Imapact of BioFit N on Rhizoshere Biology, Soil Fertility and Crop Productivity

Gary Gross
US Applied Research Manager
Innovak Global

INNOVAK GLOBAL

ENERGÍA NATURAL PARA UNA VIDA SUSTENTABLE

Research & Development

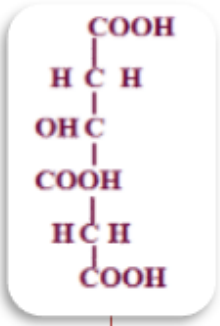
Research at Innovak Global is initiated through observations in the field and interactions with growers that allow us to identify research and development needs in agriculture

These technologies are then validated and developed in association with growers around the world and with leading universities and research centers.

- ✓ Auburn University, USA
- ✓ Center for Rhizosphere Biology CSU, USA
- ✓ CIFACITA , ESPAÑA
- ✓ INIFAT CUBA
- ✓ INIFAP, MEXICO
- ✓ ITSON, MEXICO
- ✓ Kyoto Prefectural University, JAPAN
- ✓ Rutgers University, New Brunswick, USA
- ✓ La Molina University, PERU
- ✓ University of Arkansas USA
- ✓ University of Buenos Aires, ARGENTINA
- ✓ University of California USA
- ✓ Universite Laval, CANADA
- ✓ Washington State Potato Comission, USA
- ✓ Universidad Católica , CHILE
- ✓ Jean Couloumbe Inst. , CANADA
- ✓ Universiteit Hasselt, BELGIUM
- ✓ Universidad Sao Pablo, BRAZIL

Carboxy Formulation

Aliphatic Carboxy

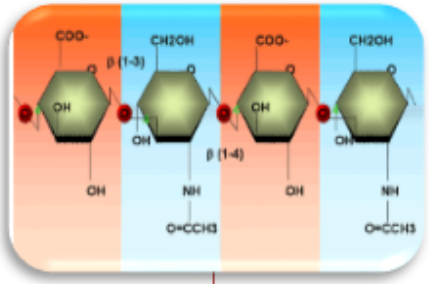


Nutrients Activated

Aromatic Carboxy

Bioregulators

Oligomers



Soil Conditioner

INNOVAK GLOBAL
ENERGÍA NATURAL PARA UNA VIDA SUSTENTABLE

biofitoN

Multi-Species Microbial Inoculant
Soil Amendement for Soil Health

Restores and maintains the productive capacity of the soil

Microbial Formulation

Soil amendment
Powder
CONTAINS NON-PLANT FOOD INGREDIENTS

Microbial inoculum 20%*

**Azotobacter chroccocum* ..... 1 X 10^5 CFU/g
Bacillus subtillis..... 1 X 10^8 CFU/g
Bacillus megaterium .....1 X 10^6 CFU/g
Bacillus mycoides .....1 X 10^5 CFU/g
Trichoderma harzianum ..... 1 X 10^6 CFU/g

Optimizes Plant Nutrient Uptake

Azotobacter chroococcum

- ✓ Free living Nitrogen fixing Rhizobacteria
- ✓ Increases the production of auxins, cytokinins, and GA-like substances that increase plant growth and root surface area
- ✓ Produces an antibiotic which inhibits the growth of several pathogenic fungi in the rhizosphere

Improves Root Growth, Vigor and Health

Bacillus subtilis, Bacillus megaterium & Bacillus mycoides

- ✓ *Bacillus spp.* have been shown to suppress plant parasitic nematodes in many agricultural crops.
- ✓ Compete for space and food against pathogenic fungi, which prevents infection of the roots.
- ✓ Prevents disease incidences in the root, caused mainly by *Phytophthora, Fusarium, Pythium, Rhizoctonia & Verticillium*
- ✓ Secretes substances that generate healthy roots that strengthen tolerance to pathogenic fungi attack.
- ✓ Increases total phosphorus uptake by plant
- ✓ Increases plant growth and root surface area.

INNOVAK GLOBAL
ENERGÍA NATURAL PARA UNA VIDA SUSTENTABLE

Maintains a Healthy Soil Microbiome

Trichoderma harzianum

- ✓ *Trichoderma spp.* have been shown to suppress plant parasitic nematodes in many agricultural crops.
- ✓ *Trichoderma spp.* displace pathogenic fungi through parasitism, antibiosis and competitive exclusion that has been shown to suppress plant and soilborne disease.
- ✓ Releases large amounts of enzymes capable of breaking down compounds with complex structures that allow for better nutrient cycling within the soil
- ✓ Releases soluble and volatile metabolites with beneficial biological activity to plants and other beneficial microbes.

INNOVAK GLOBAL
ENERGÍA NATURAL PARA UNA VIDA SUSTENTABLE

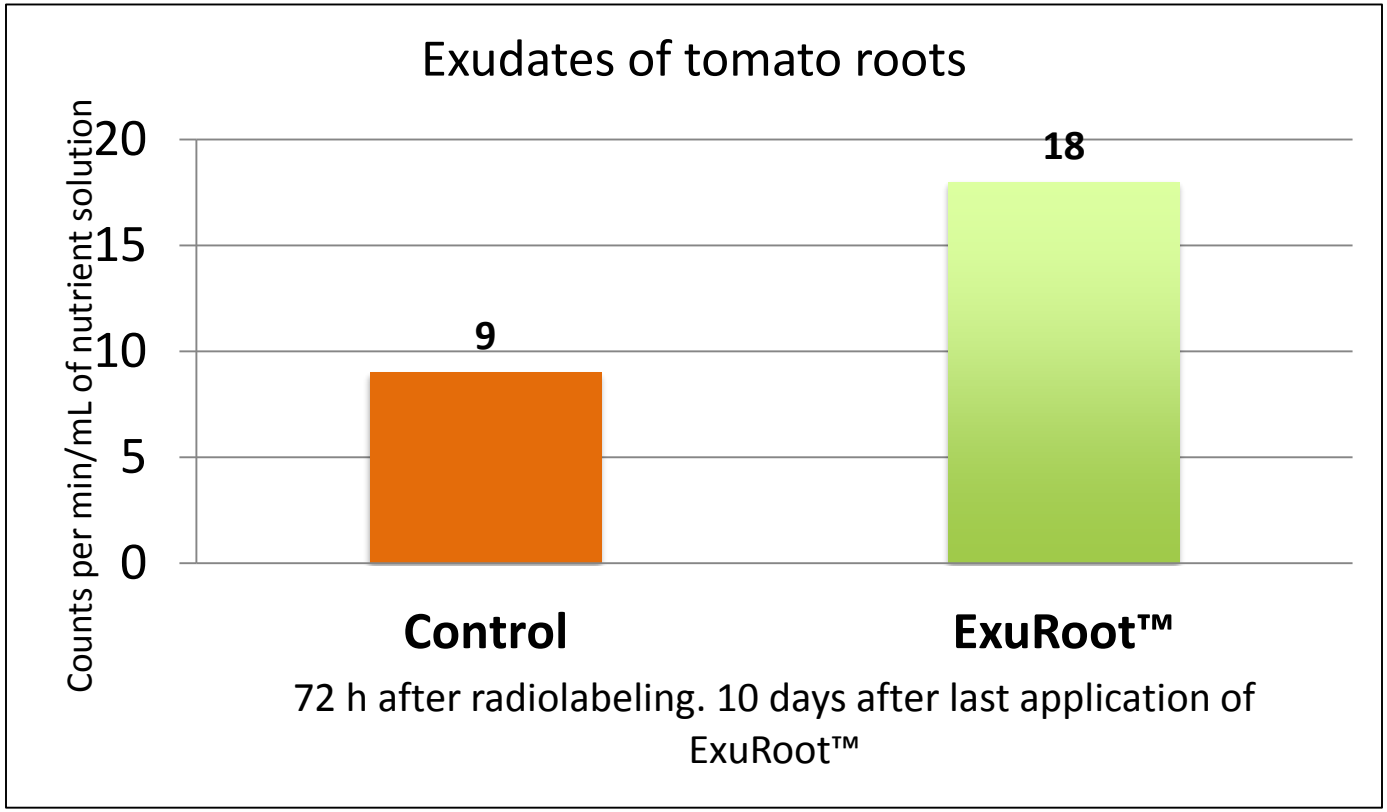
Exu-Root

The ExuRoot formulation promotes:

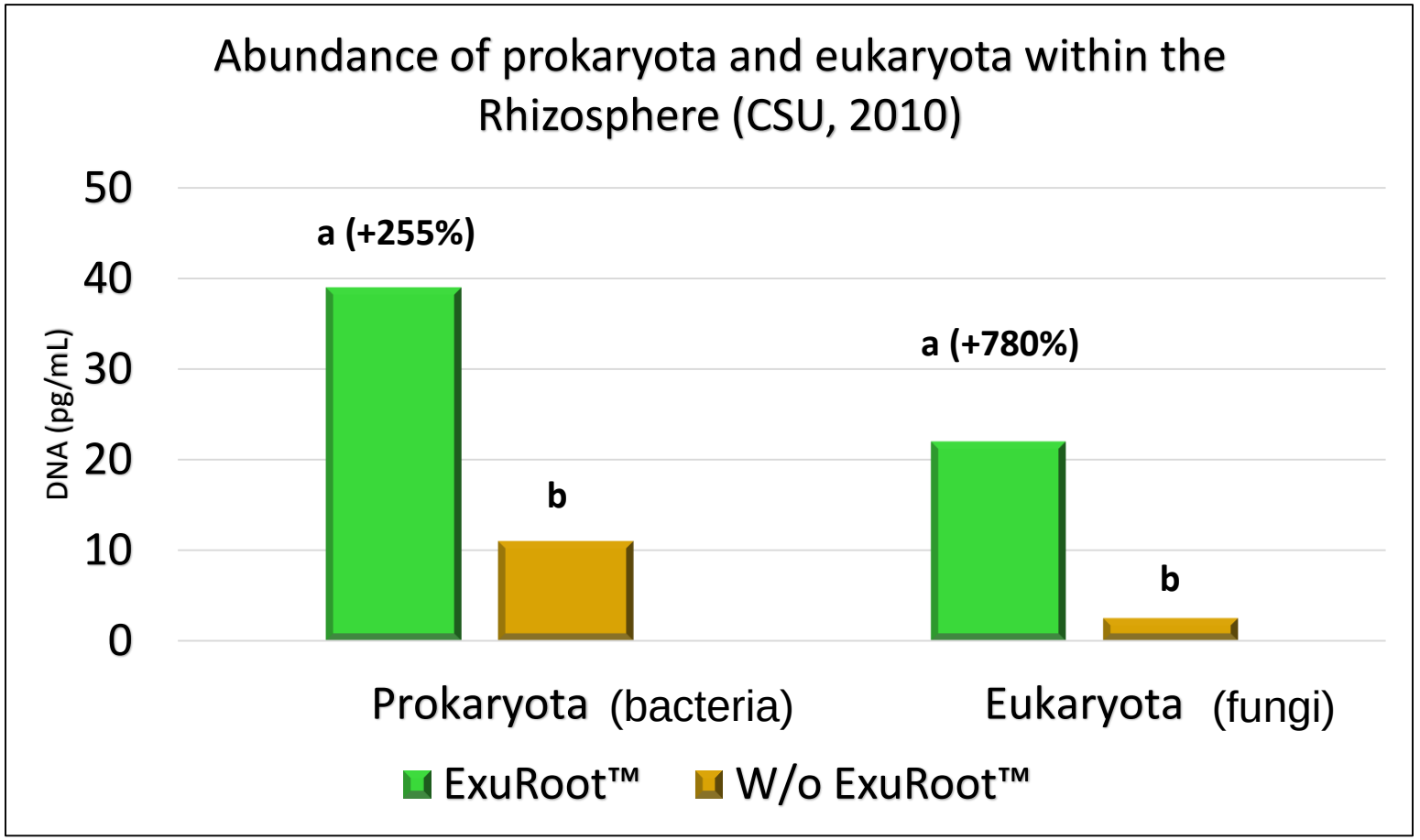
- ✓ Plant Biostimulant that increases root exudatation.
- ✓ Substantially increases microbial colonization of the rhizosphere

Exudates of tomato roots produced from radiotraced CO_2 and incorporated by photosynthesis, after treatment with ExuRoot™;

Research from Arkansas University, USA.

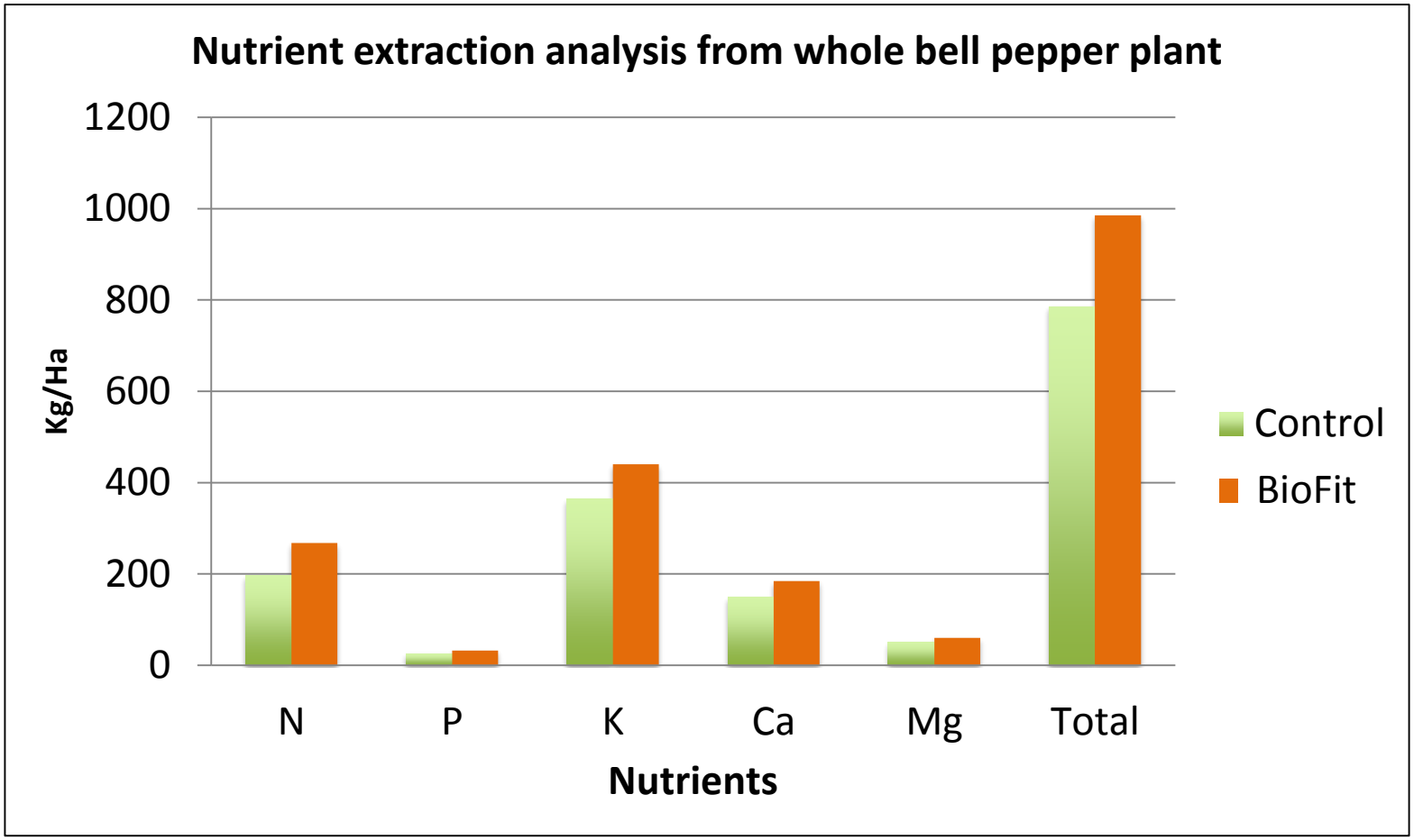


Significant statistical differences between the treatments (α=0.05)



Significant statistical differences between the treatments (α=0.05)

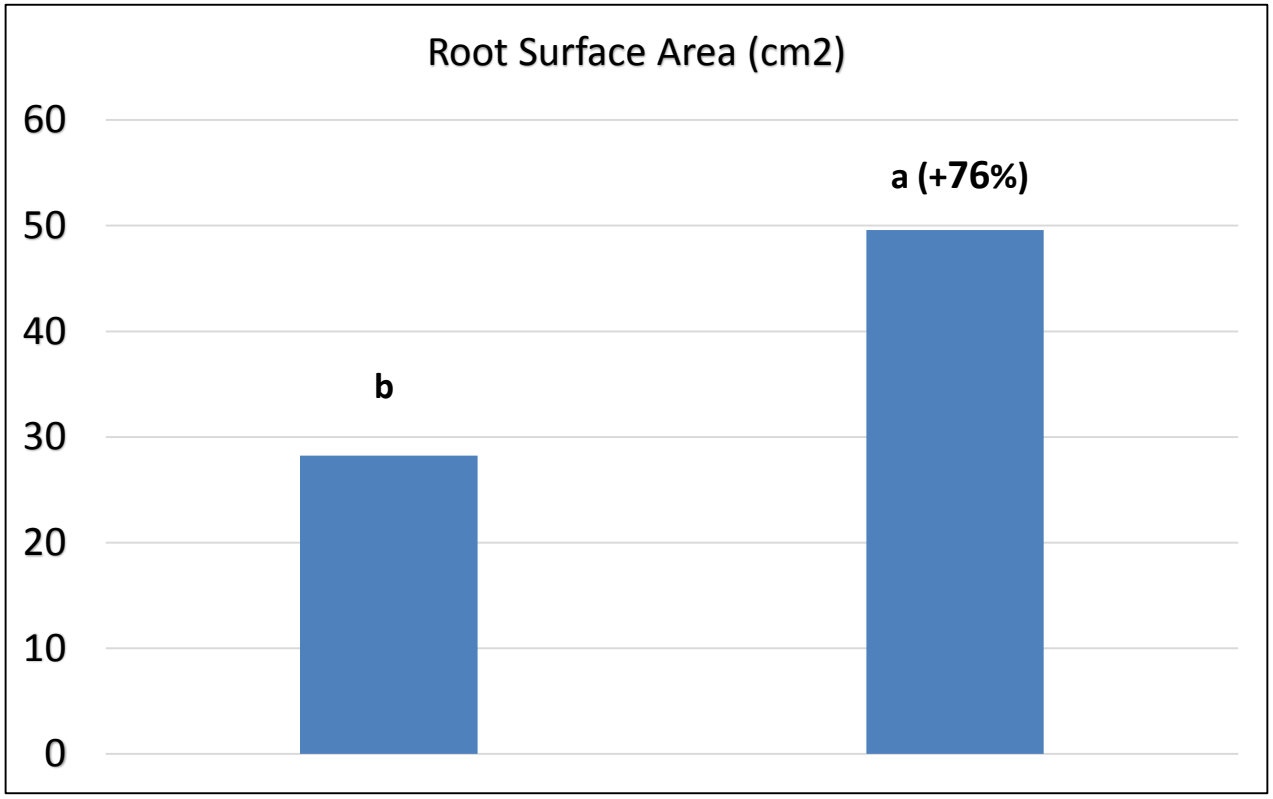
Results of BioFit N Improved Plant Nutrition - 2014



INNOVAK GLOBAL

ENERGÍA NATURAL PARA UNA VIDA SUSTENTABLE

Results of BioFit N Greenhouse Experiment on Potatoes - 2014

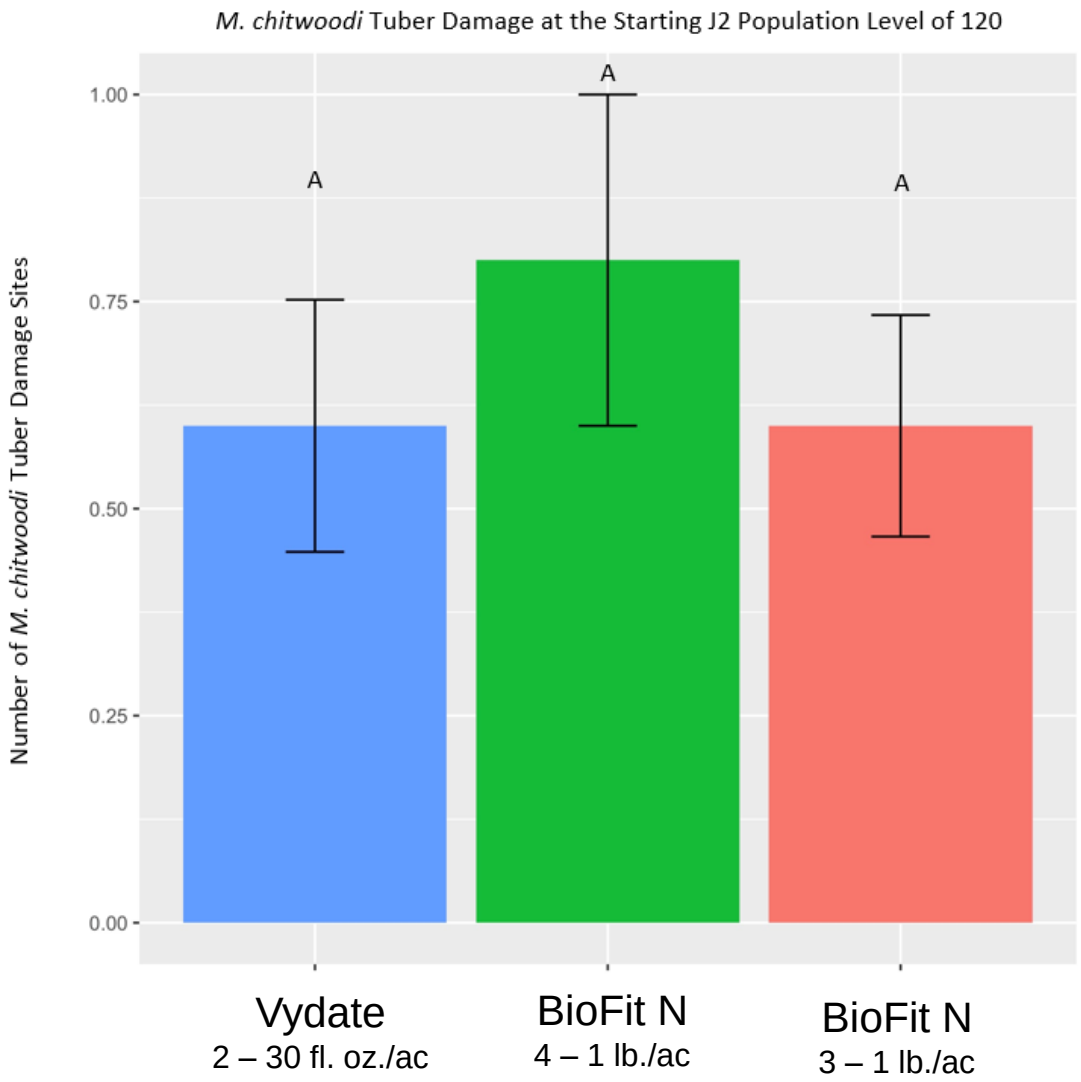


Significant statistical differences between the treatments (α=0.05)

Root-Knot Nematode
infested roots

Root-Knot Nematode
infested roots
treated with BioFit N

VanTreese Farms
BioFit N Commercial Potato
Field Trials - 2015

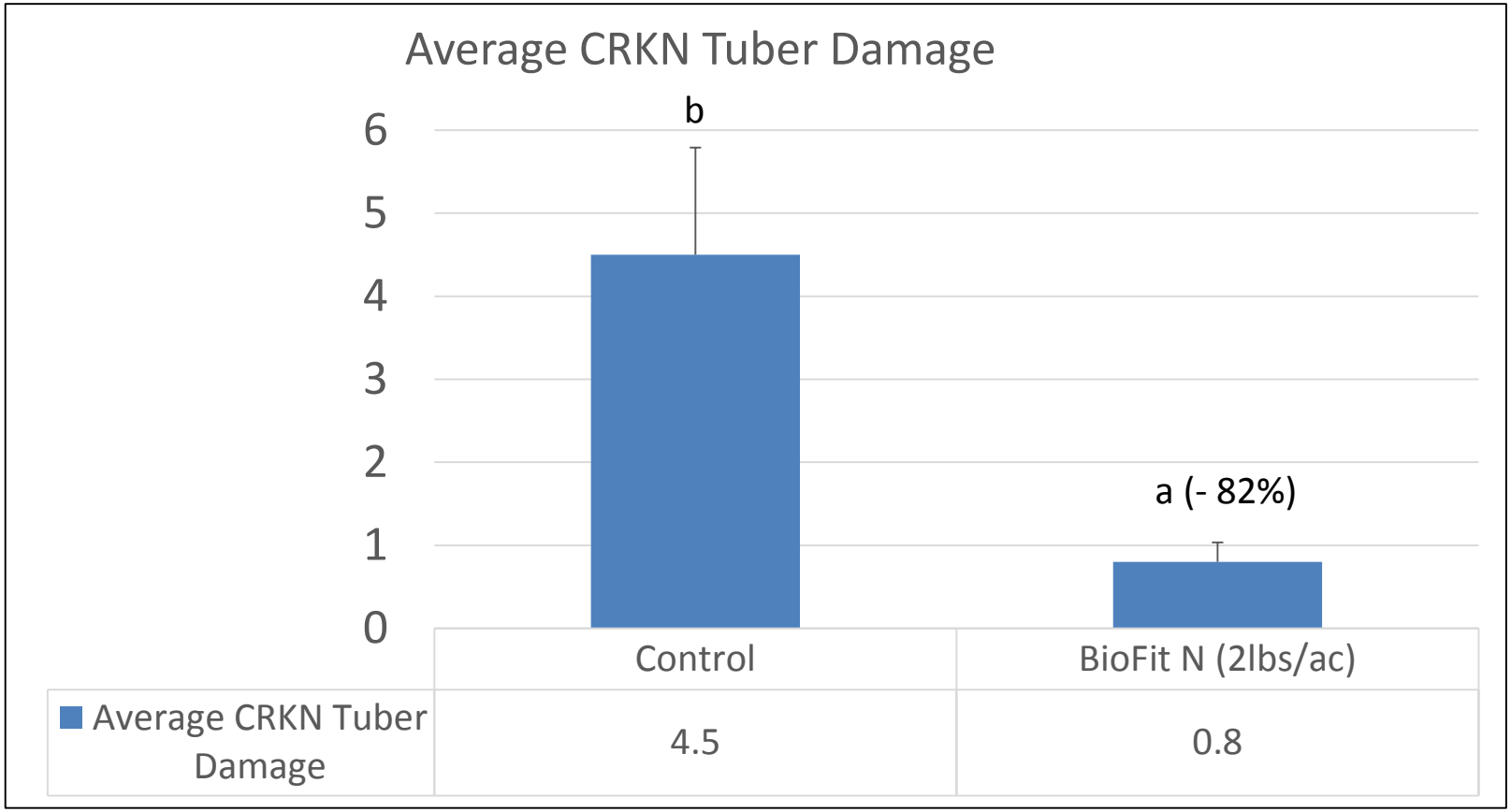


Significant statistical differences between the treatments (α=0.05)

Tomato Roots Treated with BioFit N

Tomato Roots Control

SLV Farm #1
BioFit N Commercial Potato Field Trial - 2016



Significant statistical differences between the treatments (α=0.05)

SLV Farm #1
BioFit N Commercial Potato Field Trials - 2016

Total Nematode Population (population in 100 g of soil)

Treatments	Free-Living Nematodes	Predator Nematodes	Plant Parasitic Nematodes	Total Nematodes	Percentage of Beneficial Nematodes to Plant Parasitic Nematodes
Control	27	0	12	39	56%
BioFit N	36	0	9	45	75%

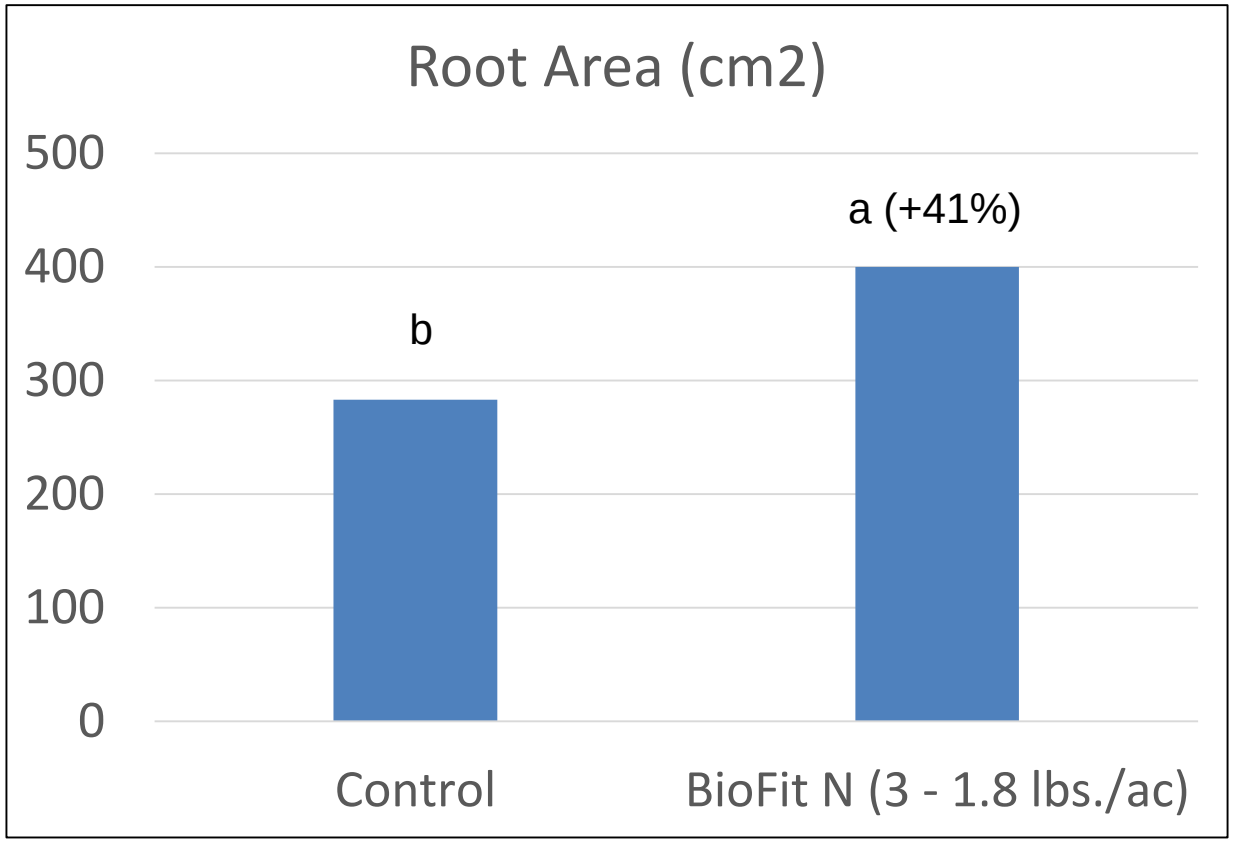
SLV Farm #1
BioFit N Commercial Potato Field Trials - 2016

Soil Microorganism Population

Treatments	Active Bacteria (ug/g)	Total Bacteria (ug/g)	Active Fungi (ug/g)	Total Fungi (ug/g)	Total Fungi to Total Bacteria (%)	Active Fungi to Active Bacteria (%)
BioFit N	25.20	487	23.20	304	62%	92%
Control	21.30	397	4.02	133	32%	19%

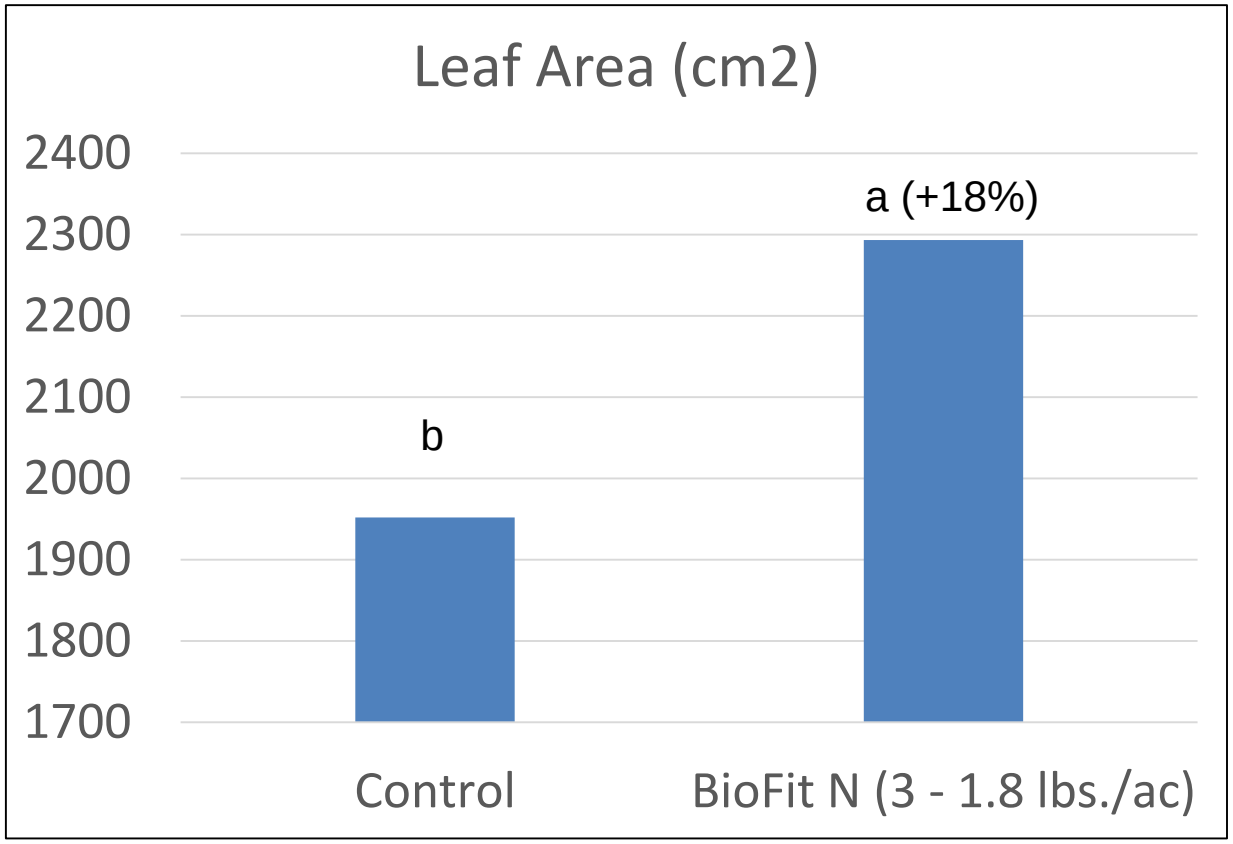
Pepper Plant Trials - 2016

Pepper Plant Trials - 2016



Significant statistical differences between the treatments
(α=0.05)

Pepper Plant Trials - 2016



Significant statistical differences between the treatments
(α=0.05)

Current Applied Research World Wide

Current Applied Research World Wide

Current Applied Research World Wide

Current Applied Research World Wide

Current Applied Research World Wide

Current Applied Research World Wide