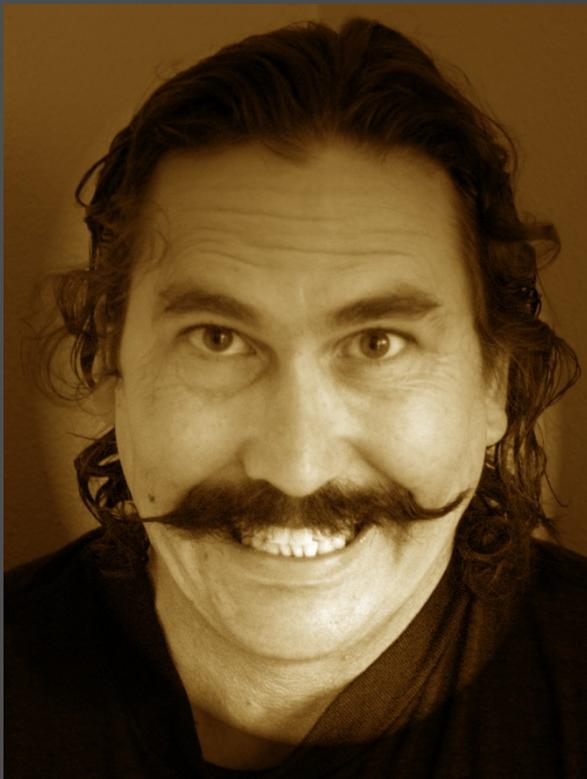


How to Detect Snake Oil: False claims, bogus products and horticultural myths



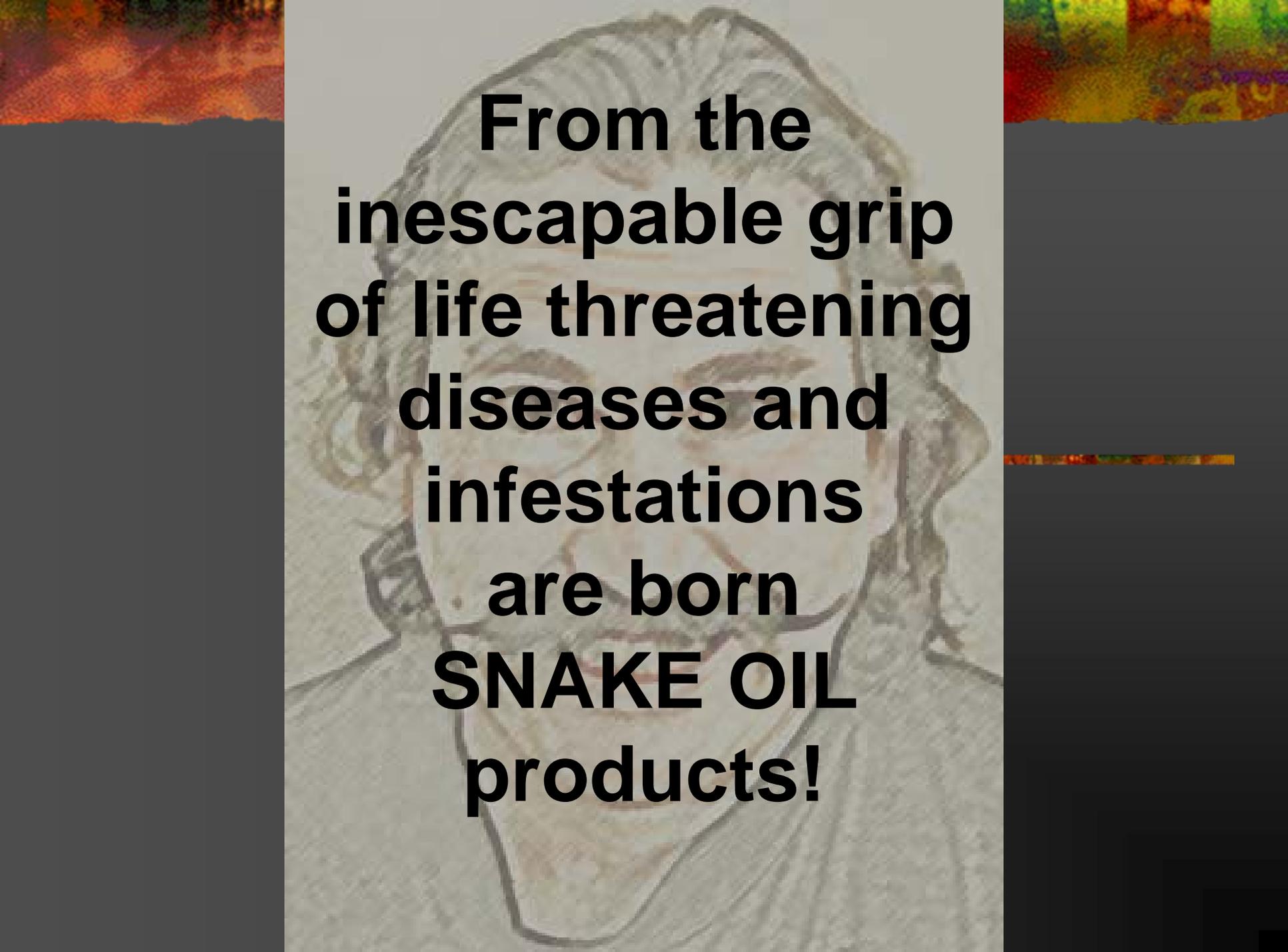
Jim Downer

University of California
Cooperative Extension

Ventura County

ajdowner@ucdavis.edu

<http://ceventura.ucdavis.edu>



**From the
inescapable grip
of life threatening
diseases and
infestations
are born
SNAKE OIL
products!**

A few facts

- Trees and all plants can contract and die from incurable diseases
- Trees and all plants can be infested with hard to treat insects
- No plant will not tolerate conditions they are not adapted to tolerate
- There are many abiotic conditions that limit growth or kill plants
- Poorly adapted plants require more inputs

Horticulture is:

- Growing trees
 - Trial and Error
 - Success and Failure
 - Health and Death!
 - Diagnostics
 - Pruning
 - Pest Management
 - Killing plants
 - Science and experiment
 - Innovation through research
 - Observation
 - logic
-

So many products!



PRODUCTS

- Marketing does not equal research
 - Not all products are required to be researched for their efficacy
 - Pesticides must submit efficacy research data prior to registration
 - Fertilizers, growth stimulators, activators, hormones and vitamins require no efficacy testing
 - Water treatment devices
-

Snake Oil

- A product that makes unsubstantiated claims of efficacy in the cure of a disease, ailment or problem.
- There really was a pure snake oil sold to treat all sorts of human ailments. The term has been expanded to include any product whose claims seem way out of proportion with actual effects.



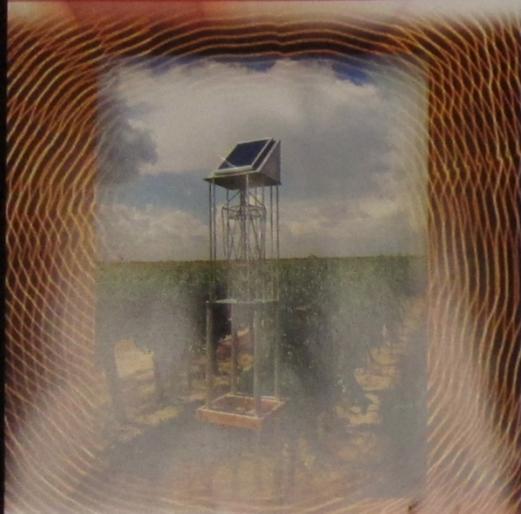
Science Based

- The most persuasive snake oil products are based on a sound principle of science or scientific fact.
 - The science is often bolstered with copious amounts of jargon.
 - Many products are ambulance chaser products and follow after natural disasters or pest outbreaks.
-

Works on a new Principle

- May be a fabrication of the snake oil purveyor or
 - May be yet undiscovered active ingredient
 - A clear explanation of how the active principal works is rarely given or explained.
-

BIOWAVE



OUR GROWERS SAY:

"Best crop in 15 years."
"20% increase, just like you said."
"As the plants lifted their branches when the machine turned on."
"Not only more yield, but a premium product."
"Peppers are slow and stopped reproducing..."

**For Purchasing Information:
Contact your
Hydroponic/Garden Supply
Retailer today!**

FAQ

How does BioWave work?

■ Biowave works by getting the plants to breathe better by dilating stomata.

I have a lot of expensive equipment in my grow room, will it damage any of it?

■ No, BioWave works in synergy with most equipment and will not affect lights or any other electrical equipment.

How long can I expect my BioWave machine to work?

■ The machine is made out of aircraft grade stainless steel, and aluminum components, making it corrosion and rust resistant. It has a three year comprehensive limited warranty that covers all parts of the machine.

Do BioWave machines have any effect on humans?

■ No, Biowave's technology only affects plants, and has no effect on humans or animals.

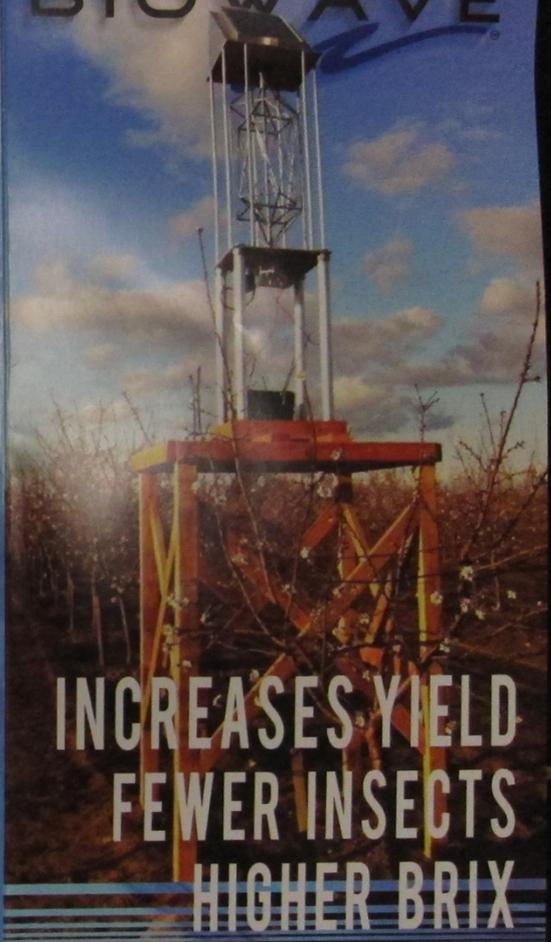
How effective is BioWave?

■ In 3 years of testing, the minimum increase in yield was 12%. We have reports of yields as high as 30% with an average of around 20%.

How long should I run the BioWave machine?

■ Two hours a day are optimal for the outside farm model. Spread the time out in even segments over the light cycle. Three hours a day are optimal for the inside model. Use BioWave throughout your entire growing cycle.

BIOWAVE



www.biowaveindustries.com

Research Based

- **Some products make extensive research claims. Usually none are published in peer-reviewed journals!**
- **In-house and contracted third party research is not a substitute for University trials and research.**
- **Some products refer to University research but never mention that the research found no effect from the product.**
- **Sometimes outright lies are purported on the basis of fraudulent research**
- **Old studies are cited by emeritus researchers that have no bearing on the current product.**

It's Too Good To Be True

- So it probably is not true.
 - There are no miracles folks!
 - If the scientific community has not found a cure for a pesky disease, it is unlikely that a small private company will cure the pandemic disease problem that has stopped everyone else.
 - If they do, I want to be reading about it in Science News!!!
-

What makes a bogus product?

- No efficacy
- Lack of active ingredient
 - Not there or deactivated
- Too many claims for broad sweeping effects: growth, yield, kills pests, etc.
- The ingredients confound one another
 - Mycorrhizae/fertilizer combinations
- Claims exceed realistic expectations

Bogus Products

- Polymers, growth activators, hormones, vitamins, fertilizers, worm castings, composts, compost teas, nutrients.
 - Since none of these is a pesticide, there are no EPA, CAL EPA efficacy testing protocols required for registration, thus the claims can run to the extreme.
-

Composts are always good?



Coffee grounds compost

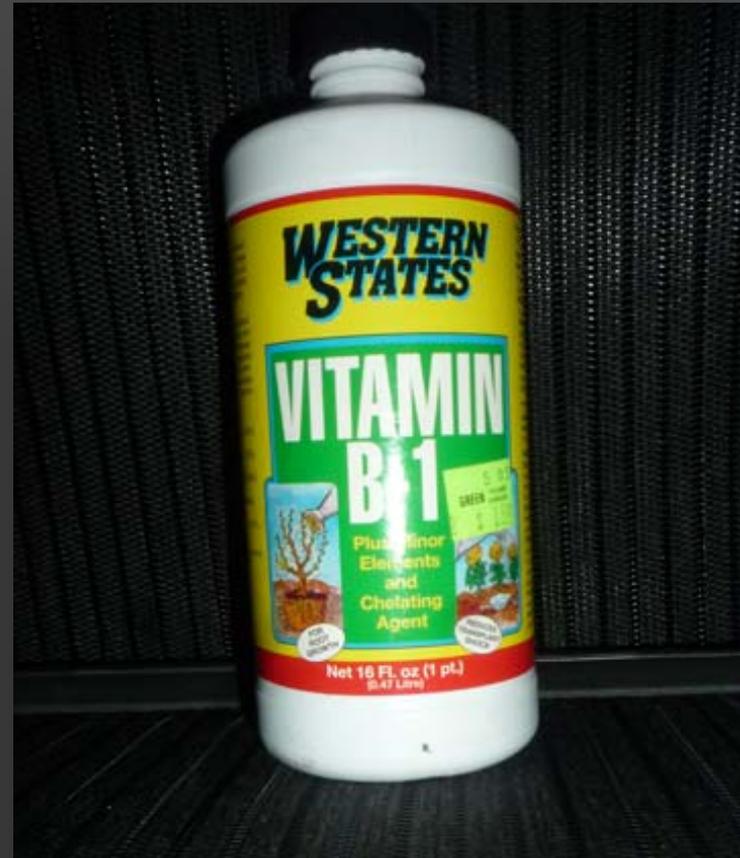


peatmoss amendment

Vitamin B-1

Discovered to be essential to plant growth by Cal Tech Plant Physiologist James Bonner in the early 20th Century

Later Bonner retracted all claims for the product



Product Claims

Claims can be hyperbolic!

Research is often old, not replicated or published

Question: who applies hormones and vitamins to plants in their native habitats?



Bogus products are confounding

- **With five active ingredients + fertilizer...**
 - **How do we know what worked or if anything worked?**
- **Some cocktail products couch their efficacy in the synergy of all the ingredients. If everything is balanced just so....**
- **When external factors unbalance the cocktail then....**
 - **Of course the product will not work, so we need to have an excuse for unsatisfied customers and a way to encourage continued use of the product.**

Fear Factor

- Snake oil products exploit our natural fears of toxic chemicals, heavy metals and pesticides.
 - All natural remedies, non toxic, “organic”
 - When there is no “cure” for a difficult disease snake oil products provide “hope”!
 - Horticultural laetrile!
-

Snake Oil Services

- Snake oil as a concept can also involve selling advice or services
 - Seminars often bolster the proposition
 - Snake oil salesmen can “peddle” anything even advice!
-

Pseudo-Scientific Zealots

- **Most people are fairly ignorant of:**
 - **Soil chemistry**
 - **Soil microbiology**

Therefore.... We can exploit that ignorance to devise products or services that appeal to that which we don't understand yet still intrigues us!

Soil Follies: Mycorrhizae

- Sound science establishes the basic requirement of mycorrhizae for all plants.
 - Poorly growing plants on infertile soils are greatly benefited.
 - Some plants are protected from root rot.
 - By extrapolation Mycorrhizal inoculants will cure diseases, revitalize declining trees and quadruple growth and establishment rates.
-

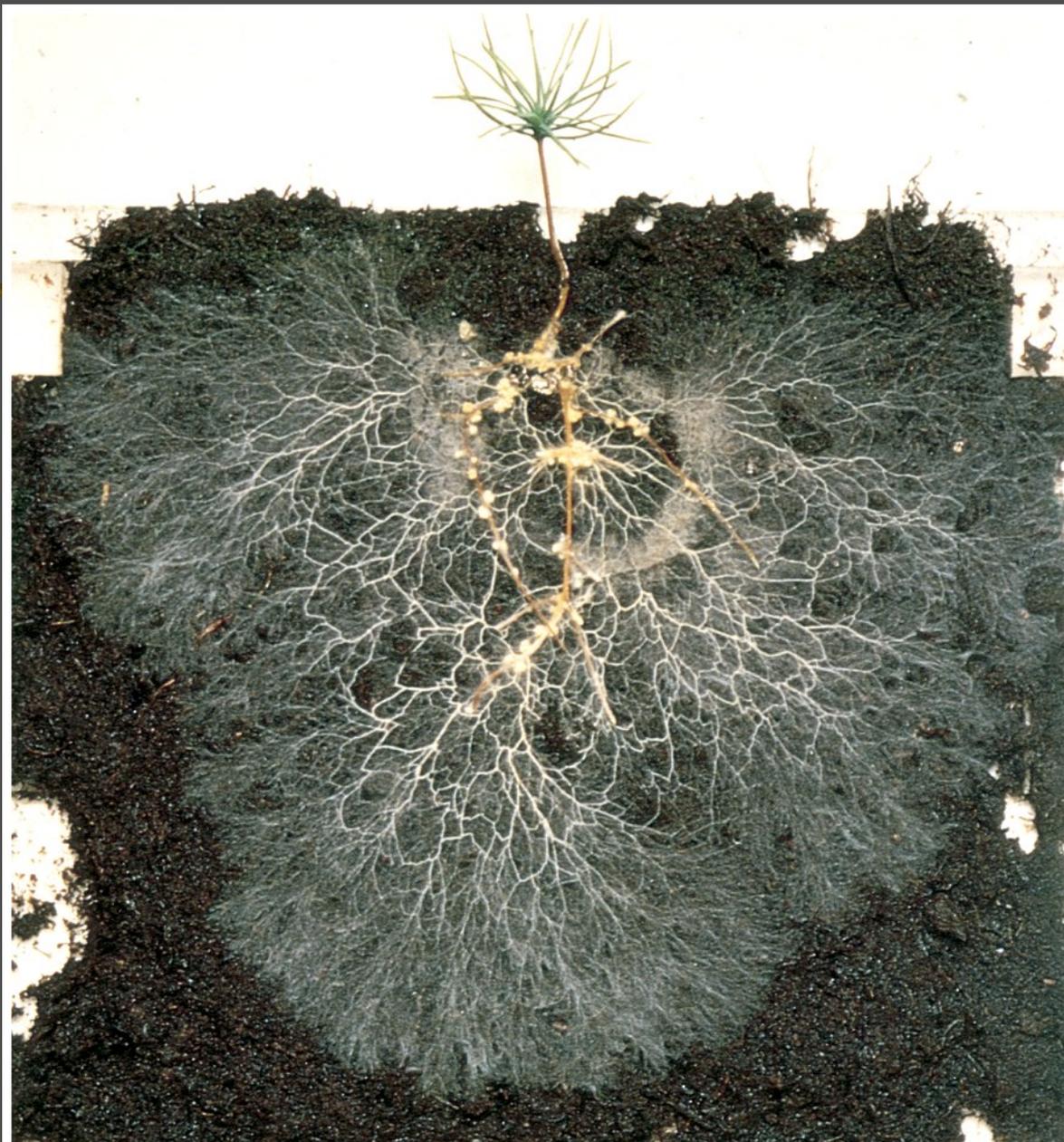
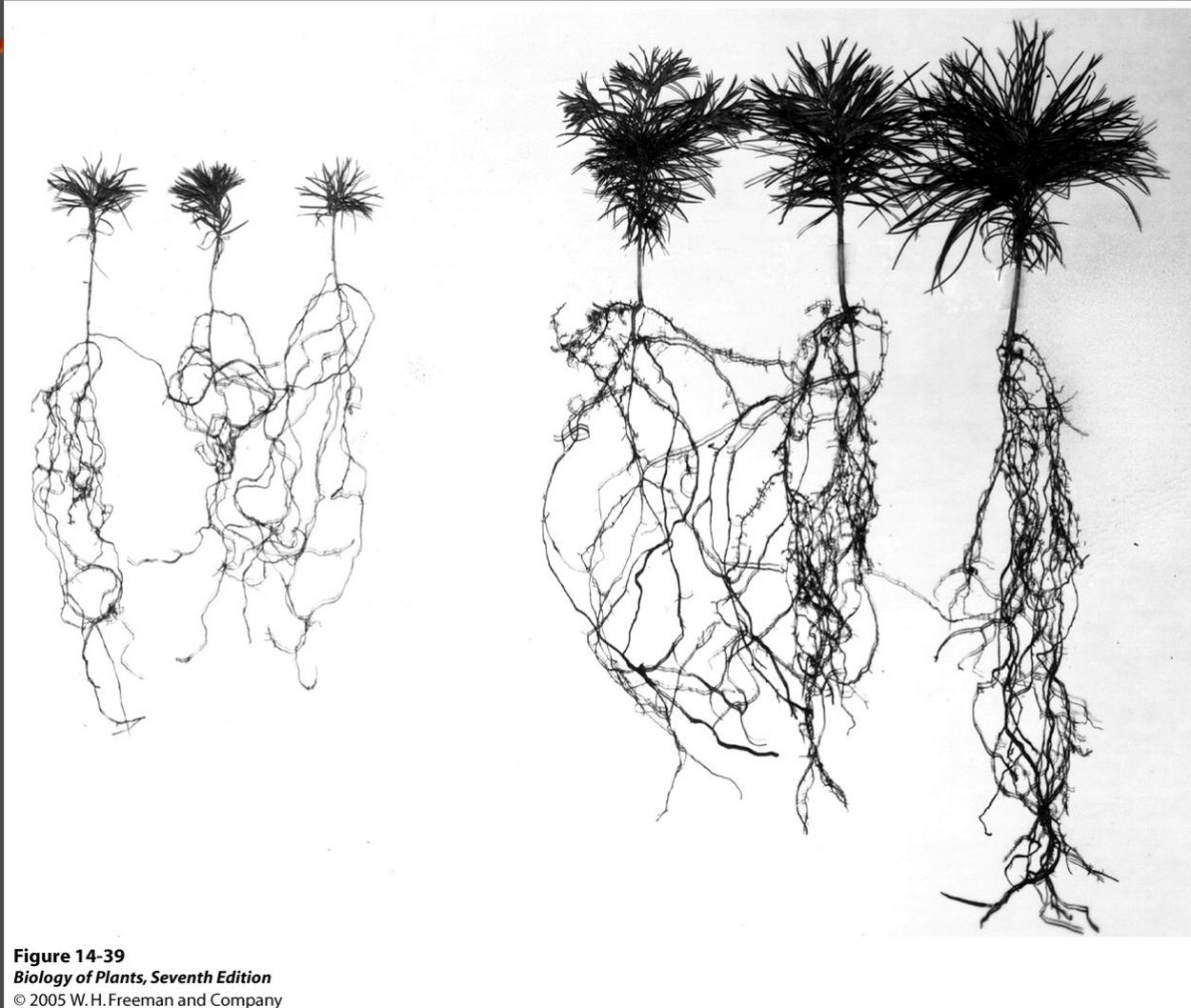


Figure 14-41
Biology of Plants, Seventh Edition
© 2005 W.H. Freeman and Company

Pinus strobus seedlings without (left) and with (right) forest soil inoculation



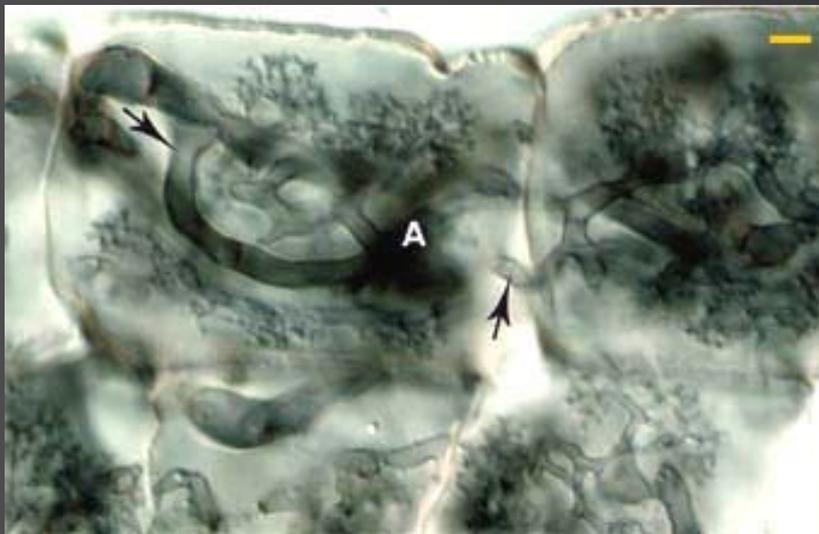
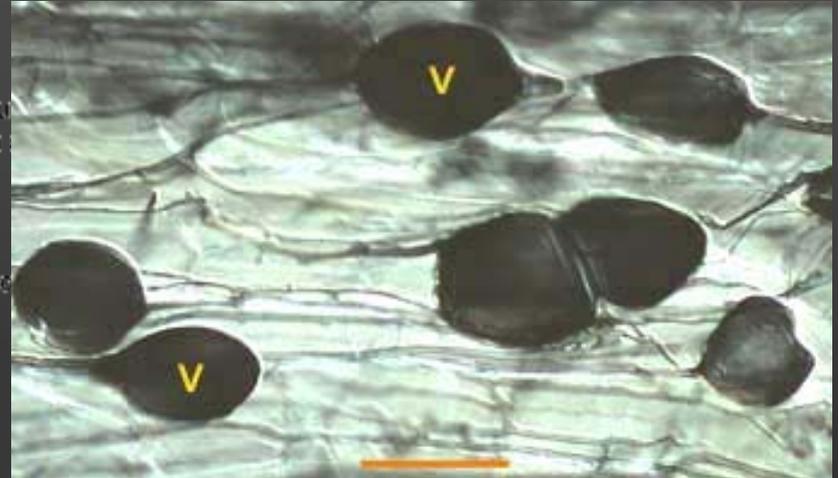
Most Roots are mycorrhizal

- Mycorrhizal roots are stubby and are often prolific
- Some mycorrhizal roots may be swollen or appear to be covered in fungal mycelium.
- Some mycorrhizae increase the branching of roots systems.

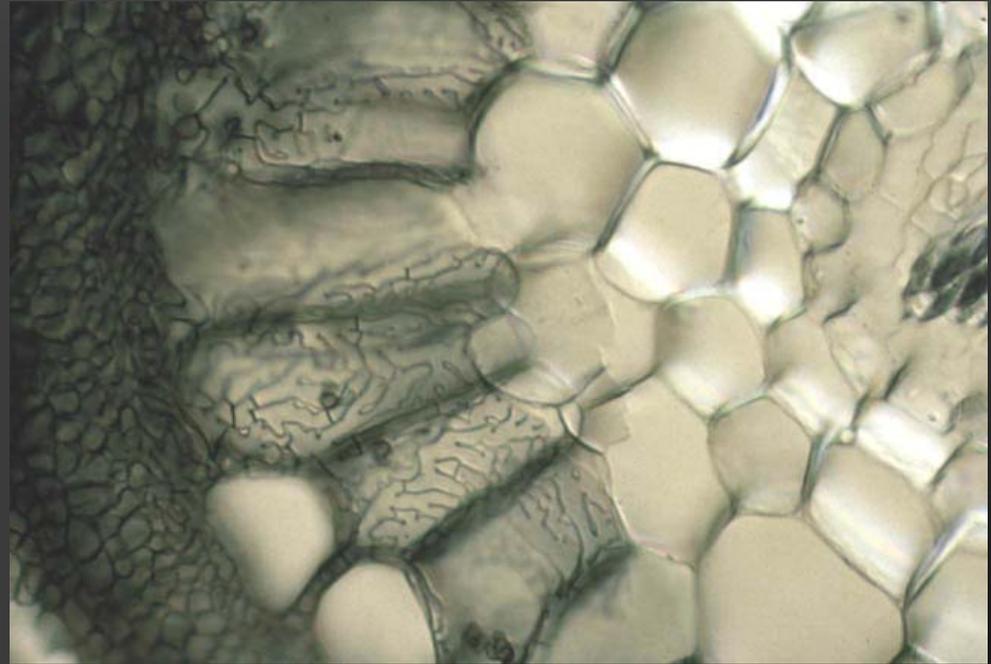


Ginkgo biloba

Endomycorrhizae



□ Ectomycorrhizae □ Surrounded by a fungal mantle the Hartig net



Root morphology

- Is varied depending on the host and its mycorrhizal affiliate
- Nodules, odd branching characters or no distinguishing morphology except a lack of hair roots.



Mycorrhizae play a role in soil aggregation

- Glomalin
- Mycorrhizal colonization of roots leads to aggregated soils
- Soils with greater porosity have lowered risk of root rot

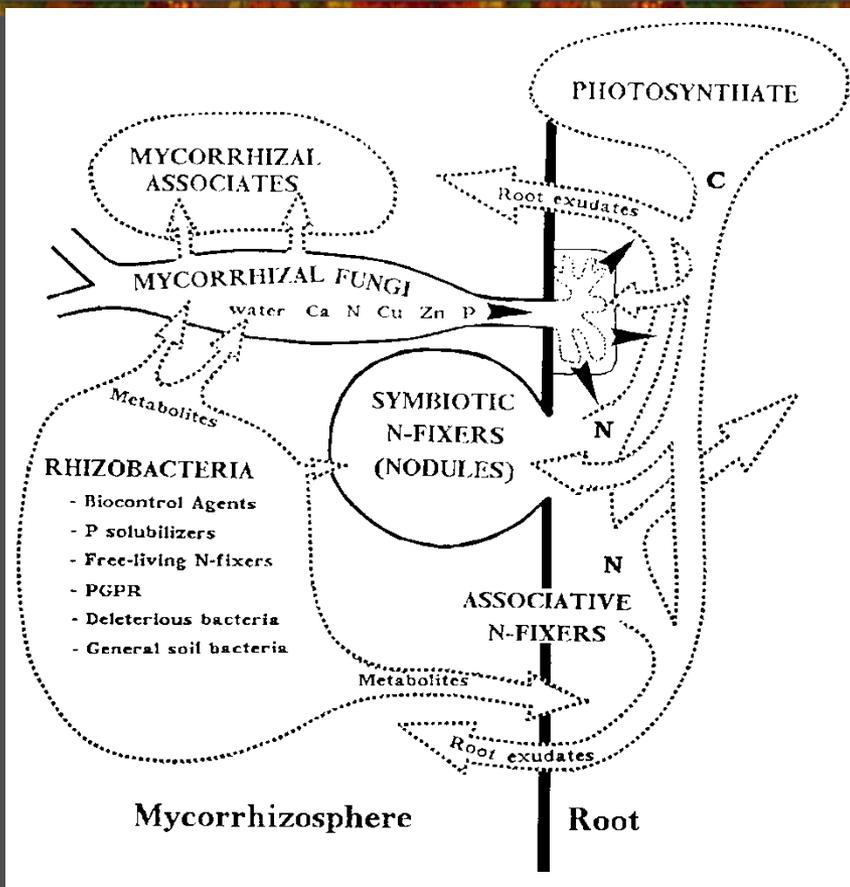


The rhizosphere

- As a concept it varies depending on how you study it.
- From 10 μ m to a few mm from the root
- The biology and chemistry near the root are very different than that of the bulk soil



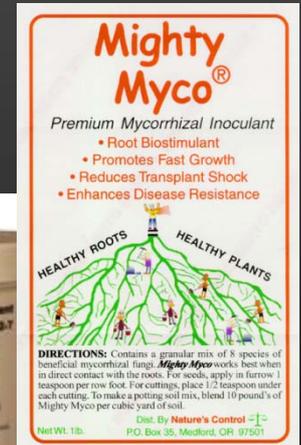
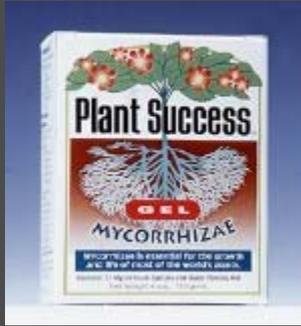
Mycorrhizae play a role in disease control



- Linderman and Paulitz, 1990
- Mycorrhizal hyphae select for bacteria that produce antibiotics that regulate fungal pathogens in the rhizosphere.

About 1/2 of tested products had viable inoculums!

Corkidi, L., Allen, E.B., Merhaut, D., Allen, M.F., Downer, J., Bohn, J. and Evans, M. 2004. Assessing the Infectivity of Commercial Mycorrhizal Inoculants in Plant Nursery Conditions. *J. Environmental Horticulture* 22:149-154.

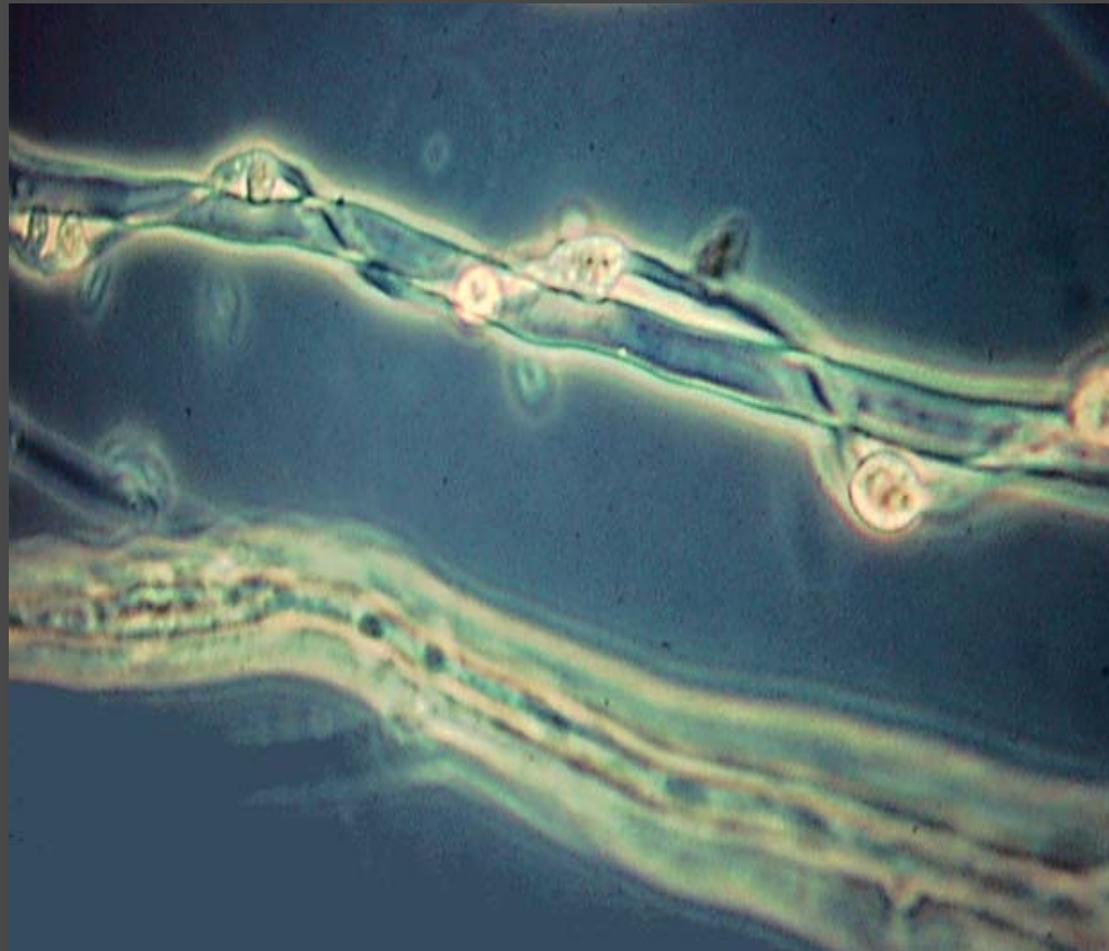


Soil Follies: biological control of plant diseases

- Baker publishes landmark Biological Control text in 1980's
- Many studies show that various fungi will control pathogens in-vitro and in greenhouse studies
- Despite repeated failures in field settings products continue to be marketed to control various diseases in field soils without good field-based research data.
- The fact that many biological control fungi naturally occur where pathogens are worst is ignored.

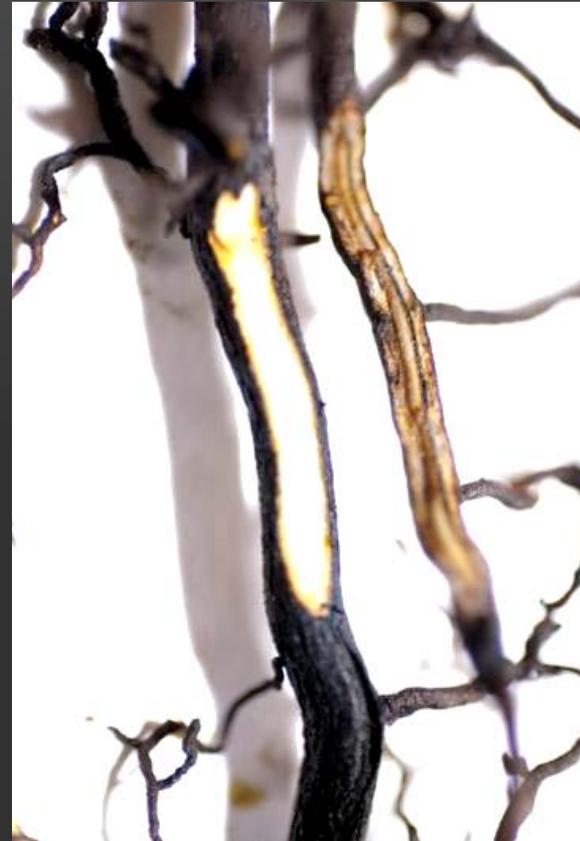
Biocontrol of soil-borne pathogens

- Many mulch fungi are hyperparasites.
- *Trichoderma*, *Gliocladium*, *Pennicillium* etc.



Healthy vs. Not

- (1) Root health is the product of microbial activities in the rhizosphere, and above-ground plant growth is a reflection of the health of the root system
- (2) Root disease is rare in natural ecosystems, due to microbial support systems in the rhizosphere soil associated with roots
 - Bob Linderman, 2005 LDS



Roots

- Roots are often dark or melanized. Melanin is a protective chemical that reduces microbial attack
- Annual emergence of young roots indicates their health
- “Skinning” the root with a pocket knife will assure you that they are not decayed.



Roots of
Prunus spp.

Trichoderma Products



CustomBio bacteria in action!

Custom GP

Biological Soil Amendment

4 Strains of Beneficial Fungi
Designed to help improve soil conditions by increasing the population of beneficial soil microorganisms.

Active ingredient:
Trichoderma Blend 20%

Trichoderma harzianum
Trichoderma viride
Trichoderma koningii
Trichoderma polysporum

Stabilizer-Tartaric Acid-0.2 g 0.4%
Water 79.6%

Shake well then mix the contents of this bottle with enough water to evenly distribute over the treatment area. For best results, use in combination with Custom BS. Crop specific application instructions are available upon request.

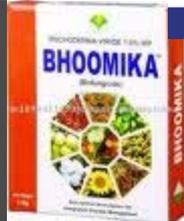
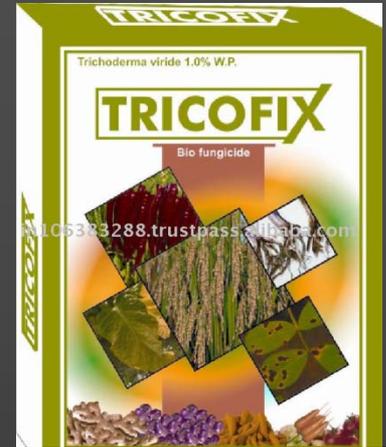
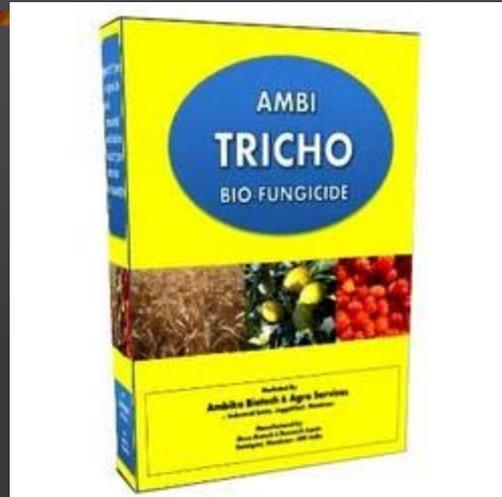
Contents: 50ml • Treats 1 hectare (2.5 acres)

www.custombio.com

Custom Bio Biologics, Inc.
Deerfield Beach, Florida USA

SHAKE WELL BEFORE USE

Increase Plant Growth
Increase Root Mass
Increase Crop Yield



Phosphorus Acid Follies

- Phosphorous acid is the active breakdown product of Aliette fungicide.
- Phosphorous acid does not supply phosphorus to the plant as a fertilizer (Adaskaveg et.al. Plant Disease).

COMPOSICIÓN QUÍMICA p/p
ACIDO FOSFÓRICO DISPONIBLE.....40%

PRECAUCIÓN
NO ALMACENE EN CASAS DE HABITACIÓN.
MANTÉNGASE FUERA DEL ALCANCE DE LOS NIÑOS.
ANIMALES DOMÉSTICOS Y ALIMENTOS.

CONTENIDO NETO
1 litro 3,785 litros
20 litros 100 litros

RECOMENDACIONES GENERALES
Nutri Phite® P Soil es una solución nutritiva concentrada que contiene en forma altamente soluble el fósforo necesario para el crecimiento de la planta y el desarrollo de la cosecha, mejorando su calidad y aumentando la producción. El producto se puede aplicar solo o en mezcla con otros elementos nutricionales o pesticidas.
Nutri Phite® P Soil está formulado para aplicarse al suelo con diferentes equipos o mediante sistemas de riego.

Usos y Aplicación
Hortalizas, vegetales, granos: Tomate, papa, chile, cebolla, melón, fresa, frijol, arroz y otros. Aplicar de 2 a 4 lts/ha dependiendo del cultivo y su estado de desarrollo. Las aplicaciones deben iniciar 8 días después del trasplante o cuando la planta emita la segunda hoja, y realizarse a intervalos de 10 a 15 días.

COMPATIBILIDAD Y FITOXICIDAD
Nutri Phite® P Soil es compatible con la mayoría de los nutrientes y pesticidas en el mercado, sin embargo el usuario asume toda la responsabilidad de asegurarse la compatibilidad de cualquier mezcla utilizada, ya que se puede reaccionar y alterar la mezcla. Se recomienda realizar una prueba de compatibilidad previo a la mezcla en el tanque. También se recomienda una prueba de fitotoxicidad, aplicando una pequeña área con la solución previo a la aplicación general.

PRECAUCIONES DE USO
No tocar el producto en forma concentrada, guardar en su envase original bien cerrado. Evitar el contacto con la piel y los ojos. En caso de contacto con la piel, lavar con abundante agua y jabón. En caso de contacto con los ojos, lavar con abundante agua y llevar al médico. En caso de ingestión, llevar al médico rápidamente. Lávese muy bien después de aplicar el producto.

NOTA IMPORTANTE
El fabricante garantiza la composición y calidad de este producto de acuerdo con la descripción química del mismo. El producto es efectivo para los propósitos expuestos en esta etiqueta, bajo las instrucciones mencionadas y en condiciones normales. Sin embargo esto no garantiza la efectividad de ningún propósito particular expresado o implicado. El comprador asume el riesgo de su uso.
Reg. del MAG 3423
Lote

BIAGRO WESTERN
Fabricantes:
BIAGRO WESTERN SALES, INC.
26401 Road 132
Visalia, CA 93200, Estados Unidos
Teléfono: 559-654-9184
Fax: 559-625-9255

Reportador y Distribuidor:
REPRESENTACIONES Y SUMINISTROS AGRICOLAS S.A. RESUSA
Del pueblo Antipalan, Puntarenas del Castillo, 2.8 km. al norte,
carretera a Cartago, Cartago, Costa Rica
Tel.: 279-6878 • Fax: 279-6880

RESUSA
NUTRI PHITE
P-SOIL
0-40-0
FERTILIZANTE EDAPICO

Flores y ornamentales: Helecho hoja de cuero, ornamentales de follaje, flores de corta, flores tropicales. Aplicar de 2 a 5 lts/ha dependiendo del cultivo y su estado de desarrollo. Las aplicaciones deben iniciar 8 días después del trasplante.
Frutales: Banano, piña, café, aguacate, cítricos y otros. Aplicar de 2 a 5 lts/ha dependiendo del cultivo y su estado de desarrollo. Realizar las aplicaciones en intervalos mensuales. Las aplicaciones en prefloración, desarrollo del fruto y 2 a 4 semanas previo a la cosecha son muy efectivas.

Phos. Acids

- Phosphorus acids have become popular “fertilizers” for control of root rot in many cropping and ornamental plant growing areas
 - Are they all alike?
 - How do they compare to Aliette for root rot control?
-

P. Cinnamomi control with phosphorus acids

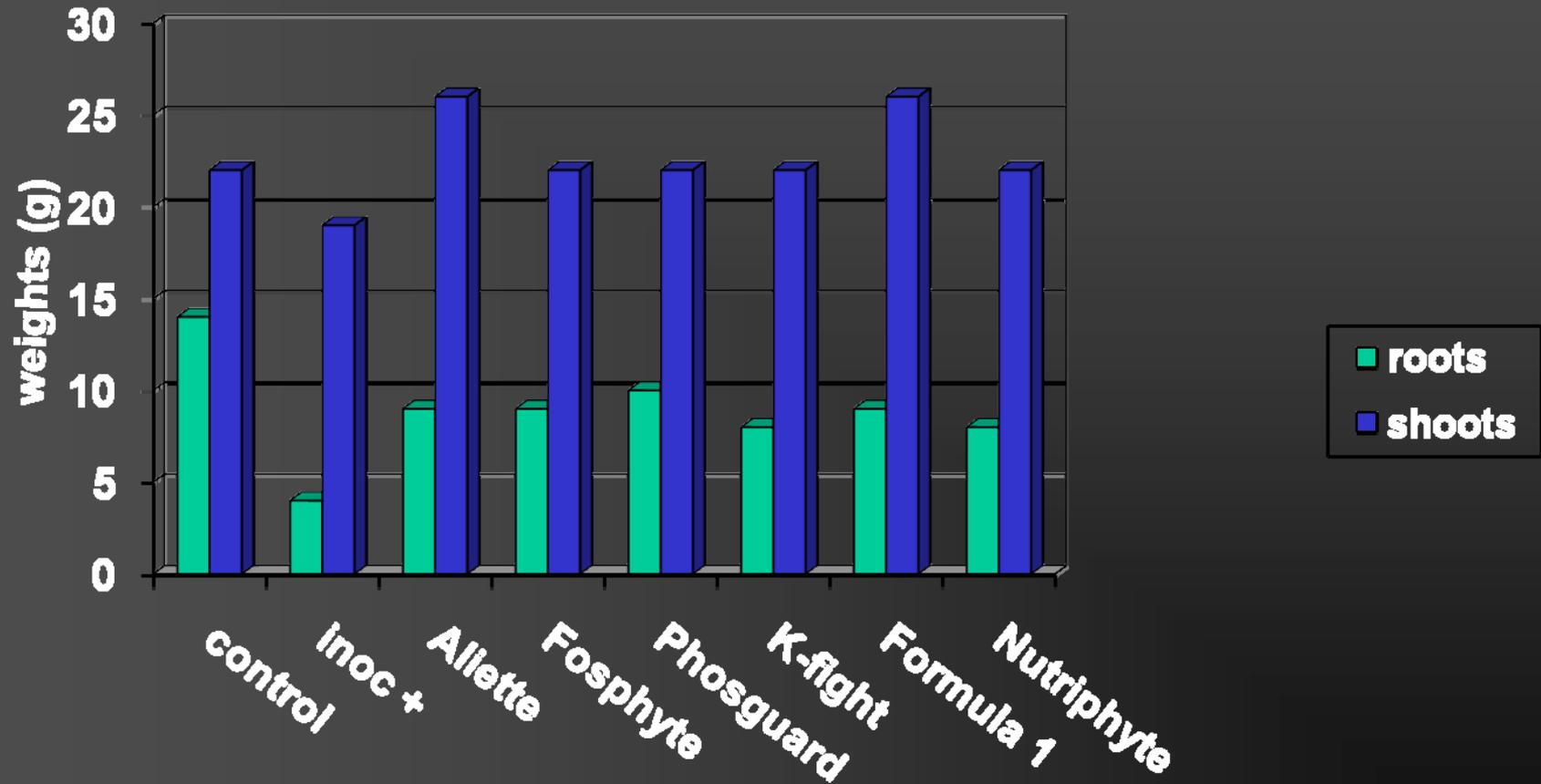


Uninoculated control

Inoculated control

Fosfite™ drench

Effect of various phosphorus acids on root rot control.



Soil Follies: Soil Food Webs

- Soil ecology takes center stage as the next microbiological fad.
 - Balancing of fungi and bacteria in soils is said to assist in crop management.
 - Again sound science underpins the ecology
 - The extrapolations to plant benefits are all suppositional.
 - Research is not published that establishes the basic concept but consulting services are sold aggressively by progenitors of the concept and of the basic lab work necessary to generate services!
-

Food webs are a complicated set of relationships between thousands of organisms

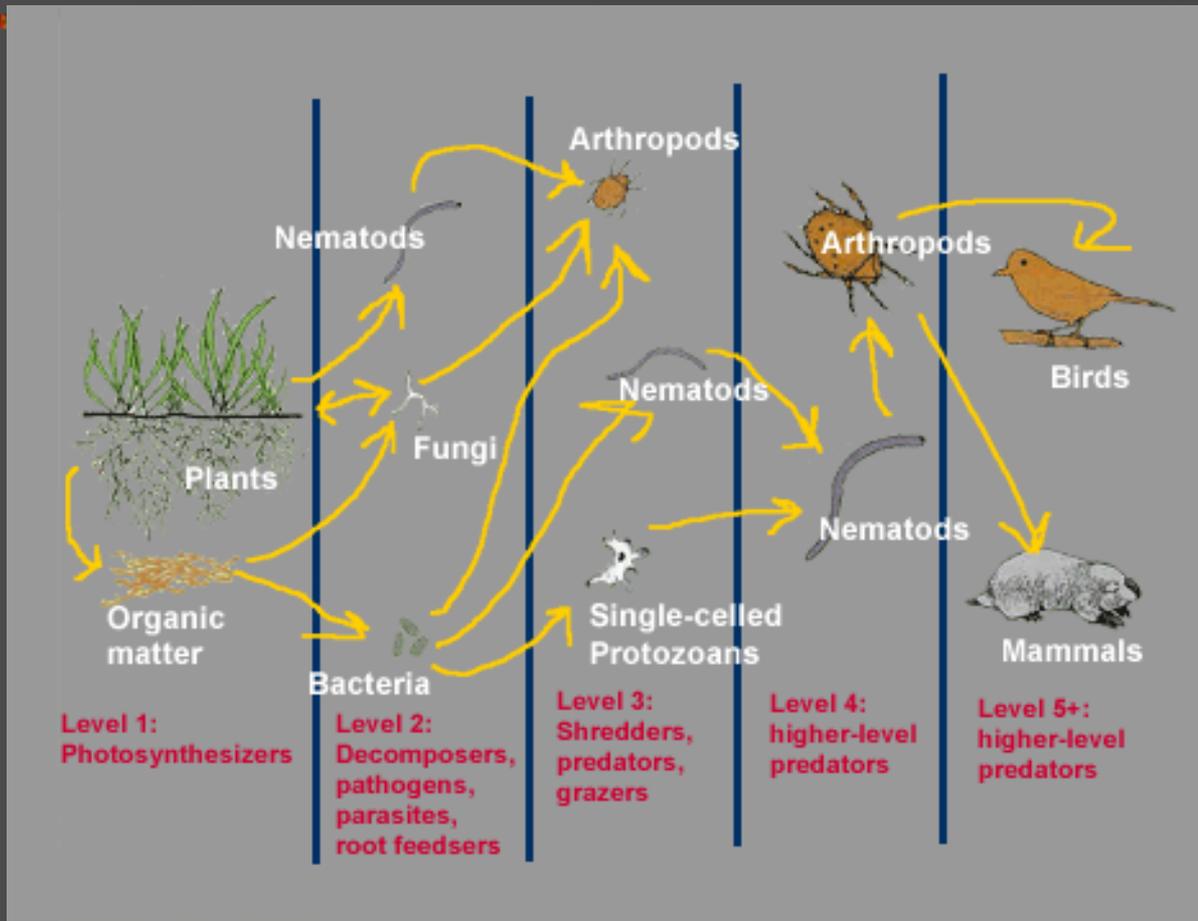


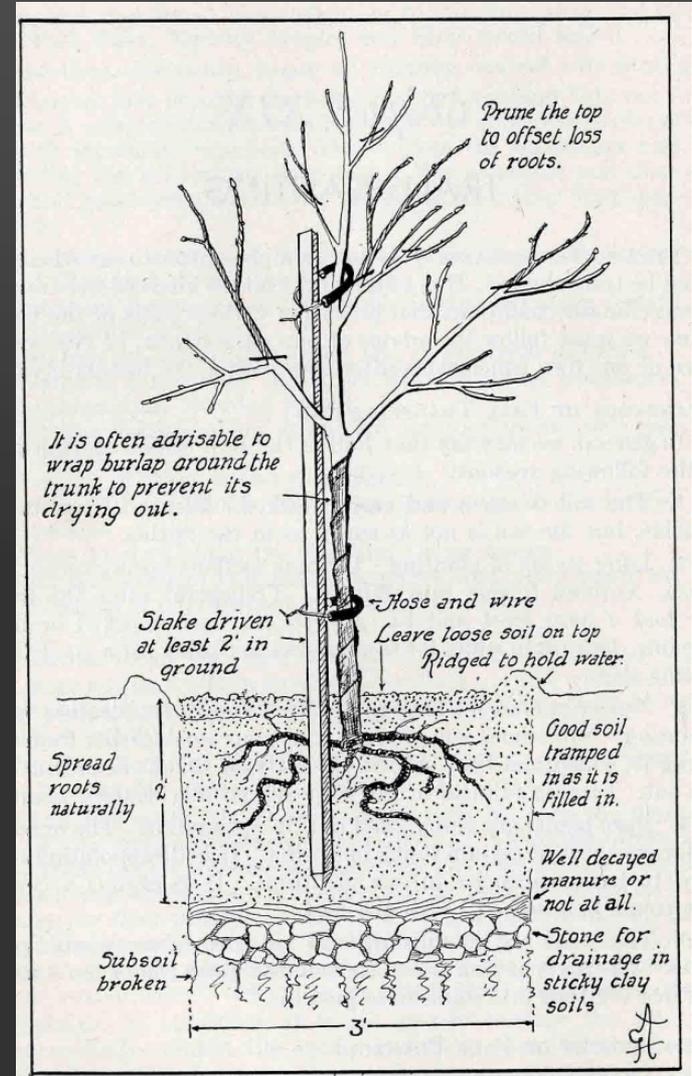
Image from Washington State U.

Soil Food Web cont.

- Plant disease control promised without an understanding of the basic tenets of plant pathology.
 - **Emphasis is placed on microbial communities but not on inoculum concentration/density**
 - **Broad generalizations are made about control of pathogens without regard to the biology of the pathogen involved.**
-

Horticultural Urban Legends debunked

- Rocks in the bottom of a planting hole will not make drainage.
- A tree tightly staked will not make a strong trunk



Roots and Root systems

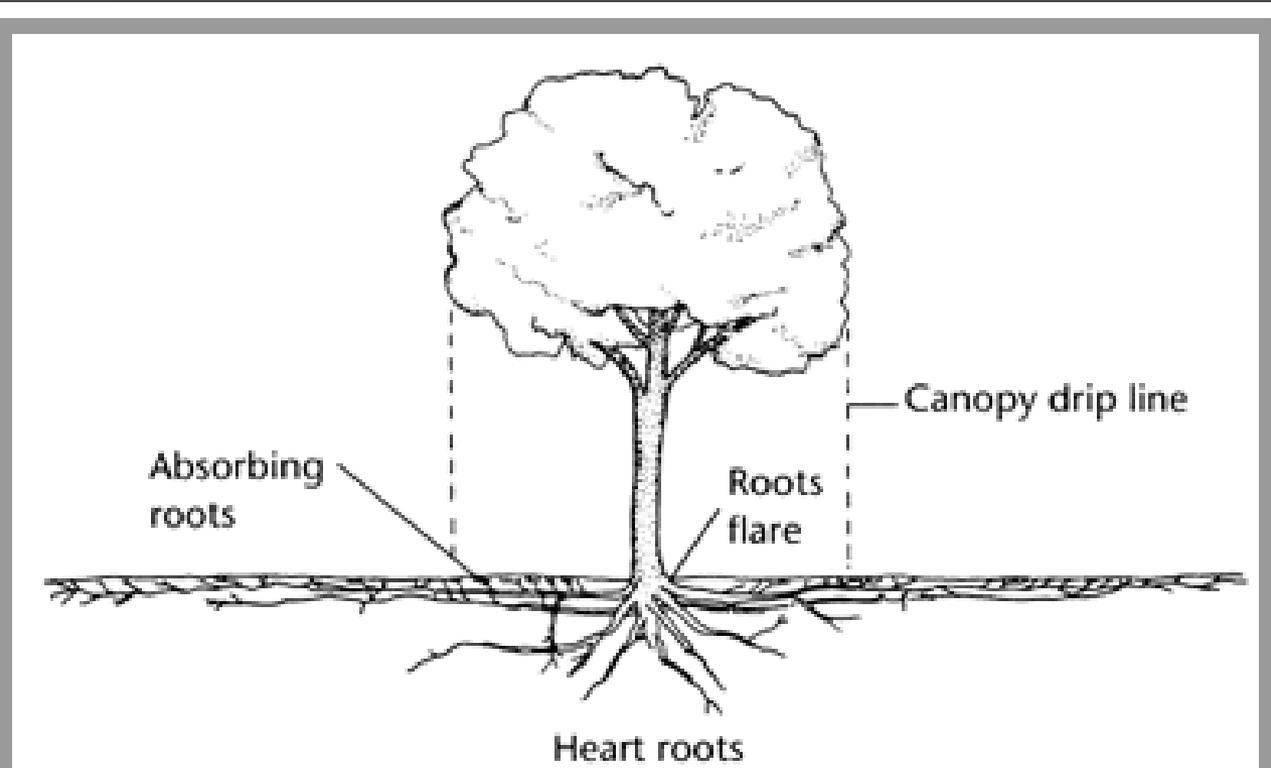


Figure 3. Tree roots are relatively shallow but grow two to three times as far as the branches.

Horticultural Urban Legends debunked

- Nursery stakes are not an integral part of the early life of newly planted trees.
- Nor will they support life if you cut the stem out and create an air gap!



Horticultural Urban Legends debunked

- PVC tubes in a U shape do not let tree roots have more oxygen.
- Nor do they place water where the tree needs it.



Once trees outgrow the tubes
then what?



Horticultural Urban Legends debunked

- **Surface applied mulches do not suck the nitrogen from underlying soils.**
 - **Fertilizers are not required for most landscape trees, shrubs or herbaceous plants.**
-

Horticultural Urban Legends debunked

- Surface applied mulches do not suck the nitrogen from underlying soils.
- Freshly chipped trees as mulches will add nutrients in proportion to their depth of application



Horticultural Urban Legends debunked

- Nutrient balancing does not cure diseases
- Incidence of “heavy metals” does not cause widespread disease in landscape ornamental plants.
- Copper toxicity is not rampant
- Zinc Toxicity is not rampant



Root Barriers—Don't!

- Over the long term, root barriers provide little help preventing the incidence of invading surface roots.
- They can predispose trees to failure.



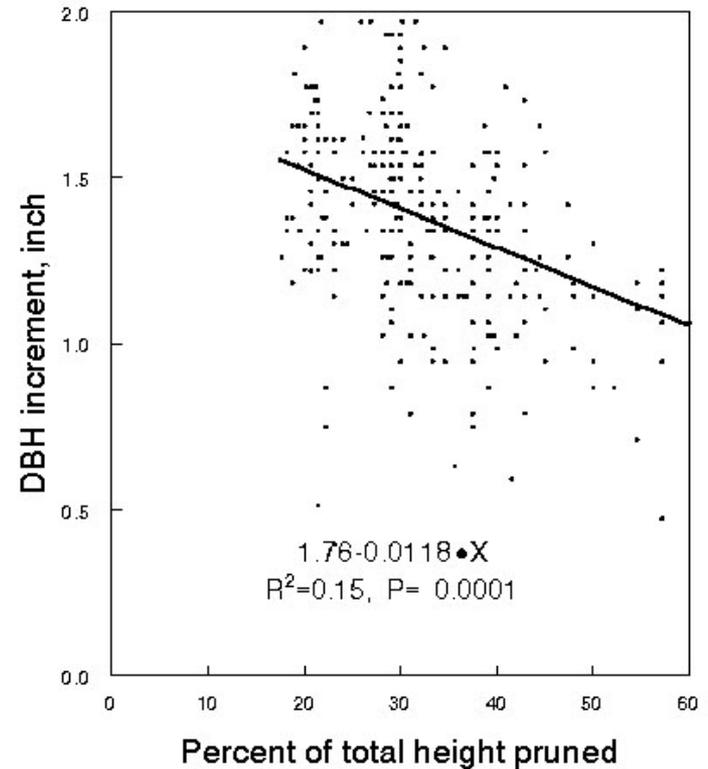
Other Tree Myths

- There is little or no evidence that microbial products will cure the decline of geriatric shade trees!
- To avoid decay in trees, prune more frequently but make smaller cuts
- A cut on one tree is the same as on another it just depends on how it is made!



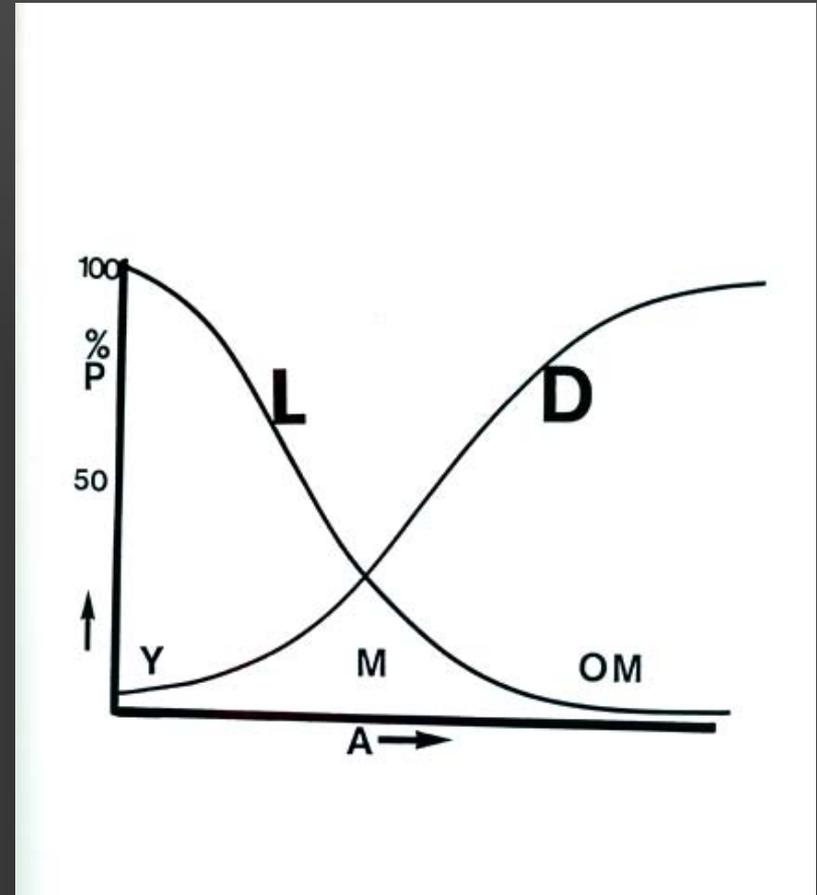
Horticultural Urban Legends debunked

- Pruning trees does not make them grow more!
- Pruning is a growth inhibiting process
- It is also a bud invigorating process so all kinds of growth can appear after a severe pruning event.
- Transplanted trees do not need compensatory pruning



How much to prune?

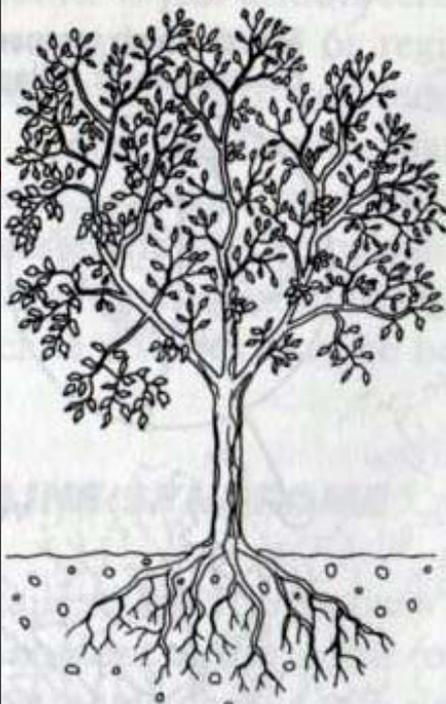
- Pruning removes photosynthetic machinery necessary for carbohydrate production
- Old trees should have very few “green” branches removed



From Alex Shigo: A New Tree Biology

From
Manion,
Tree
Disease
Concepts
1991

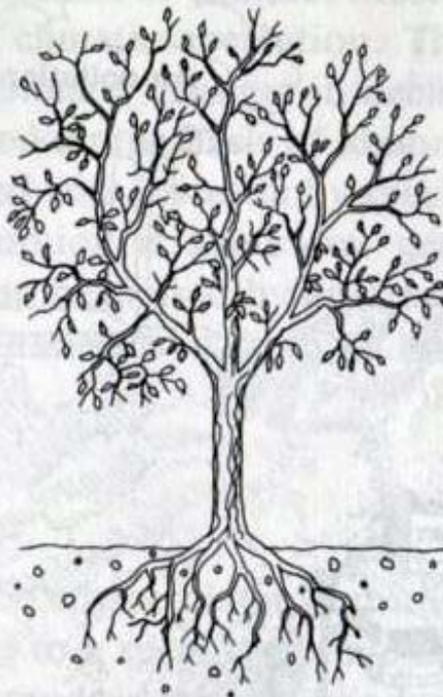
PREDISPOSING



Long-term factors:

Genetic potential
Age
Viruses
(interacting with)
Climate
Soil factors
Air pollution

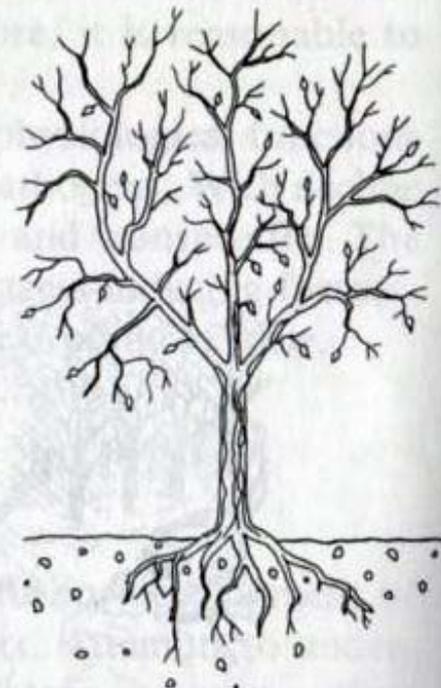
INCITING



Short-term factors:

Insect defoliation
Frost
Drought
Salt
Air pollutants
Mechanical injury

CONTRIBUTING



Long-term factors:

Bark beetles
Canker fungi
Root-decay fungi

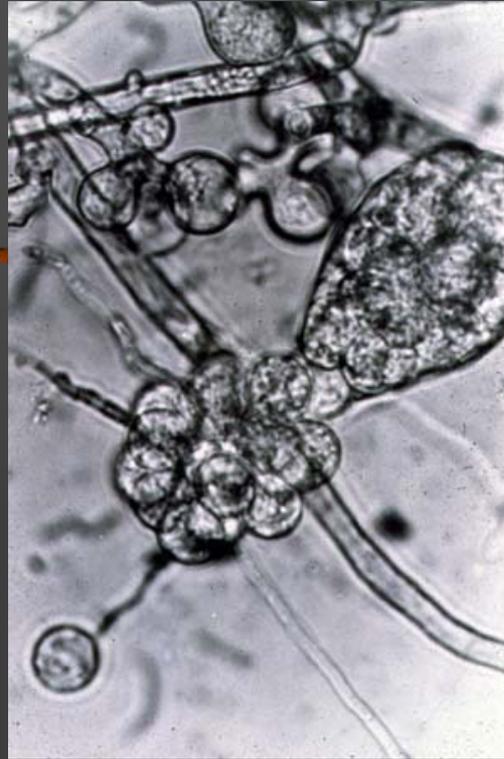
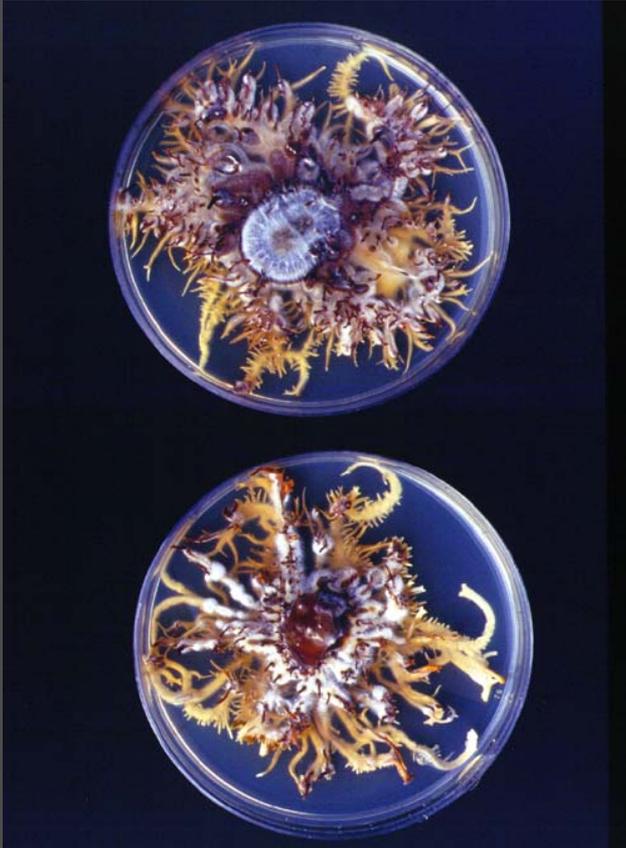
Some Plant Pathology Myths

- Over watering does not cause disease
- A healthy plant is not “immune” to attack from a virulent pathogen
- Diseases are easily cured with the right control method
- Fungicide resistance is not as prevalent as insecticide resistance
- Diseases are easy to spot and see!

Symptoms

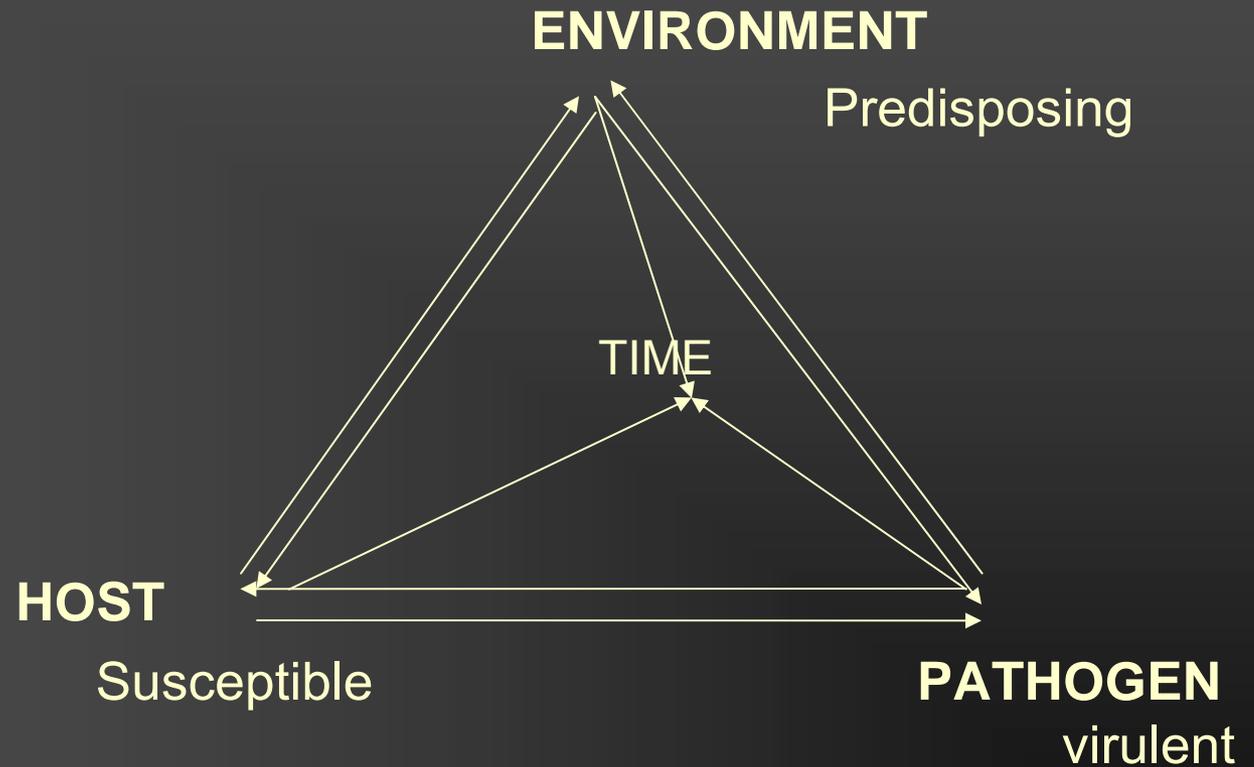


Disease Signs



Disease

- Biotic
- Abiotic



Earth transport + compaction



Flooding is deadly if *Phytophthora* is present in the soil



Root Collar inspections are necessary for trees (always)



Conclusion

- **Products come and go based on their need in the marketplace and their effectiveness.**
 - **Marketing can sustain a poor product or let a good one languish**
 - **Published, peer-reviewed, independent third party research that establishes efficacy is usually available for effective products.**
 - **There is much voodoo in horticulture avoid practices that are not supported by research.**
-