



*Are Microbes Going to Put a Dent in the  
Market for Inputs?*

David Stark, Ph.D.

# Meet your host

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# Question 1:

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What industry are you in?

## Question 2:

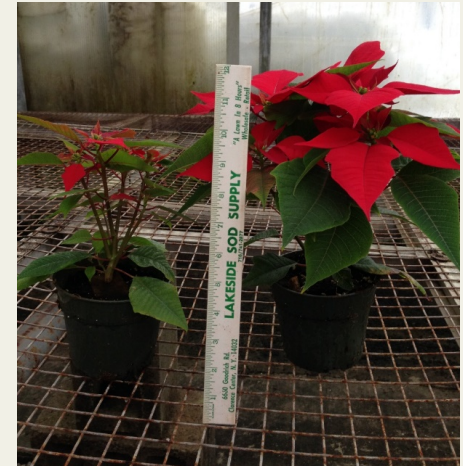
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Are you currently using any Holganix products?  
If so, which ones?



# How Do We...

Produce **MORE...**



...**USE** Less





# How Much Fertilizer *Actually* Goes to the Plant



- Run off
- Volatilization
- Tied up in the soil





## Biology builds and maintains functional soils

- Organic matter, CEC, water-holding capacity, nutrient availability and recycling
- Plants and soil life work together: protect and feed each other





In a functional soil, organisms (including plants)  
contribute to a mineralization cycle.  
Mineralization = Freeing immobilized nutrients





Without microorganisms, dead plant and animal life would not decompose.

- Soils would be putrid
- Compaction layers would be created
- Many nutrients won't be available to plants



# Types of Soil Microorganisms

- Bacteria
- Actinomycetes
- Fungi
- Algae
- Protozoa
- Nematodes





“Almost without exception, bacteria are involved in basic enzyme transformations that make possible the growth of higher plants, including our food crops. From man's point of view, bacteria may well be the most valuable of the life forms in soil.” How soil is destroyed. [www.fao.org](http://www.fao.org)

Microbes mineralize N, P, K, S, Fe and other nutrients which may be in the soil but in a form plants can't use.







Mycorrhizae are fungi that facilitate water and nutrient uptake by the roots, and plants provide sugars, amino acids and other nutrients to the fungi.



# Protozoa and nematodes



- Eat bacteria, organic matter, protozoa & fungi
- Require less N than bacteria, so release excess



# Harness the Power of *Soil Microbes*

Plant and soil life work together to build a functional soil









# Our Flagship: Holganix Bio 800<sup>+</sup>



100% organic plant probiotic that harnesses the power of 800+ species of microbes to foster healthier plants with less chemicals.



Holganix delivers in grasses what farmers are looking for...fast establishment, larger root mass, less disease

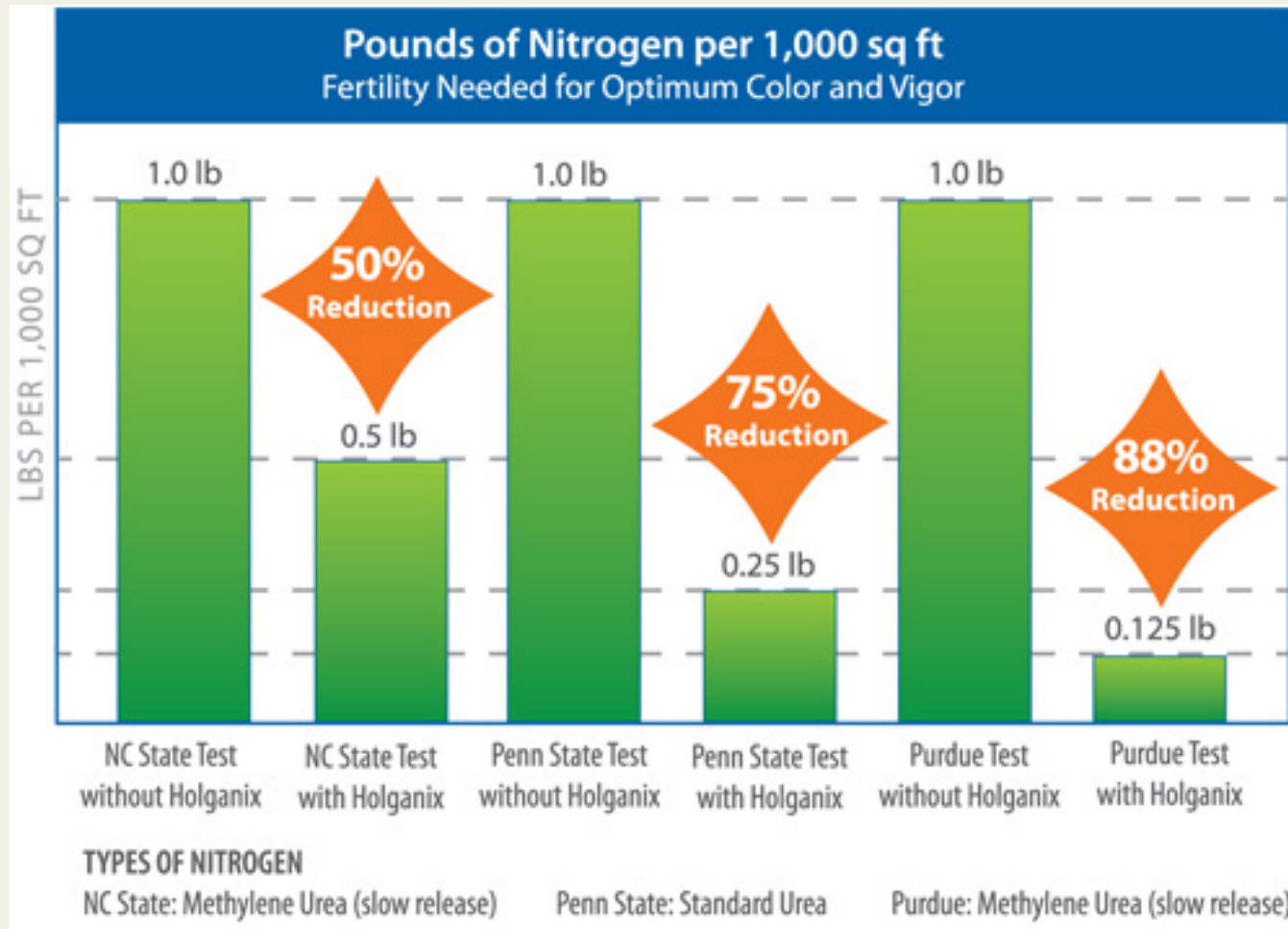


Muirfield Village, Aug. 13

One month later, ready for the President's Cup



# Reducing Fertilizer Rates



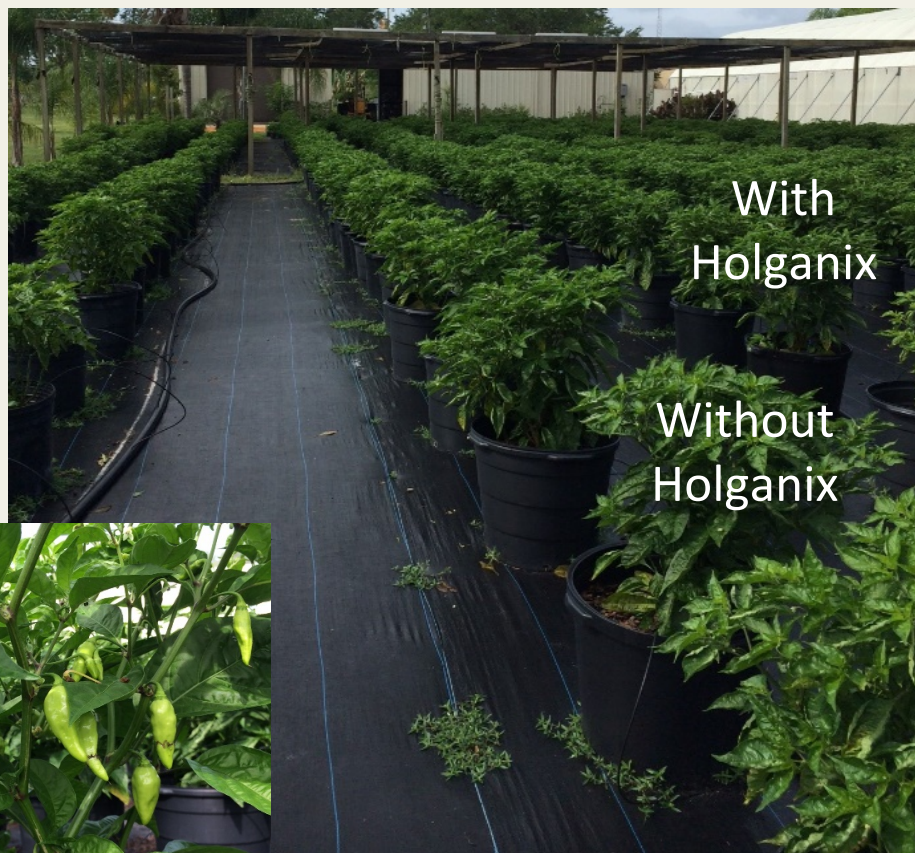


# Increasing Yield with Less Inputs

Holganix Bio 800+ + 50% less fertilizer

- Increased vigor
- Heavier fruit set

“After growing Datil’s for 15 years, I have never seen a crop so beautiful, with fruit so large.” - E. Lambert, FCTC





# Increasing Fertilizer Efficiency in Potato

Payable Yield with  
No Fertilizer Reduction\*

10 – 16% higher weight/acre

Extra Money Earned

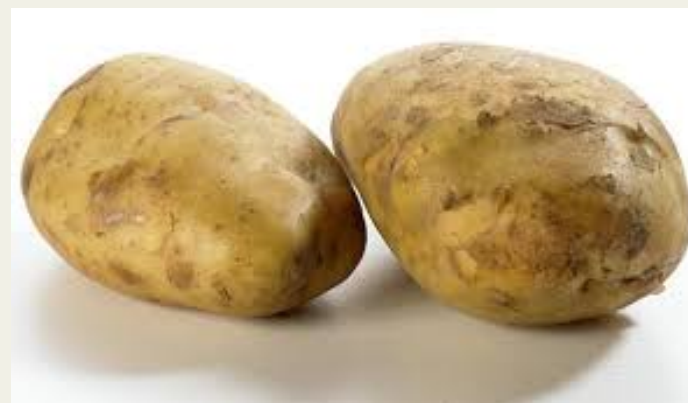
\$300 – 440/acre

Payable Yield with  
20% Fertilizer Reduction\*\*

Higher marketable yield  
\$200/acre advantage

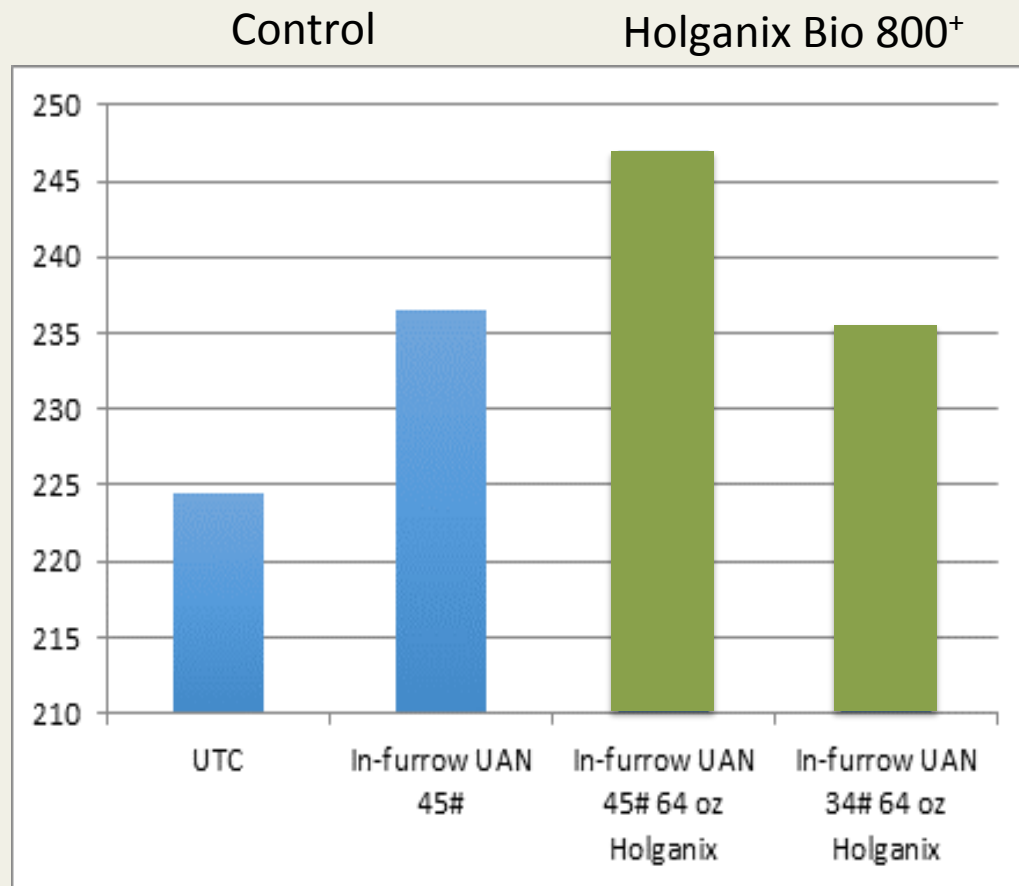
\*Tests from Idaho Commercial Growers

\*\*Tests from Washington State University





# Increasing Fertilizer Efficiency in Corn



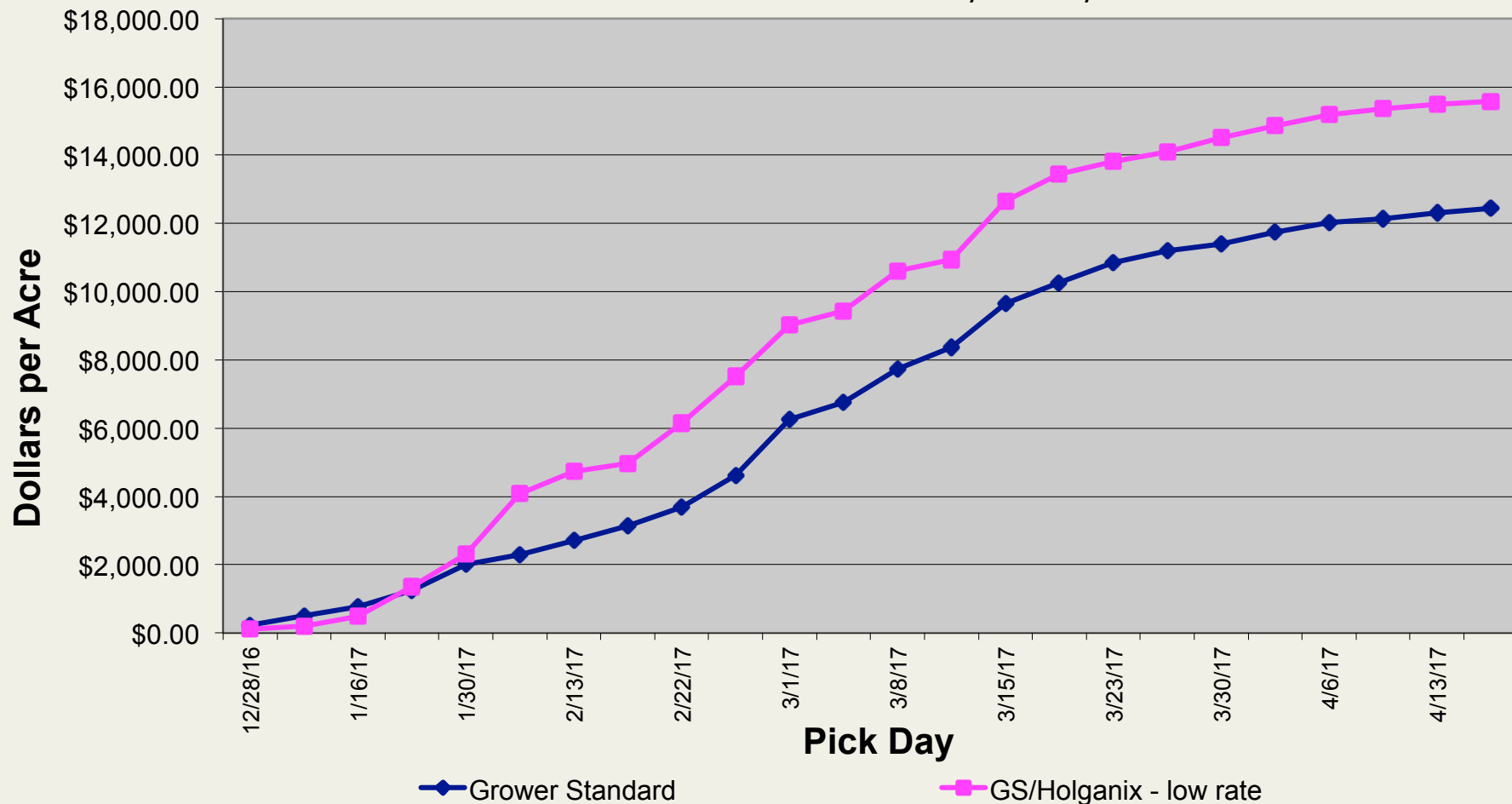
## Corn Trial

- Yield parity with 20% less fertilizer
- 11 bu/a increase at minimum fertilizer rate



# Over \$3,000/acre Higher Yield in Strawberries

Holganix Bio 800+ in Strawberries - Ventura County - Winter 2017 - Cumulative Marketable Production Net Return by Pick Day



Grower standard fertilizer + Holganix – 4.8 gal/acre at planting, 2.4 gal/acre every 28 days. +\$3,136/acre, >10X ROI on the cost of Holganix  
All applications through drip tape, injected toward end of the irrigation run, total water 100 gal/acre



# Increasing Yield in Processing Tomatoes/ Cucurbits

## Cucumber Trials\*

1 week earlier harvest & higher yield



## Tomato Trials\*

2-4 ton/acre yield increase (~10%)



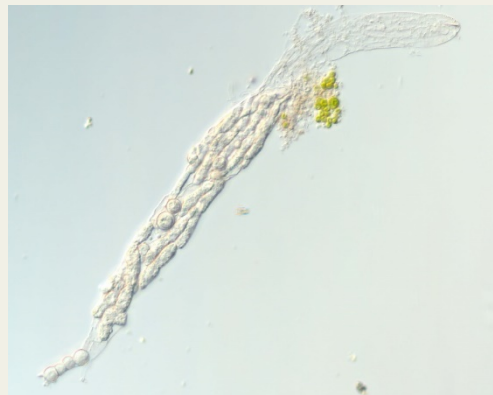
\*Trials from Midwest Commercial Growers

# Revolutionary tool to fight nematode damage

- Globally \$80B in ag yield loss/yr.
- Soybean cyst nematode >\$1B/yr. U.S. alone
- Global nematicide/other pesticide market \$5.6B (U.S. \$1.8B, Mordor Intelligence, 2014)
- Chemical control is expensive and damaging to the environment; some chemicals phasing out
- Many acres go untreated

## Three modes of action:

- Impaired ability of juveniles to find roots; 7 days to feed or die. *Unique to Holganix Bio 800<sup>+</sup>*
- Suppresses egg hatching. *Unique to Holganix Bio 800<sup>+</sup>*
- Some microbes have direct killing action



Nematode killed by Holganix  
K. Lambert, U. of Illinois

### Club Course Front Nine

	Sting Nematodes	Root Knot Nematodes	Lance Nematodes
Before	13	140	10
After 1 Year	0	48	0

### Club Course Back Nine

	Sting Nematodes	Root Knot Nematodes	Lance Nematodes
Before	21	140	8
After 1 Year	0	32	0

### Old Course Front Nine

	Sting Nematodes	Root Knot Nematodes	Lance Nematodes
Before	17	160	110
After 1 Year	0	20	4

### Club Course Back Nine

	Sting Nematodes	Root Knot Nematodes	Lance Nematodes
Before	18	140	92
After 1 Year	0	24	28

Broken Sound Golf Club, Boca Raton, FL



# Brix – Multiple farms, Northeast U.S.

Crop	Without Holganix	With Holganix
Peas	6	16
Sweet Corn	8	25
Raspberries	8	14
Strawberries	7	11
Tomato	12	15
Watermelon	10	16
Alfalfa	12	21

Besides better taste, there is some evidence that increased brix leads to reduced insect pressure.







# Resources

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Look for a follow up email containing the following:

- PPT slides and webinar recording
- Holganix Bio 800+ ingredient list
- Case Studies in Agriculture
- Product Catalog



# Questions?

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