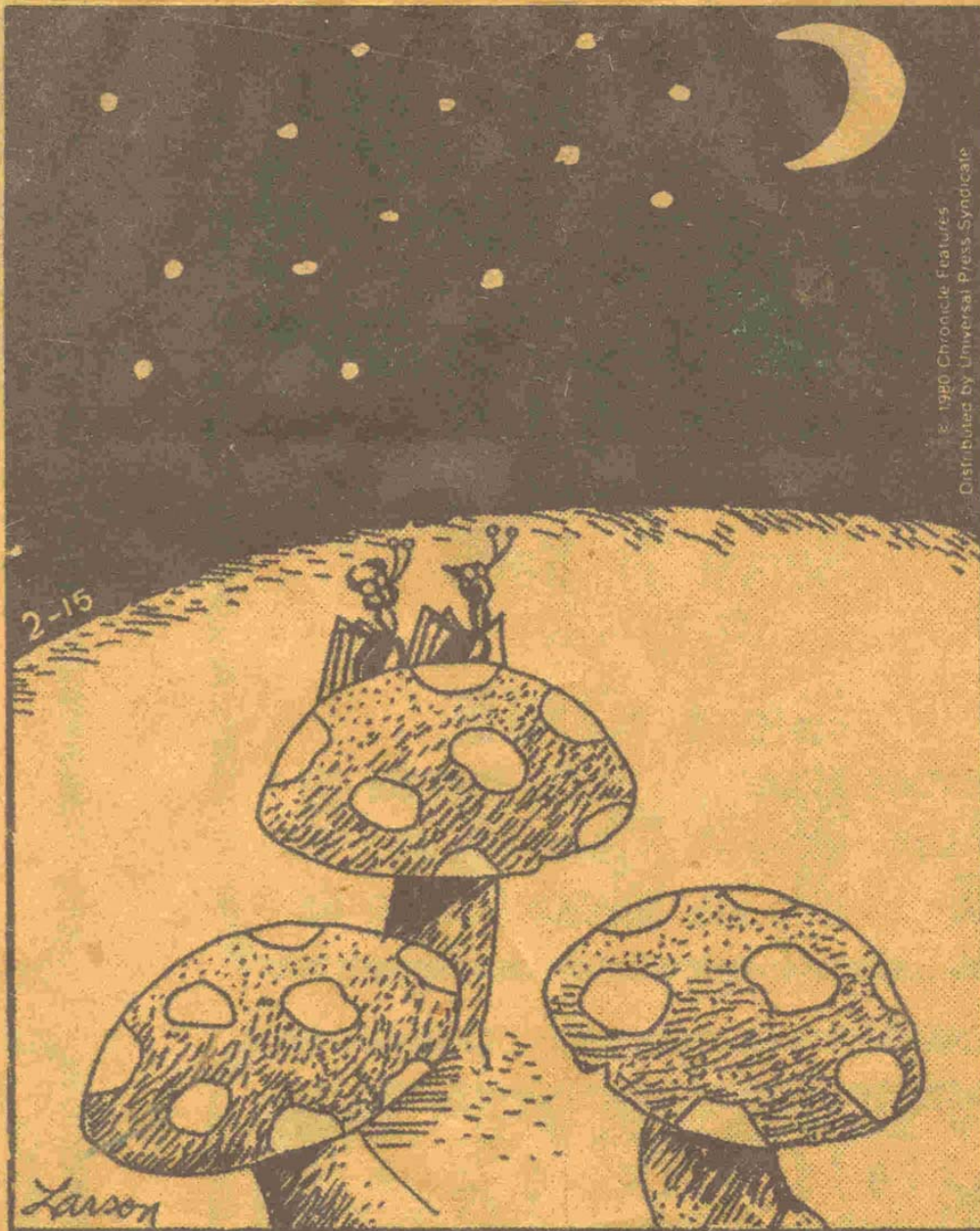


# Nursery Diseases

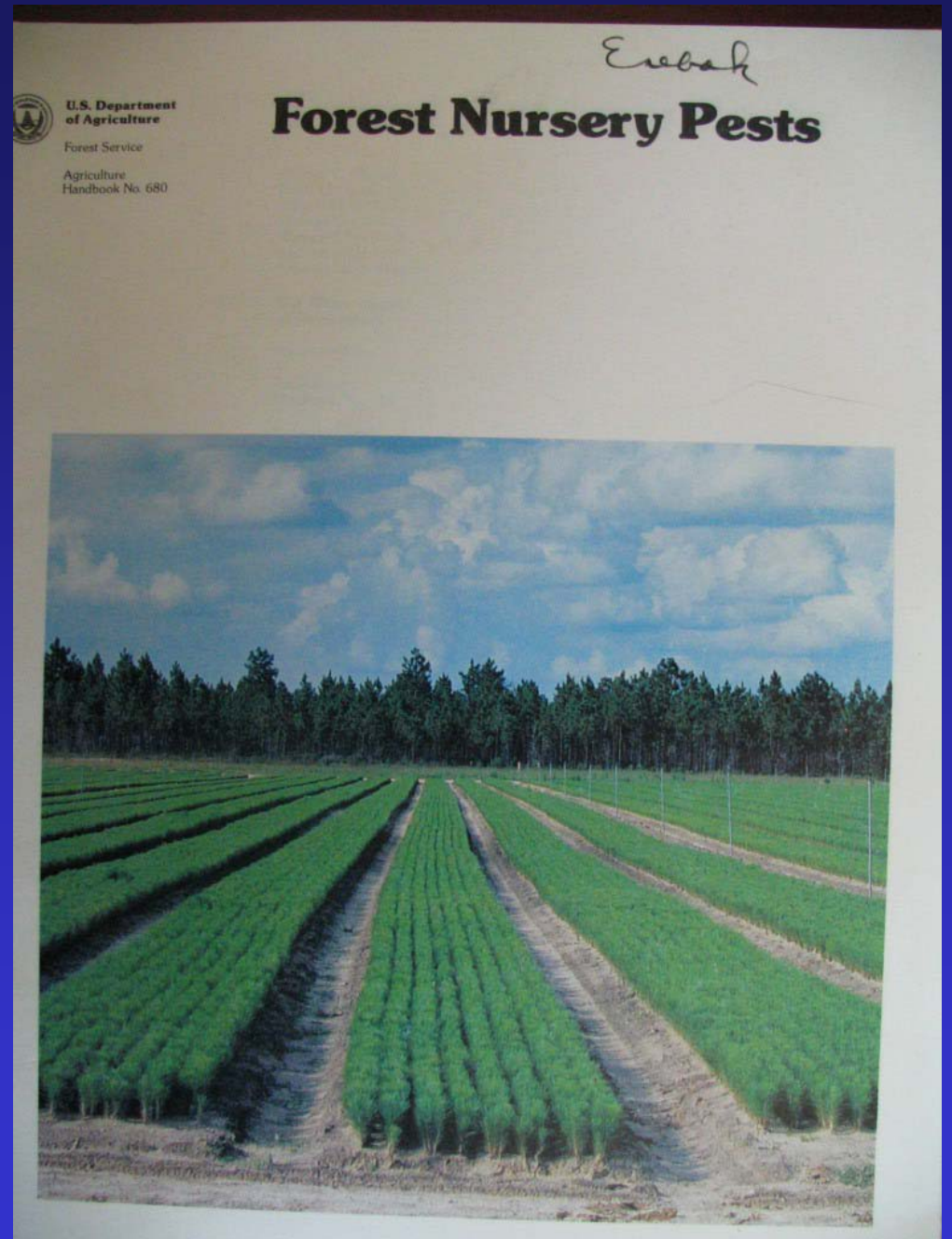


"Just look at those stars tonight ... makes you feel sort of small and insignificant."

# Reference

## Forest Nursery Pests

USDA Forest  
Service Ag  
Handbook 680



# Plant Pathology

- **Pathogen:**
  - **Obligate**
  - **Facultative:**
- **Parasite:**
  - **Obligate parasite:**
- **Saprophyte:**
  - **Facultative parasite:**
- **Symbiosis:**
  - **Obligate saprophyte:**
  - **Facultative saprophytes**

# **DISEASE = IMPAIRED PHYSIOLOGY**

- **Signs and Symptoms of Disease**
  - **Signs**
  - **Symptoms**



# Symptoms of Disease

– Necrosis

– Decay

– Cankers

– Leaf spots

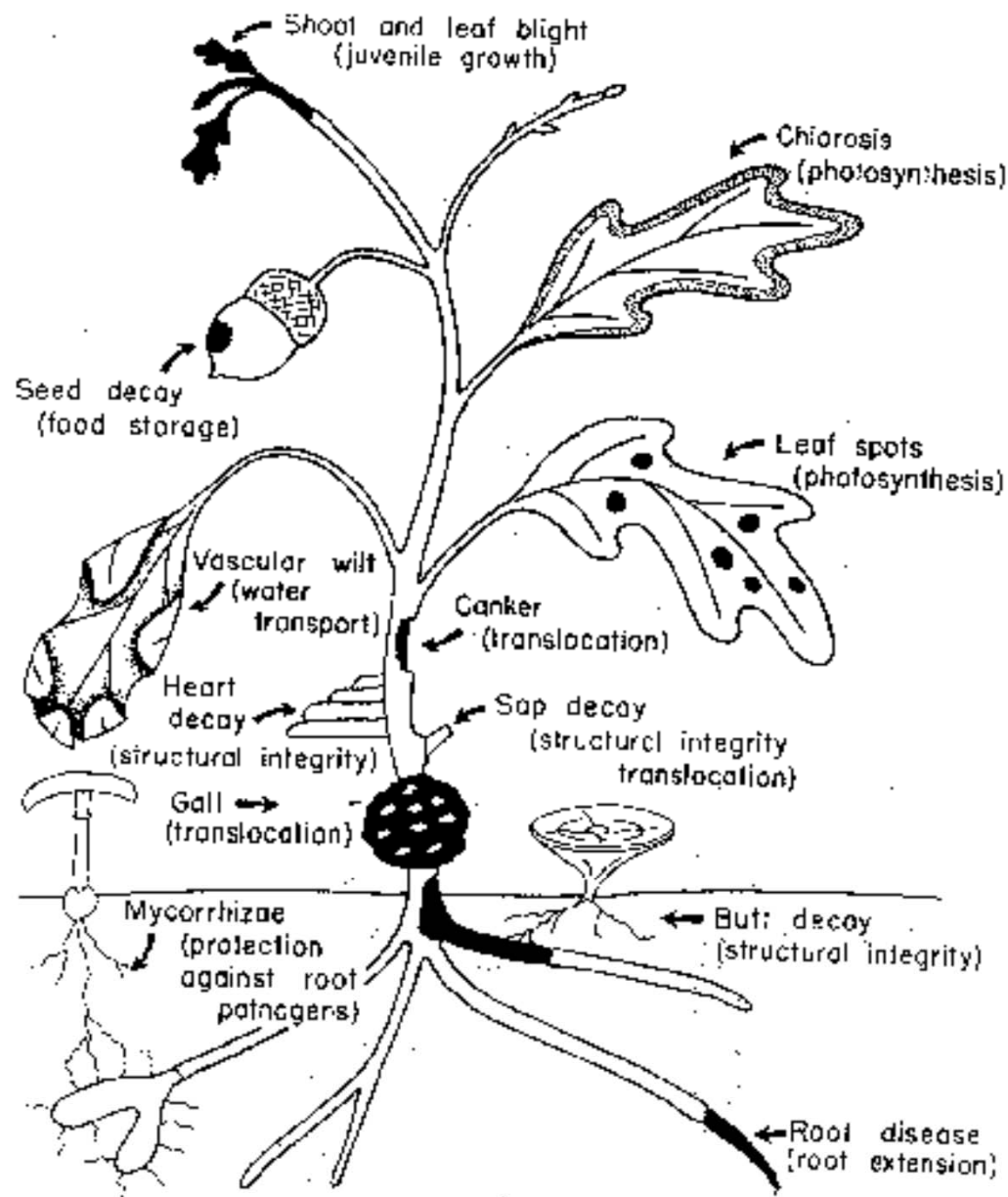
- Wilts

- Blights

- Hypertrophy

- Atrophy

- Physiology



**FIGURE 2.3** Schematic representation of the effects of diseases on tree health, showing the vital functions of a tree and their impairment by various types of pathogenic influences.

# Principals of Disease Prevention

- **Exclusion**                      **distribution**
- **Eradication**                **survival**
- **Protection**                 **barrier**
- **Resistance**                **compatibility**

# Agents of Plant Disease in Forest Tree Nurseries

- Fungi are the big Number 1
- Nematodes; once major now minor. In the future without MBr? They predispose seedlings to fungi.
- Bacteria are minor in nurseries.
- Viruses are even less. More so in seed propagated plants.



# Fungi

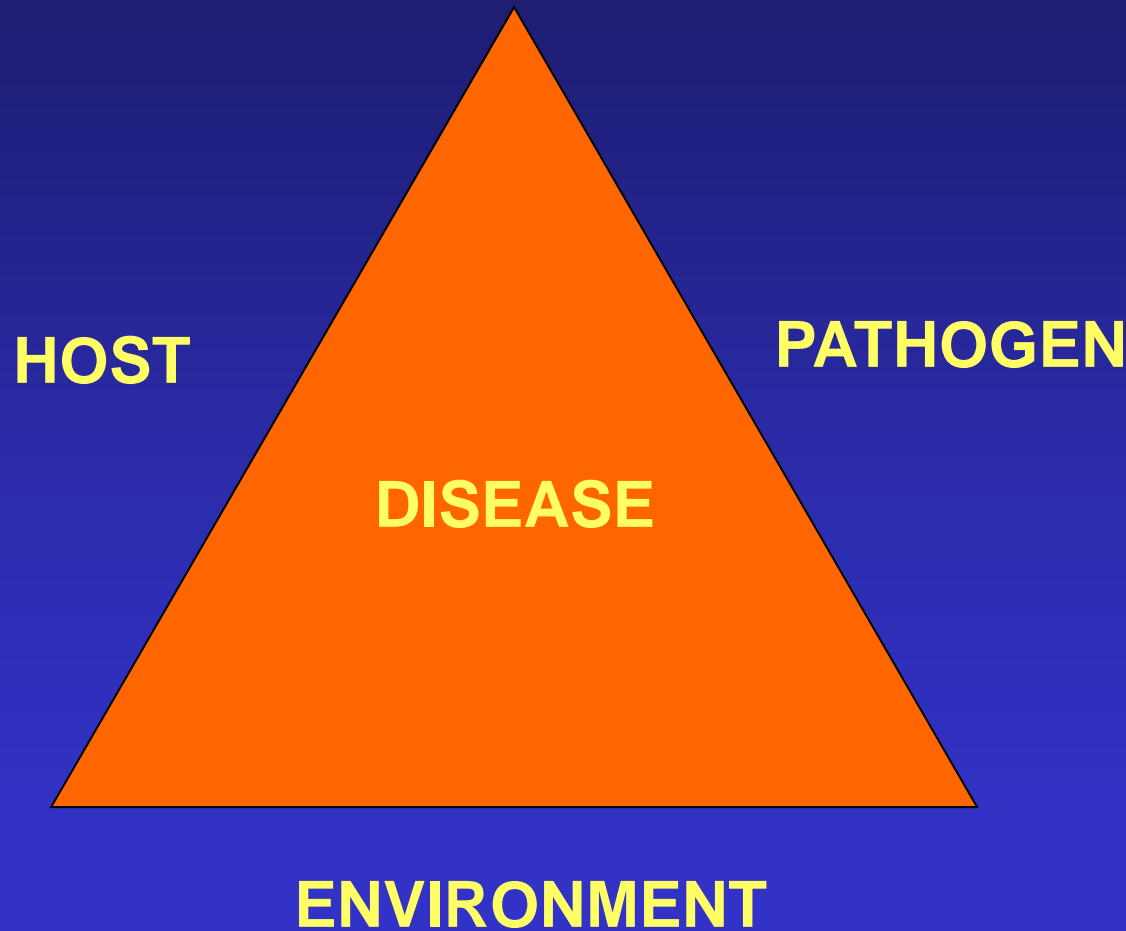
- Eukaroytic organisms
- Non-chlorophyll
- Vegetative growth is through mycelium  
Singular = mycelia
- Single thread = Hypha  
plural = Hyphae
- Propagate via spores

# KOCH'S RULES OF PROOF

## Proof of Pathogenicity

1. The pathogen must be associated with the disease in all the symptomatic plants examined.
2. The pathogen must be isolated and grown in pure culture on nutrient media and its characteristics described.
3. The pathogen in pure culture must be inoculated into healthy plants of the same species and produce the same symptoms in the diseased plants in No. 1
4. The pathogen must be re-isolated from inoculated plants and grown in pure culture again and its characteristics must be like those described in No. 2

# THE DISEASE TRIANGLE



# THE DISEASE TRIANGLE

**HOST**  
**(Immune)**

**PATHOGEN**

**DISEASE**

**ENVIRONMENT**





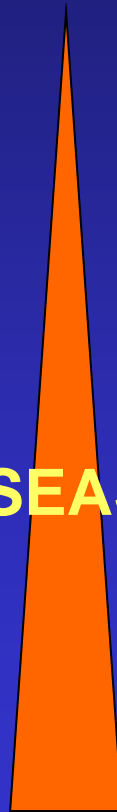
# THE DISEASE TRIANGLE FOR A PATHOGEN LIKE A RUST

HOST  
Resistance

PATHOGEN  
Fungicides

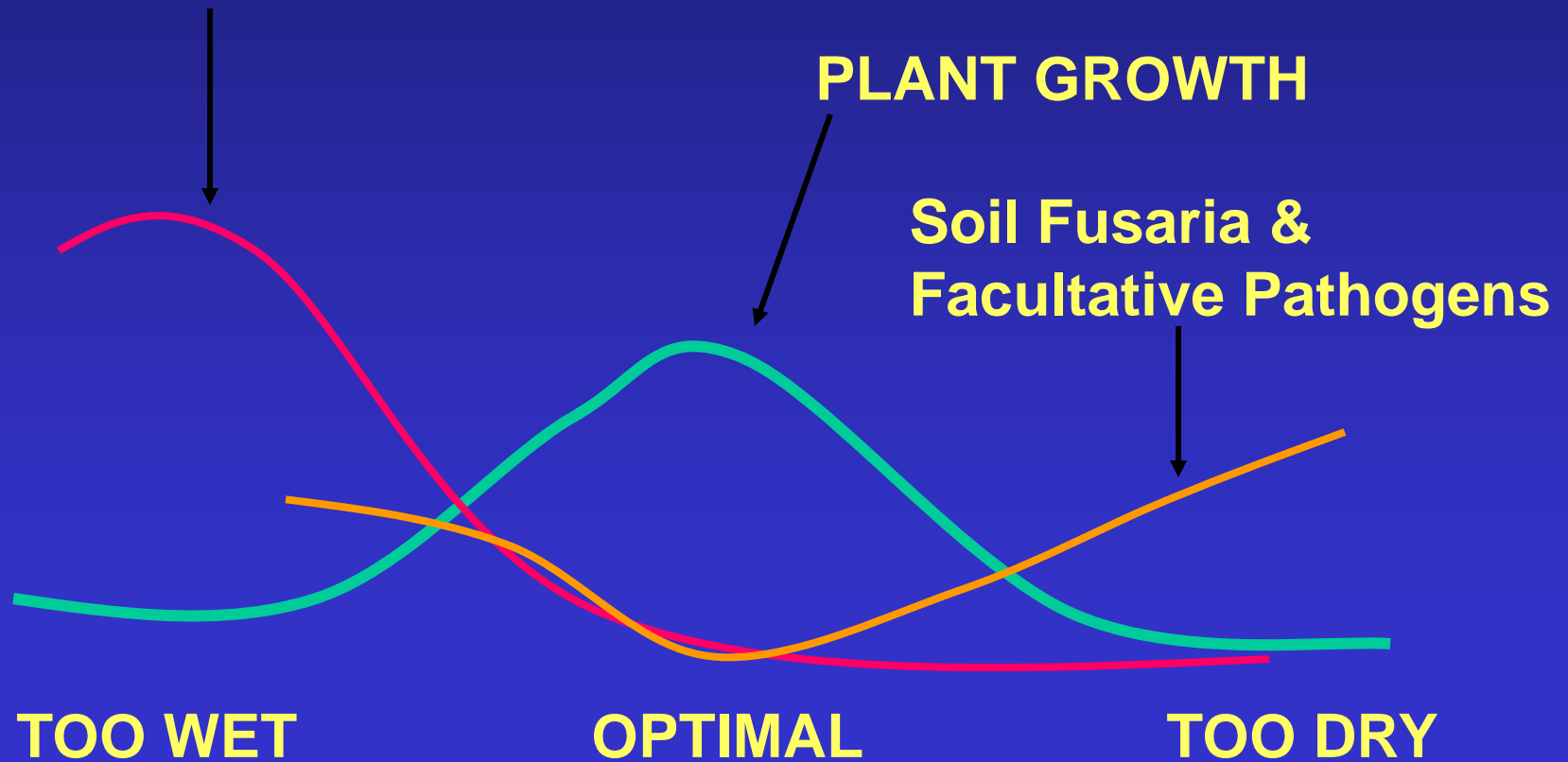
DISEASE

ENVIRONMENT

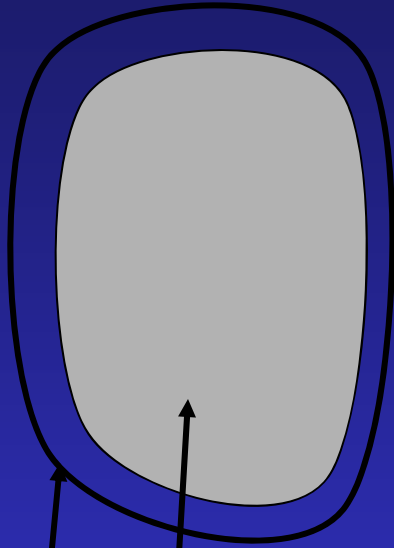


# EFFECTS OF SOIL MOISTURE ON DISEASE POTENTIAL and PLANT GROWTH

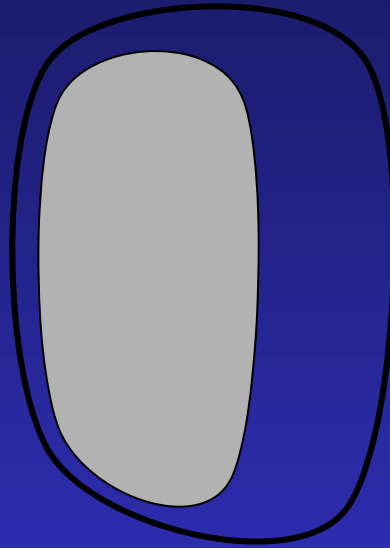
**DISEASE**  
Water molds (Pythium/Phytophthora)



**Healthy / full turgor**



**Plasmalized**



**The plasmalized  
cell is predisposed  
to penetration by  
fungi**

**Plasma membrane with cytoplasm inside**

**Primary cell wall**







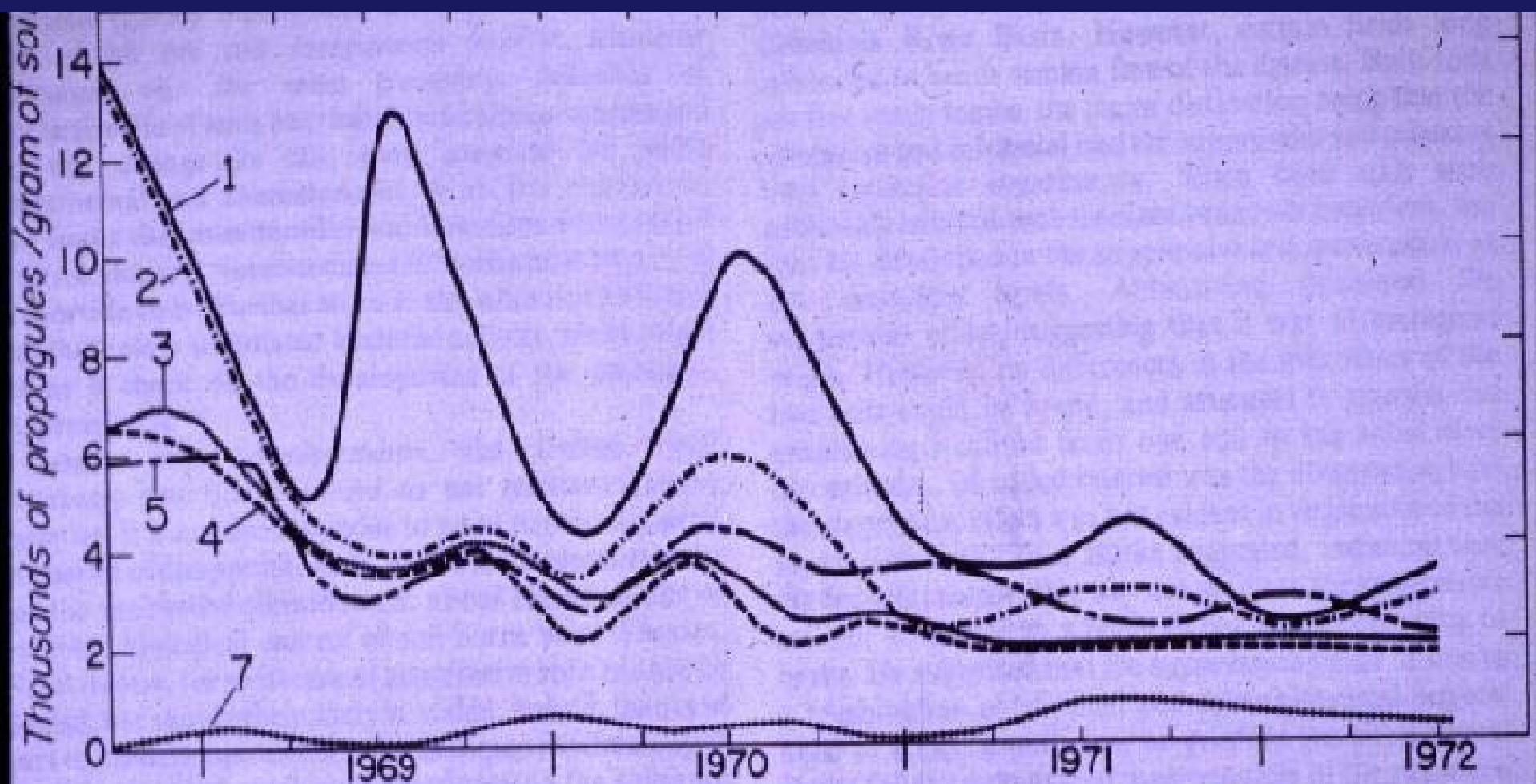


Fig. 1. Fluctuations of *Fusarium* populations in forest and nursery soils. Numbers on curves refer to soil types and treatments as follows: 1) nursery soil left at nursery undisturbed, kept uncovered, 2) nursery soil left at nursery, undisturbed, covered with 15-cm layer pine needles, 3) nursery soil taken to pine forest, kept uncovered, 4) nursery soil taken to pine forest, covered with 15-cm layer pine needles, 5) nursery soil taken to laboratory and kept air dry (control), and 7) forest soil taken to nursery, left uncovered. The following forest soils contained no detectable *Fusarium* and were not graphed: 6) forest soil left at pine forest, undisturbed, covered with 15-cm layer pine needles, and 8) forest soil taken to nursery and covered with 15-cm layer pine needles. Soils 3, 4, and 6 were replicated. (Courtesy of R. S. Smith, Jr., Pacific Southwest Forest and Range Experiment Station, U.S. Forest Service, Berkeley, California.)

# Trichoderma after fumigation with MBr and other fumigants





# Rhizoctonia without and with Trichoderma

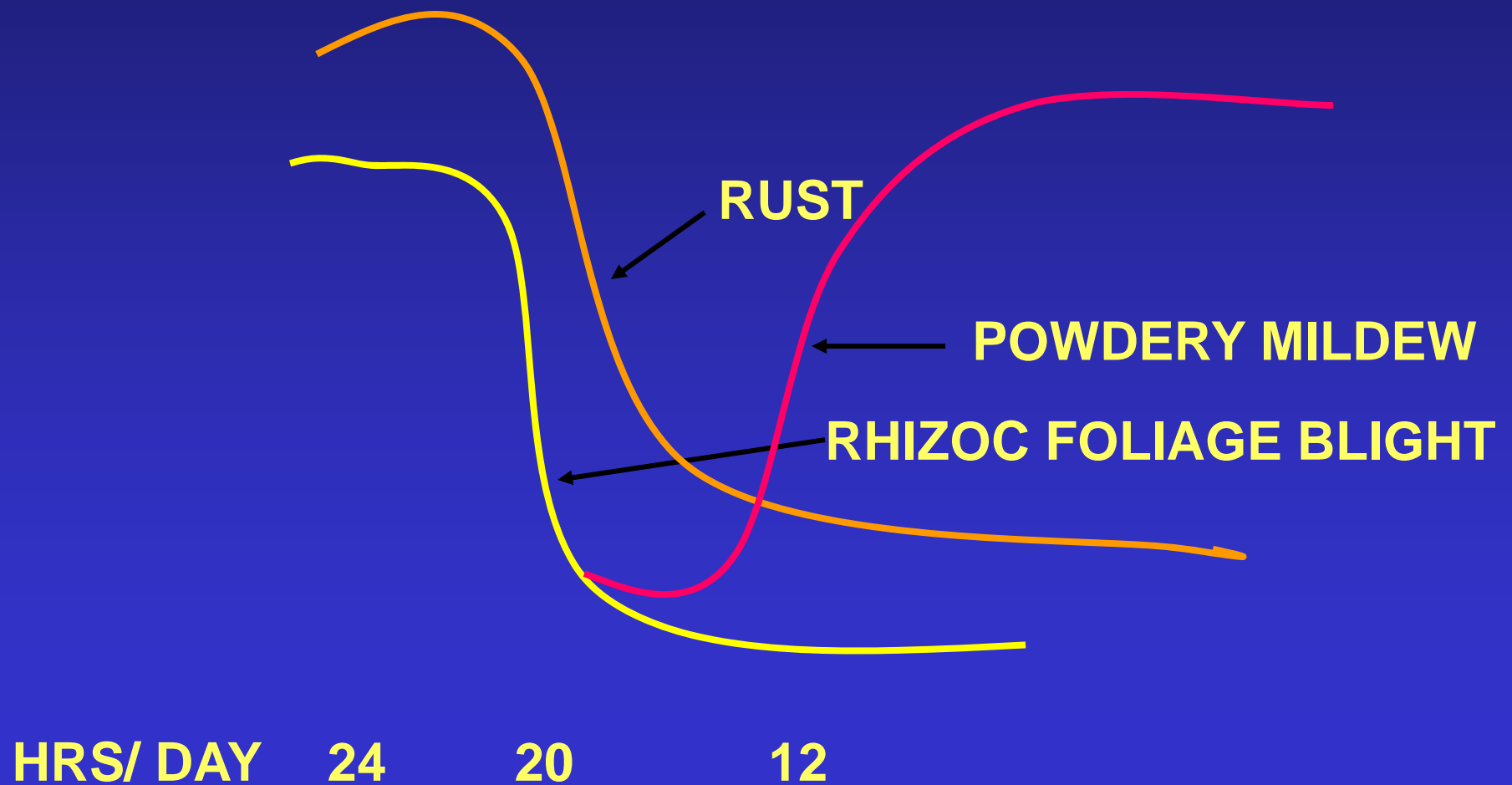


**Rhizoctonia**

**Rhizoctonia under Trichoderma**



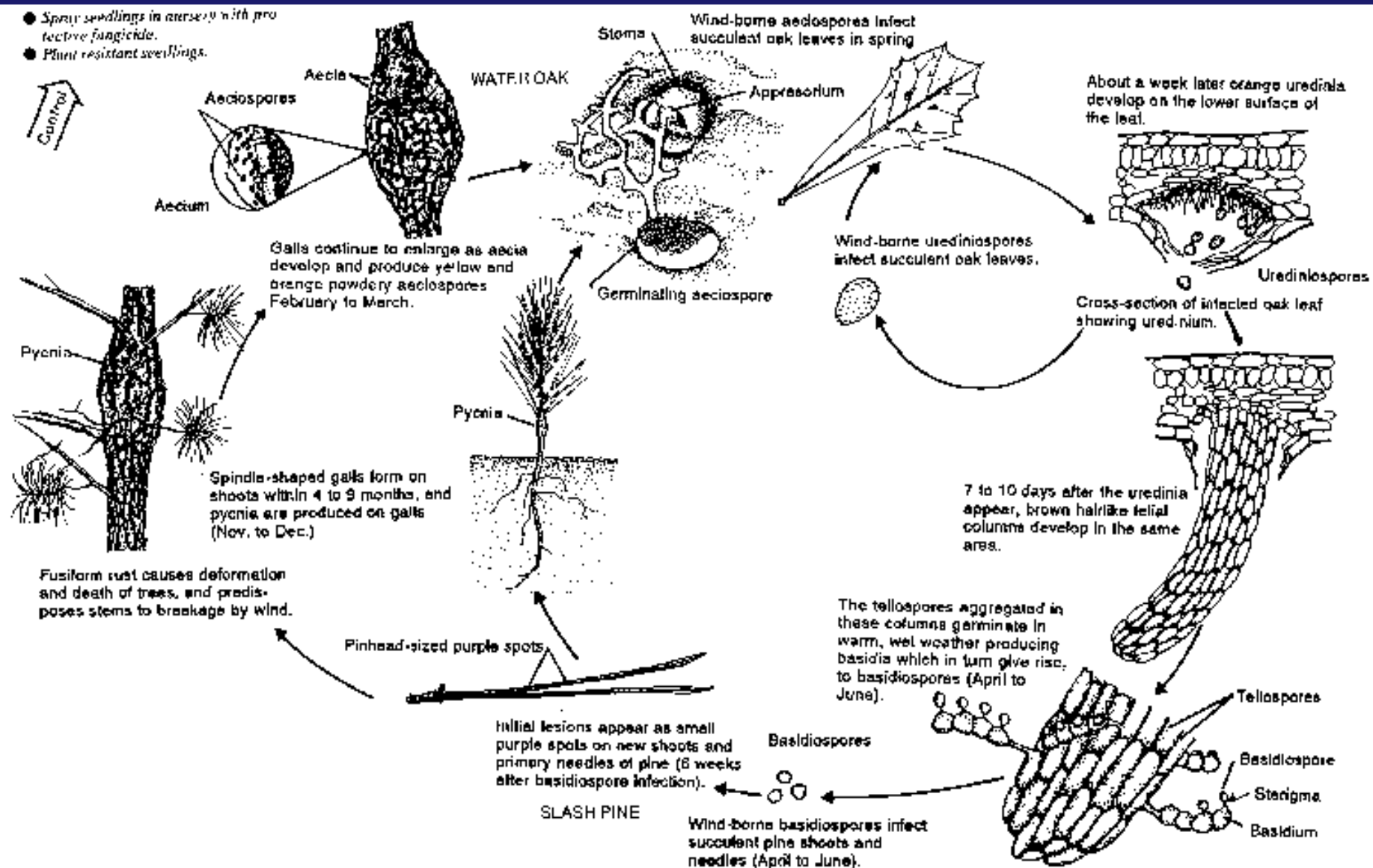
# EFFECTS OF FOLIAGE MOISTURE ON DISEASE POTENTIAL OF THREE PATHOGENS



# Fusiform rust

## *Cronartium quercuum* f.sp. *fusiforme*

- Spray seedlings in nursery with protective fungicide.
- Plant resistant seedlings.











FOR EXPERIMENTAL USE ONLY—NOT FOR SALE  
OUT OF REACH OF CHILDREN  
WARNING

Eye irritation. Harmful if swallowed, inhaled or  
absorbed through the skin.  
Wear goggles or face shield.

First aid: No specific antidote is available. Treat symptomatically.

Bayleton is a Reg. TM of Bayer AG, Leverkusen.  
Treated seeds or feeds should not be used, except for residue  
studies. Exercise care in handling this product.  
PRECAUTIONS and RESTRICTIONS in Technical Infor-

CONTENTS: 1 LB.

FORMULA: 021957

Miles Inc.  
Agriculture Division

93  
®BAYLETON  
50% DF  
Fungicide

ACTIVE INGREDIENT:

1-(4-Chlorophenoxy)-3,3-dimethyl-1-(1H-  
1,2,4-triazol-1-yl)-2-butanone

INERT INGREDIENTS:

BATCH: 2032621  
3030020

RESEARCH & DEVELOPMENT  
KANSAS CITY, MO

Triadimefon - Bayleton

# Fusiform rust

*Cronartium quercuum* f.sp. *fusiforme*

Seed treatment:

Bayleton & Thiram at time of sowing

Foliar sprays: 21 days post sowing, every 21 days until mid to late June. When the threat of basidiospores is past.



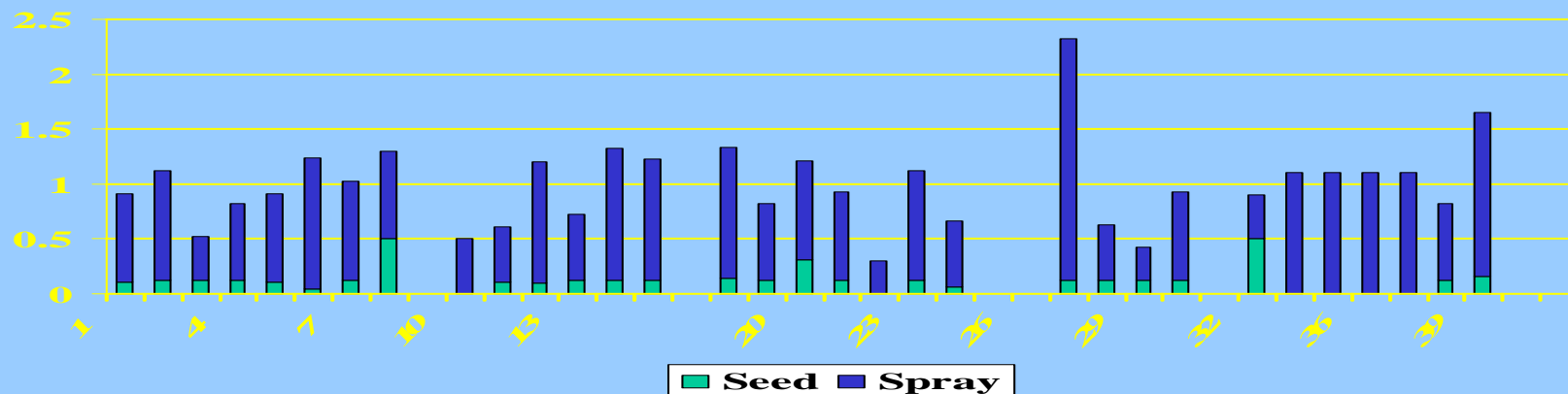




# Bayleton & Thiram

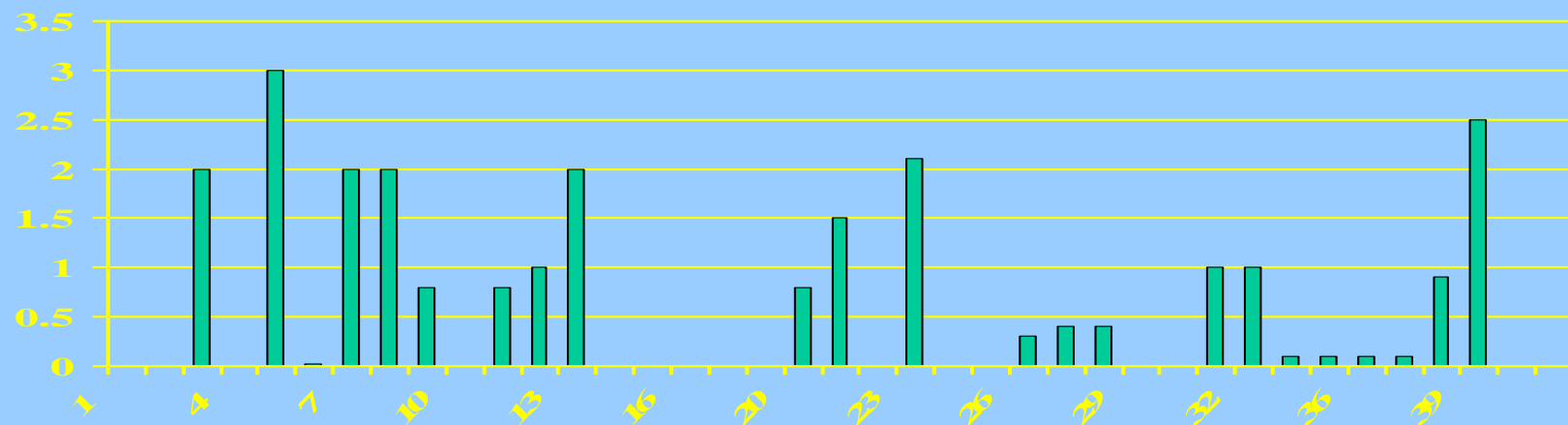
lbs ai/100 lbs & /ac

Bayleton



lbs ai / 100 lb seed

Thiram





# Rhizoctonia needle blight

*Rhizoctonia solani*



06/07/2005







**“Disease-Free” Nursery Beds**



**Rhizoctonia within Seedling Rows**





**Rhizoctonia “appearing” after top clipping**





**Hyphae – fungal threads of Rhizoctonia**



# Rhizoctonia Blight: Management

- Fumigation appears to affect incidence and severity.
- Moisture and stand density related to disease.
- Fungicides can be used to control pathogen; iprodinone, fludioxonil & azoxystrobin (RR 03-04)

## Other Diseases:









**Excessive moisture coupled with hurricane force winds. Abiotic disorder that mimics foliar pathogen.**





# Disease control other than rust

