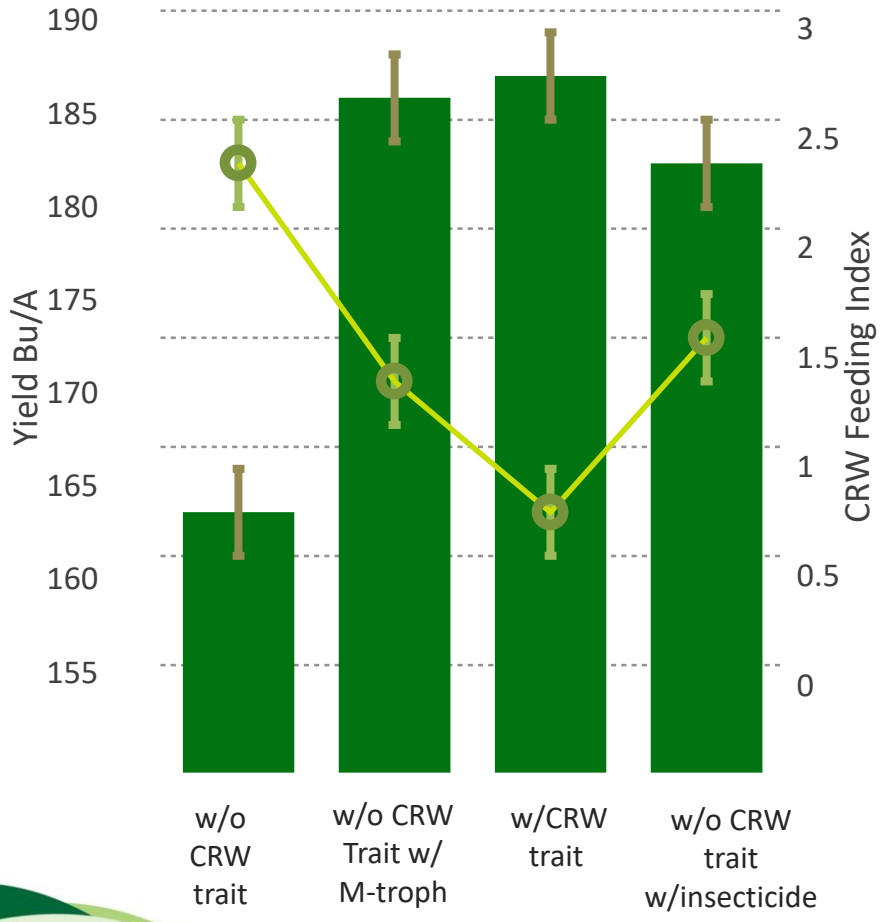
UNTREATED CONTROL

METALAXYL LOW RATE

METALAXYL HIGH RATE

TERRASYM 601

Corn Rootworm (CRW) Mitigation

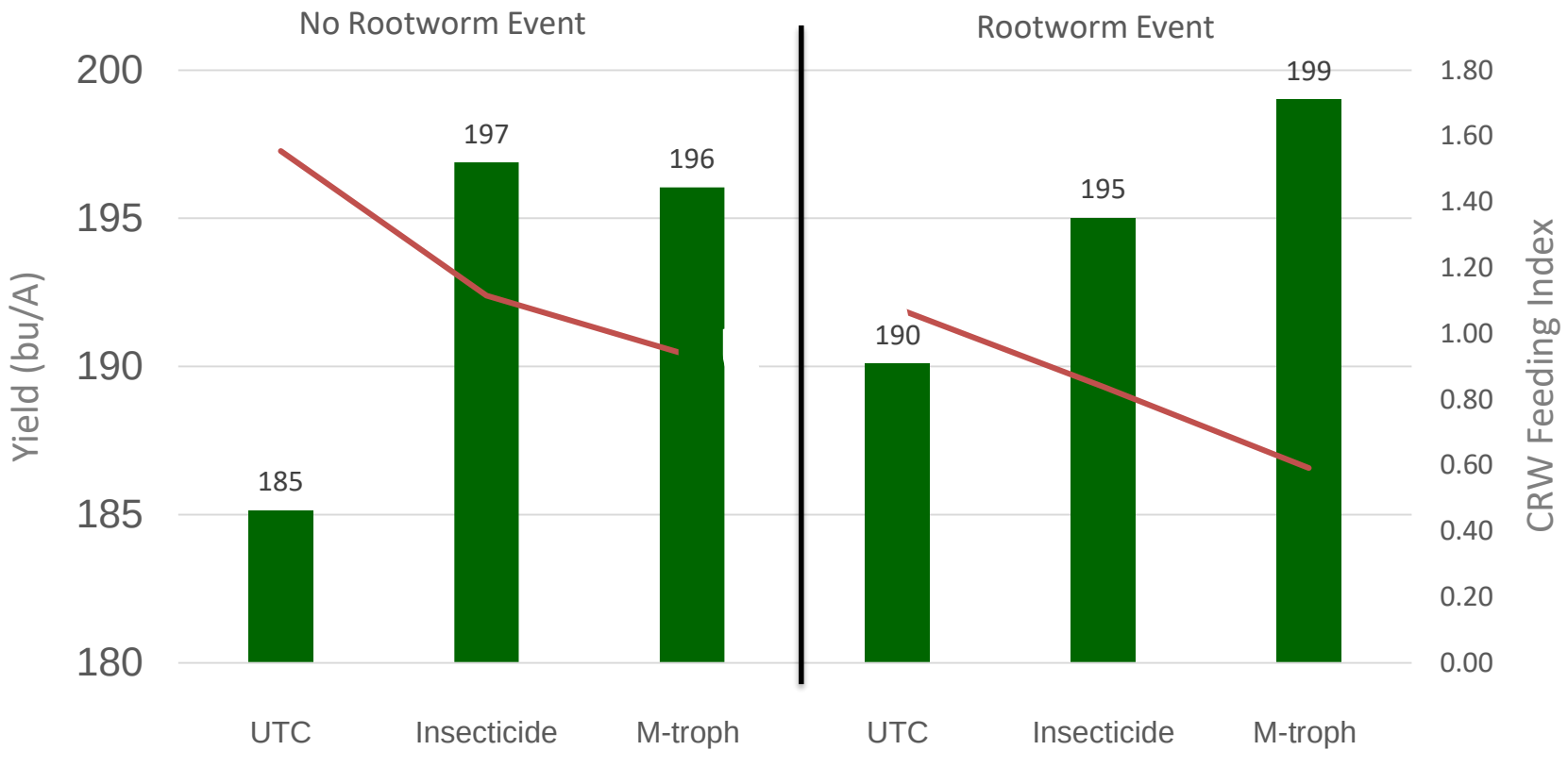


Untreated

Treated

- M-troph yield contribution comparable to CRW trait or insecticide on elite corn hybrid
- Integrated Pest Management opportunity

CRW 2015-17 In-furrow Field Trials



Untreated

Treated

terrasym