



PLANT HEALTH

— C A R E —

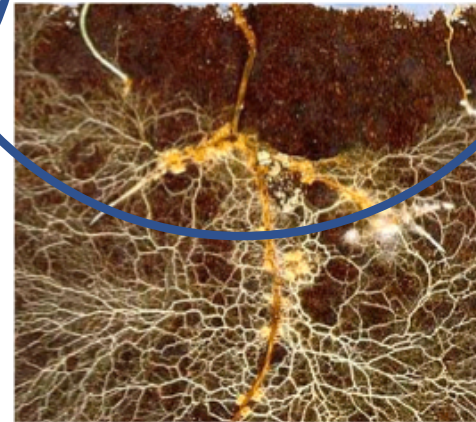
Glen Donald

AgBiotech Summit Feb 20 -21, 2018 Chapel Hill, NC

Soil



Plant



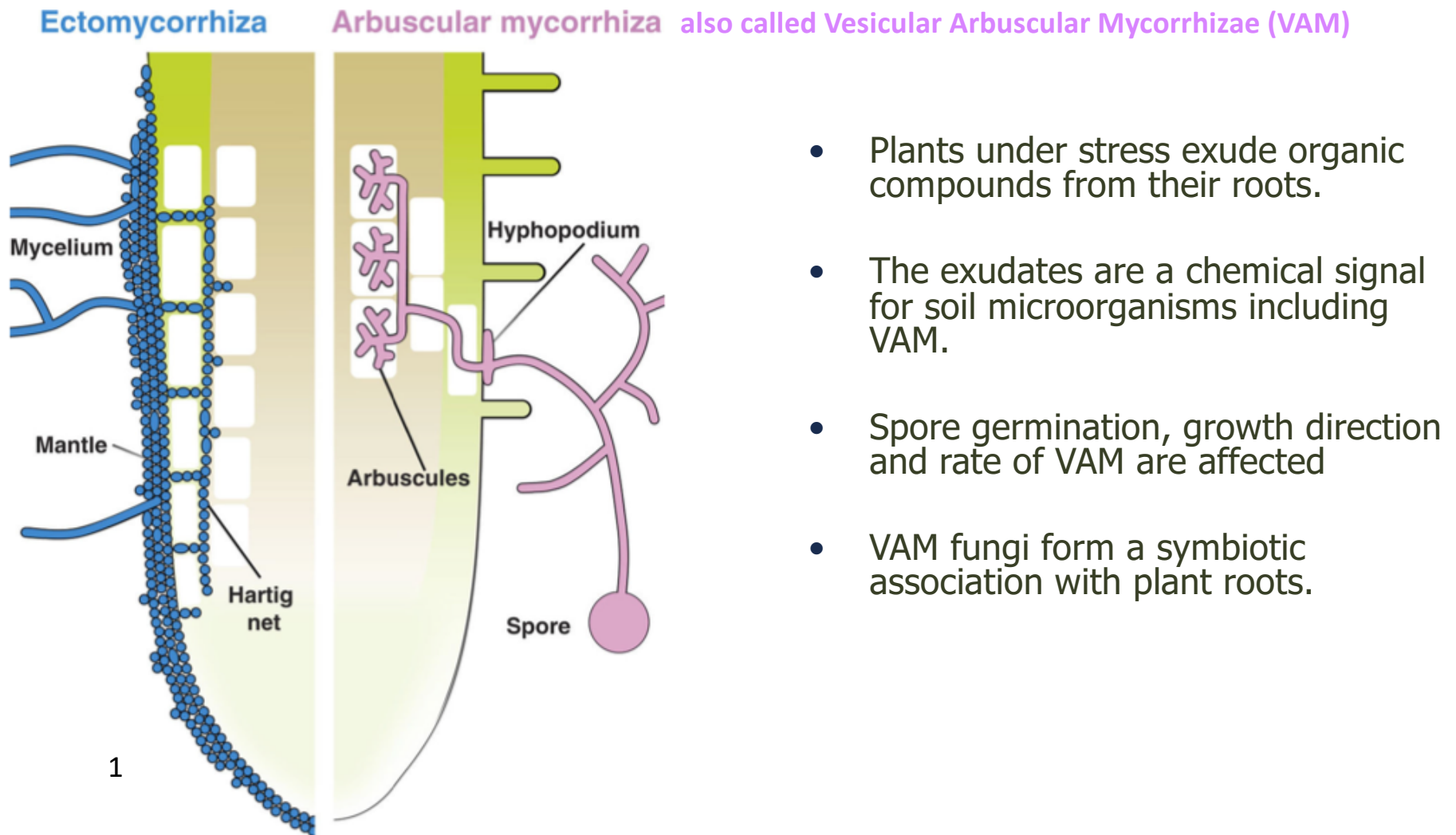
Mycorrhizal
Fungi

WHAT ARE MYCORRHIZAL FUNGI?

- Literal translation means
“Fungus-Root”
- They are the symbiotic association between a plants’ root and a fungus where the fungus derives most of its carbon from the plant, and the plant derives most of its mineral nutrient from the fungus, to mutual benefit.
- They are obligate bio-trophic fungi



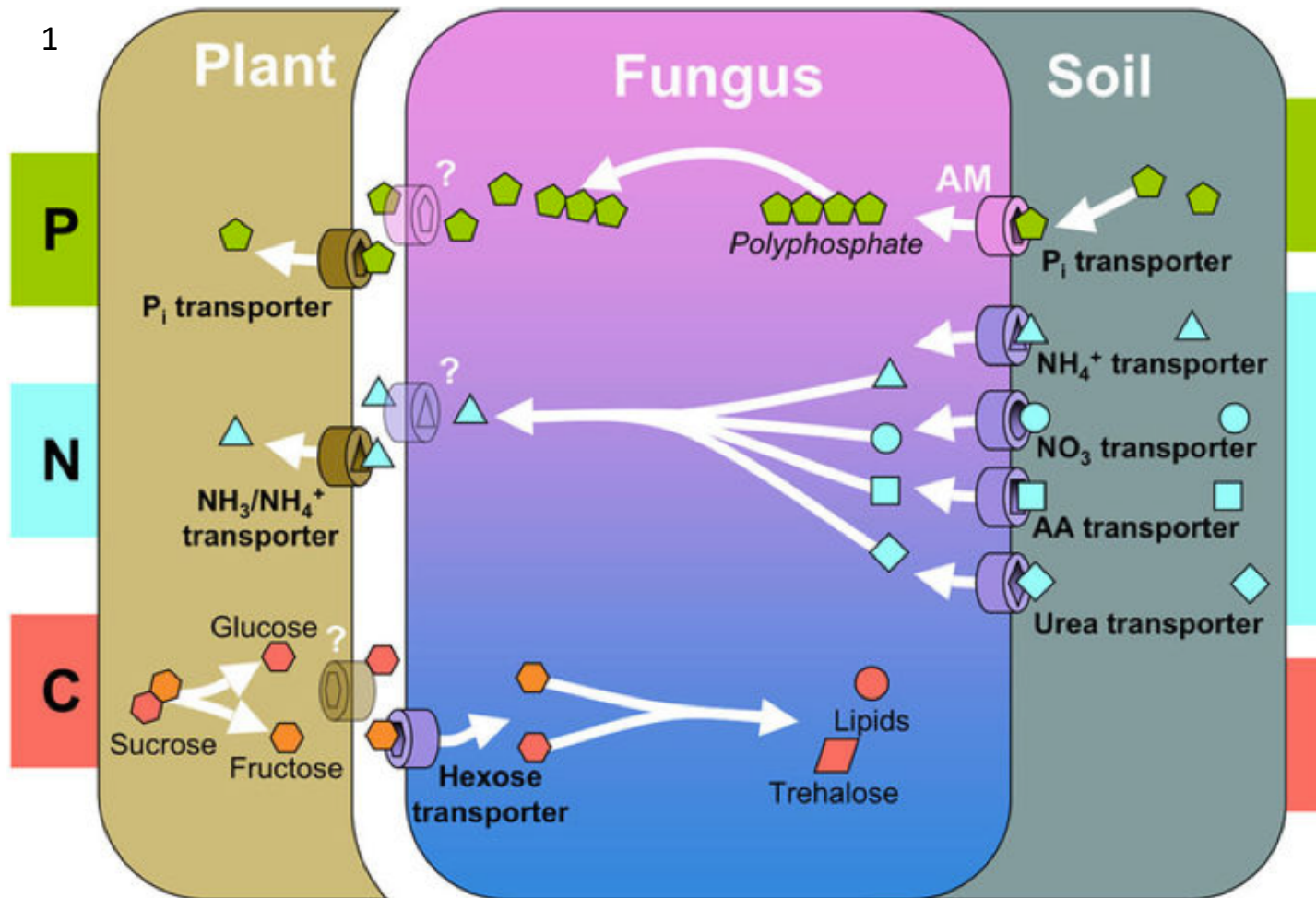
How Vesicular Arbuscular Mycorrhizae (VAM) Work



- Plants under stress exude organic compounds from their roots.
- The exudates are a chemical signal for soil microorganisms including VAM.
- Spore germination, growth direction and rate of VAM are affected
- VAM fungi form a symbiotic association with plant roots.

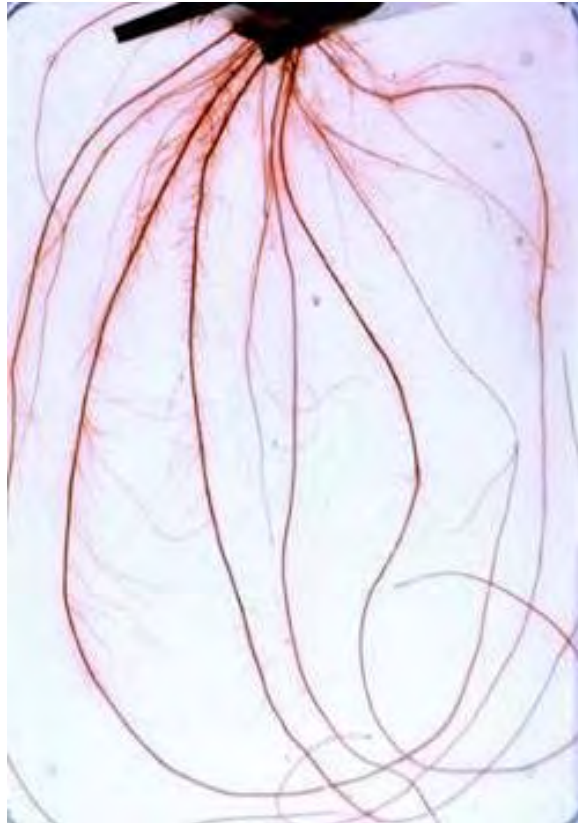
1) Mechanisms underlying beneficial plant–fungus interactions in mycorrhizal symbiosis, Paola Bonfante & Andrea Genre, Nature Communications, Volume 1, Article Number: 48 (2010). Published online 27 July 2010

- Host plant receives minerals and water: the fungi obtain carbon compounds.



1) Mechanisms underlying beneficial plant–fungus interactions in mycorrhizal symbiosis, Paola Bonfante & Andrea Genre, Nature Communications, Volume 1, Article Number: 48 (2010). Published online 27 July 2010

Absorbing Root Area Comparison +/- Vesicular-Arbuscular Mycorrhizae (VAM)

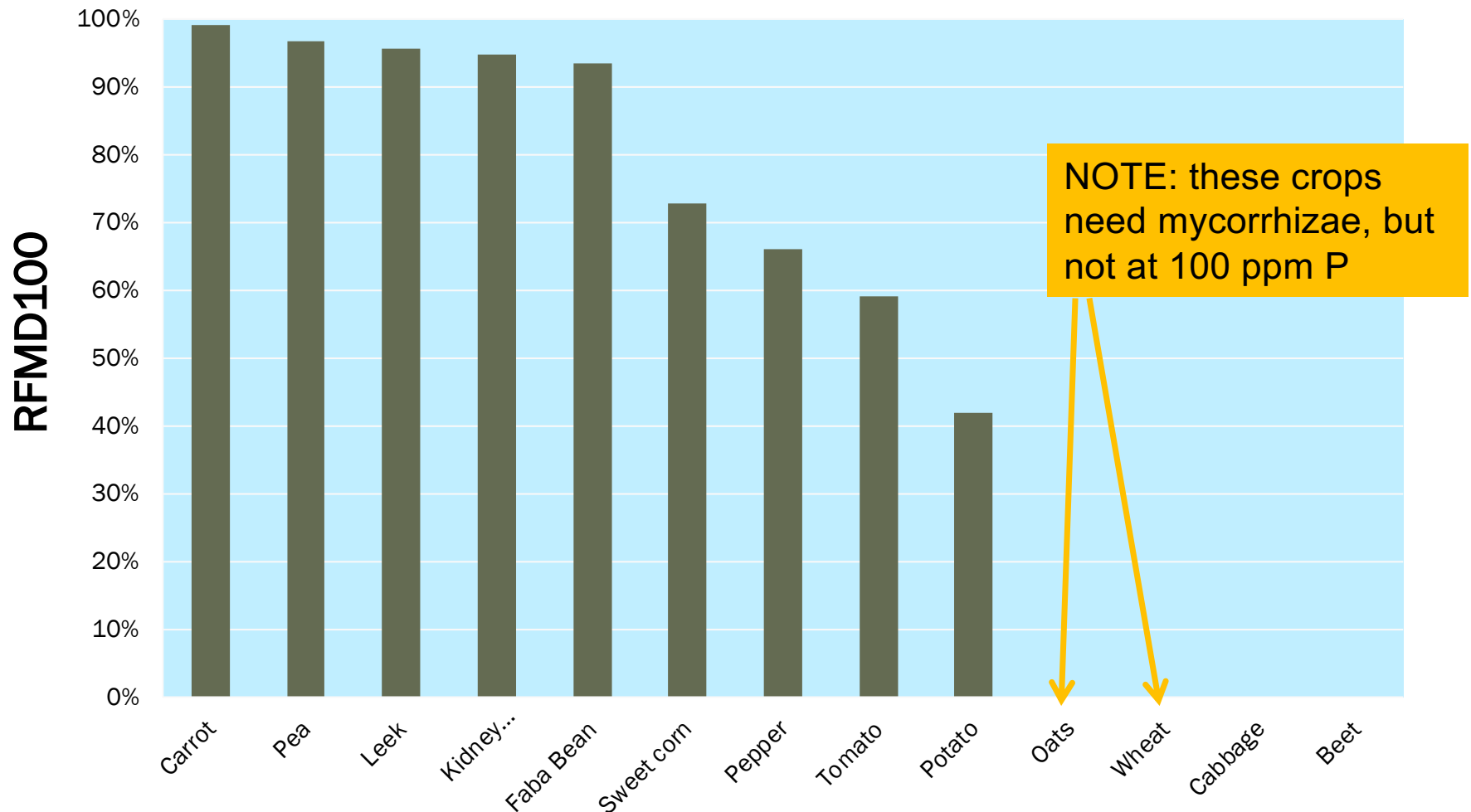


Nonmycorrhizal roots of a fescue plant. Red stain indicates the effective absorbing area



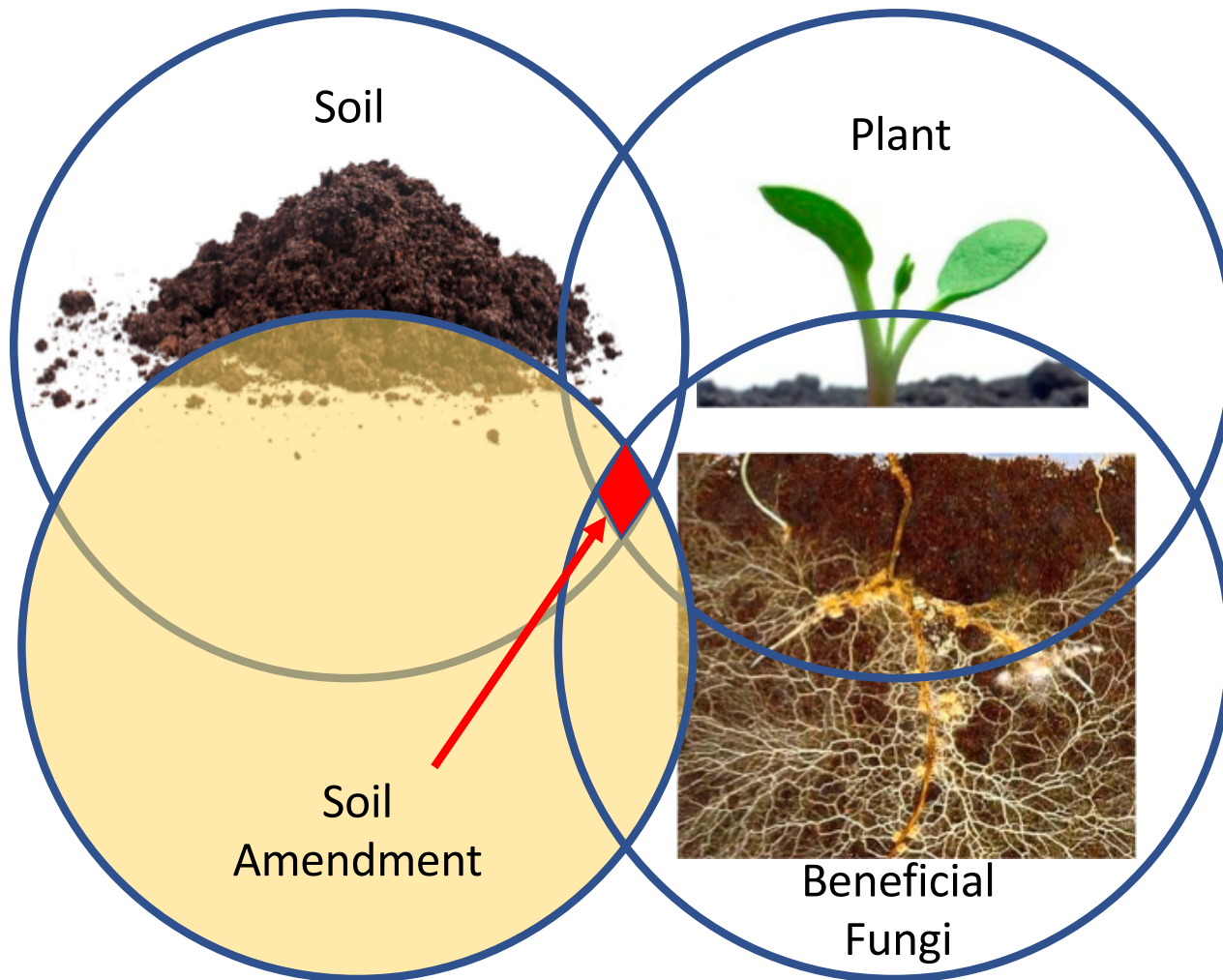
VAM roots of fescue. The red stain indicates the effective absorbing area

Growth Responses of Several Plant Species to Mycorrhizae in a Soil of Moderate P-Fertility



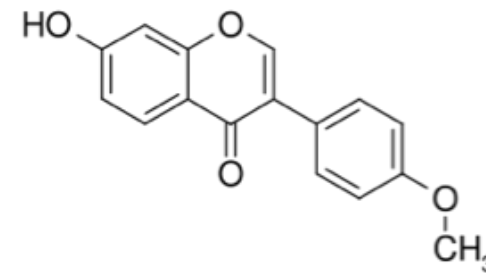
RFMD¹⁰⁰ is the percent of a plant's dry weight that can be attributed to the effects of mycorrhizae at a soil phosphorus level of 100 ppm (Bray 2).

Adapted from: Plenchette, Christian, J.A. Fortin, and V. Furlan, 1983. *Growth Responses of Several Plant Species to Mycorrhizae in a Soil of Moderate P-fertility*. **Plant and Soil**, 70:199-209. *N.B.*: Cabbage and beets do not support mycorrhizae.





Myconate® is the isoflavone – **formononetin** – originally isolated and identified from P-deficient clover roots

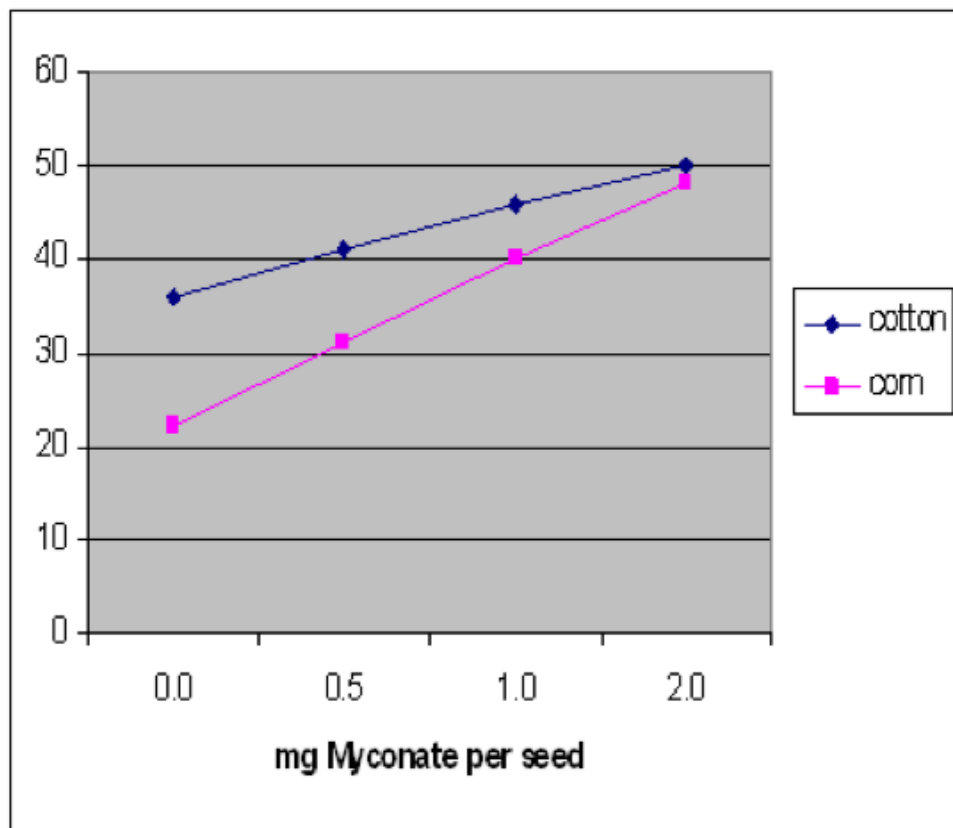


Myconate® acts as a signal molecule and increases the growth and colonization of roots by beneficial Vesicular-Arbuscular Mycorrhizal (VAM) fungi



VAM Stimulation by Myconate®

% Root Colonization



Cotton Seed in Inoculated Soil, 2004

Myconate Treatment	% roots colonized in 10 weeks
0 mg / seed	36%
0.5 mg / seed	41%
1 mg / seed	46%
2 mg / seed	50%

Corn Seed in Inoculated Soil, 2004

Myconate Treatment	% roots colonized in 8 weeks
0 mg / seed	22%
0.5 mg / seed	31%
1 mg / seed	40%
2 mg / seed	48%

Results for Vegetables & Potatoes

Crop	USA (% YIELD INCREASE)	EUROPE (% YIELD INCREASE)
Carrot	27% (9 demo trials)	
Celery	14% (1 trial)	
Onions	13% (1 trial)	
Tomatoes	5 – 13% (2 trials)	4.5 – 13% (3 trials)
Peppers	6 – 17% (2 trials)	
Field Beans	9% (9 trials)	
Potatoes	5% (3 trials)	4.5 – 7% (3 trials)
Field Peas	4% (6 trials)	7 – 20% (4 trials)



Questions?