Fusarium wilt of tomato

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Fusarium wilt

Crown rot

Foot rot

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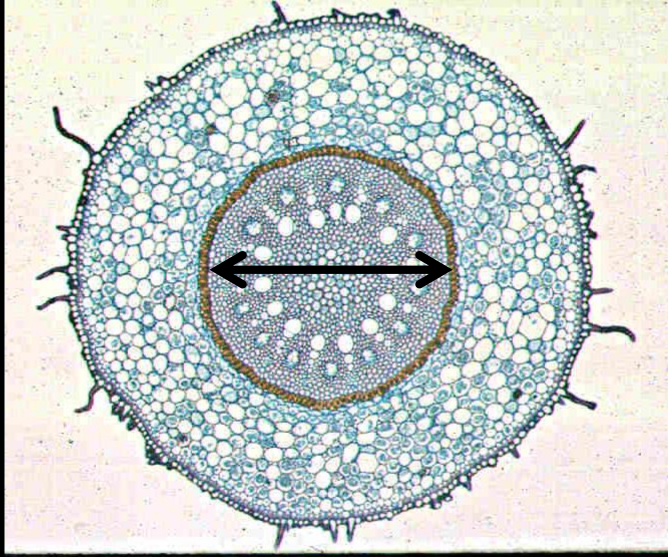
Crown rot

Foot rot



Fusarium wilt

Fusarium oxysporum

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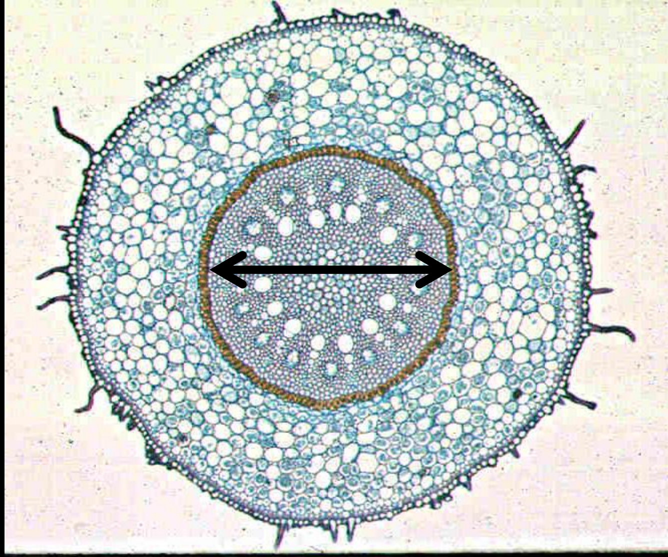
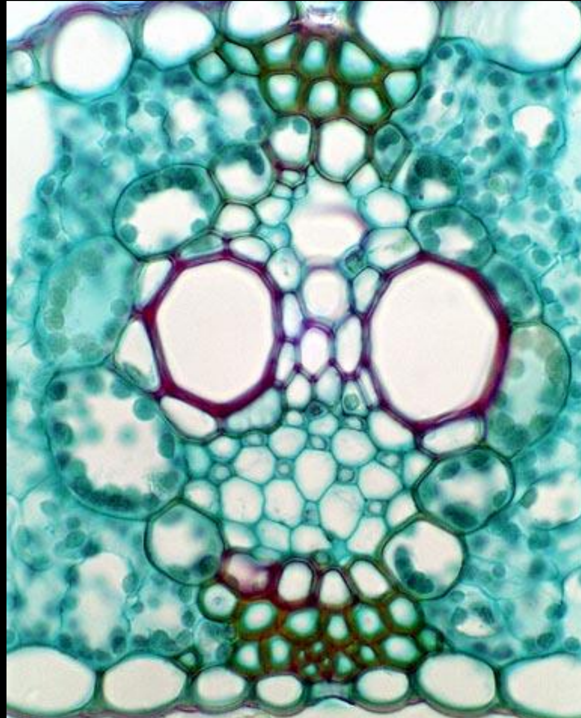
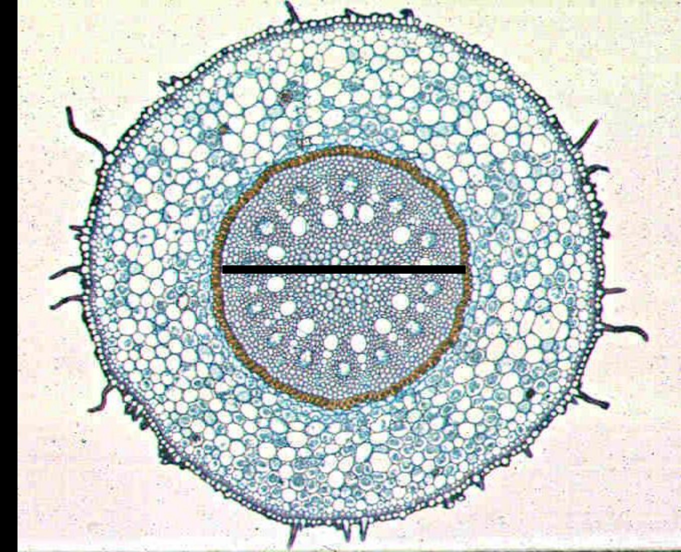
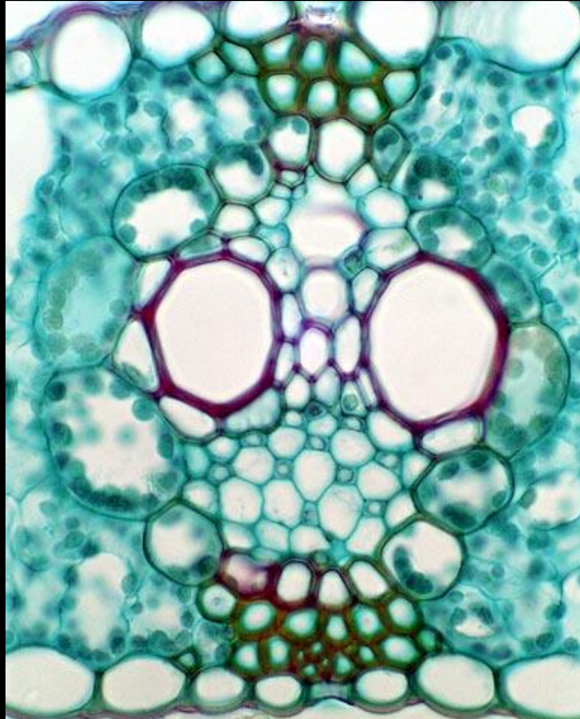




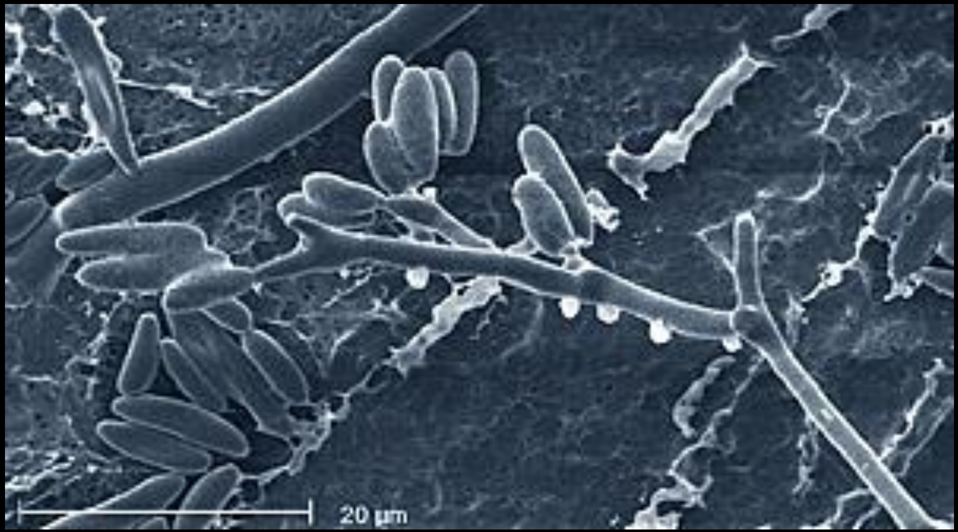


Fusarium oxysporum

Microconidia carried upward in xylem vessels



Discolored vascular tissue



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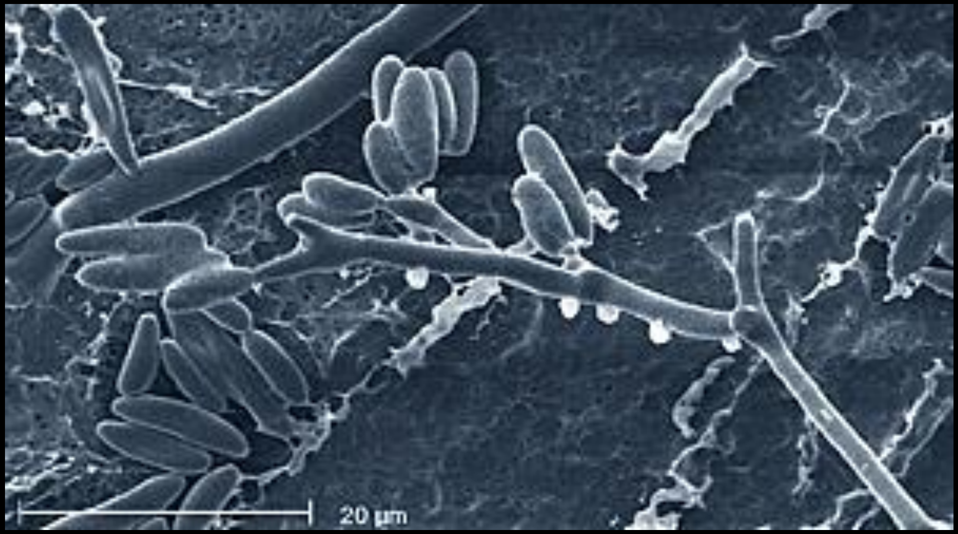


Microconidia carried
upward in xylem vessels

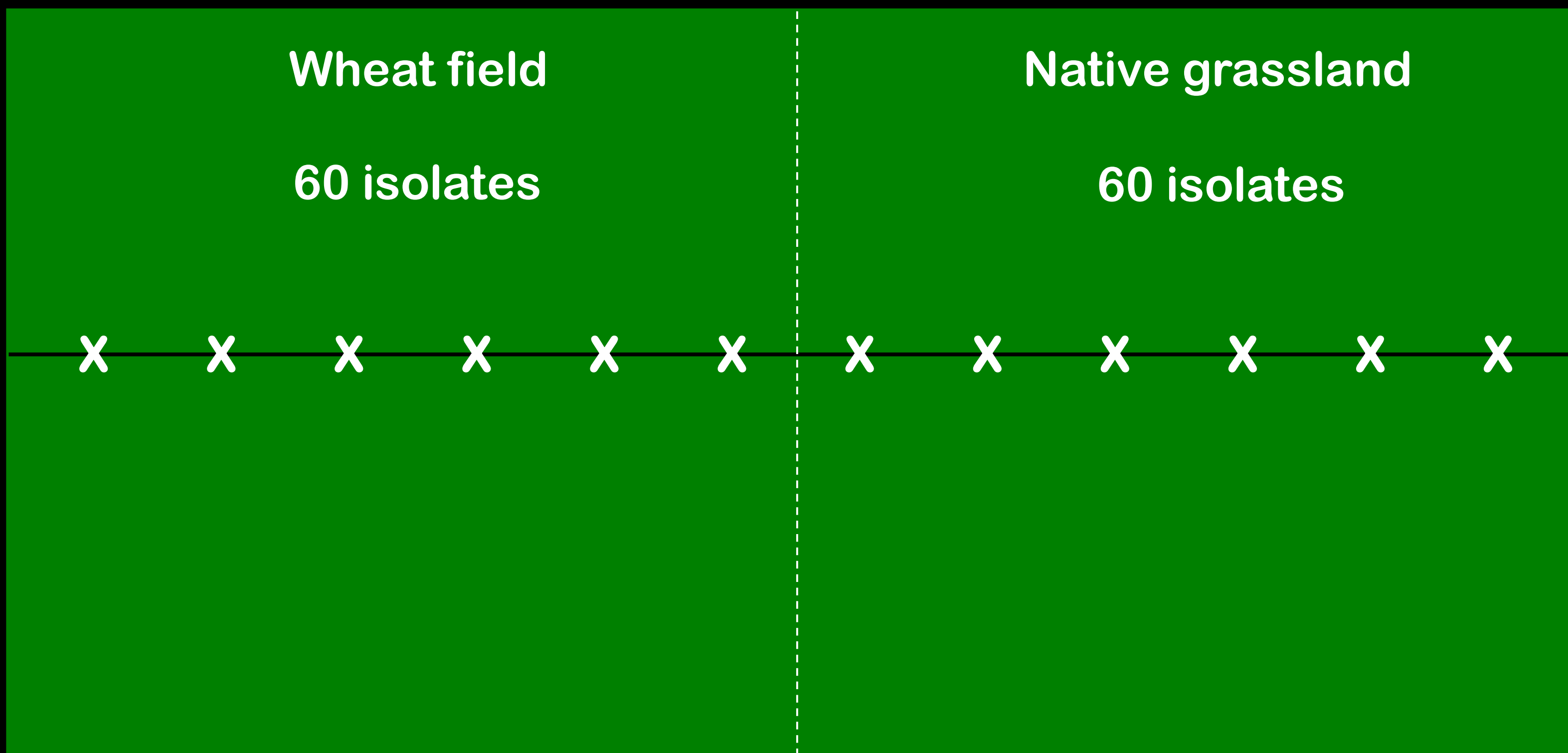
Origin of Fusarium wilt

Fusarium oxysporum is common in arable soils

Grasslands

Populations of *Fusarium oxysporum*

Native and cultivated soils



Same population in both soils

Most are non-pathogenic

No visible damage to roots

Pathogens arise through chance encounters

Strain * crop combination

> 120 host-specific strains

Pathogens arise through chance encounters

De novo origin is a rare event

Strain * crop combination

> 120 host-specific strains

De novo origin is a rare event

Most new occurrences are
introductions of existing strains

> 120 host-specific
strains

De novo origin is a rare event

Most new occurrences are introductions of existing strains

Moved with infested soil

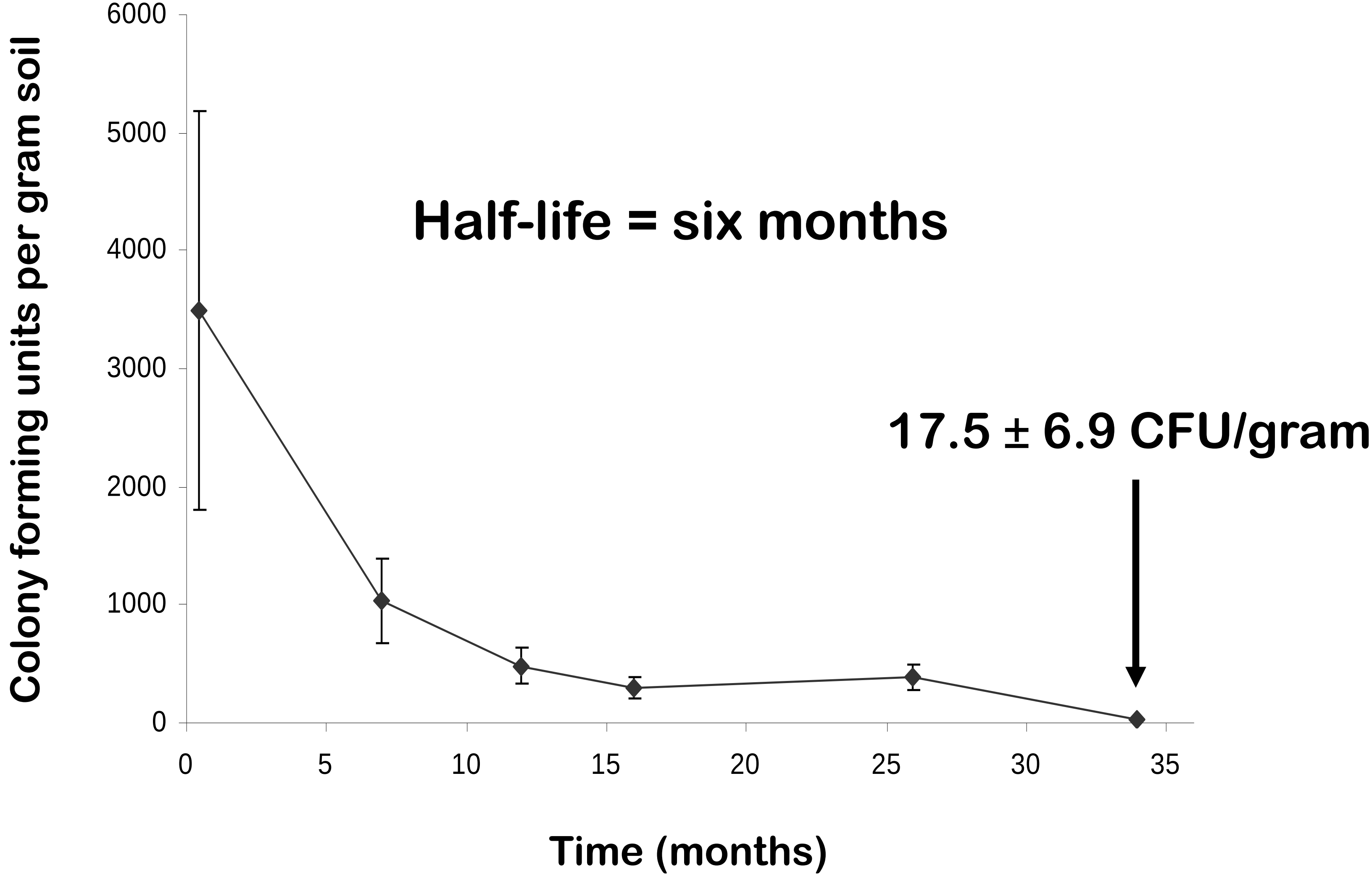
or seed

Crop rotation

Growing non-susceptible crops

Attrition of existing propagules

Survival of the pathogen in fallow soil

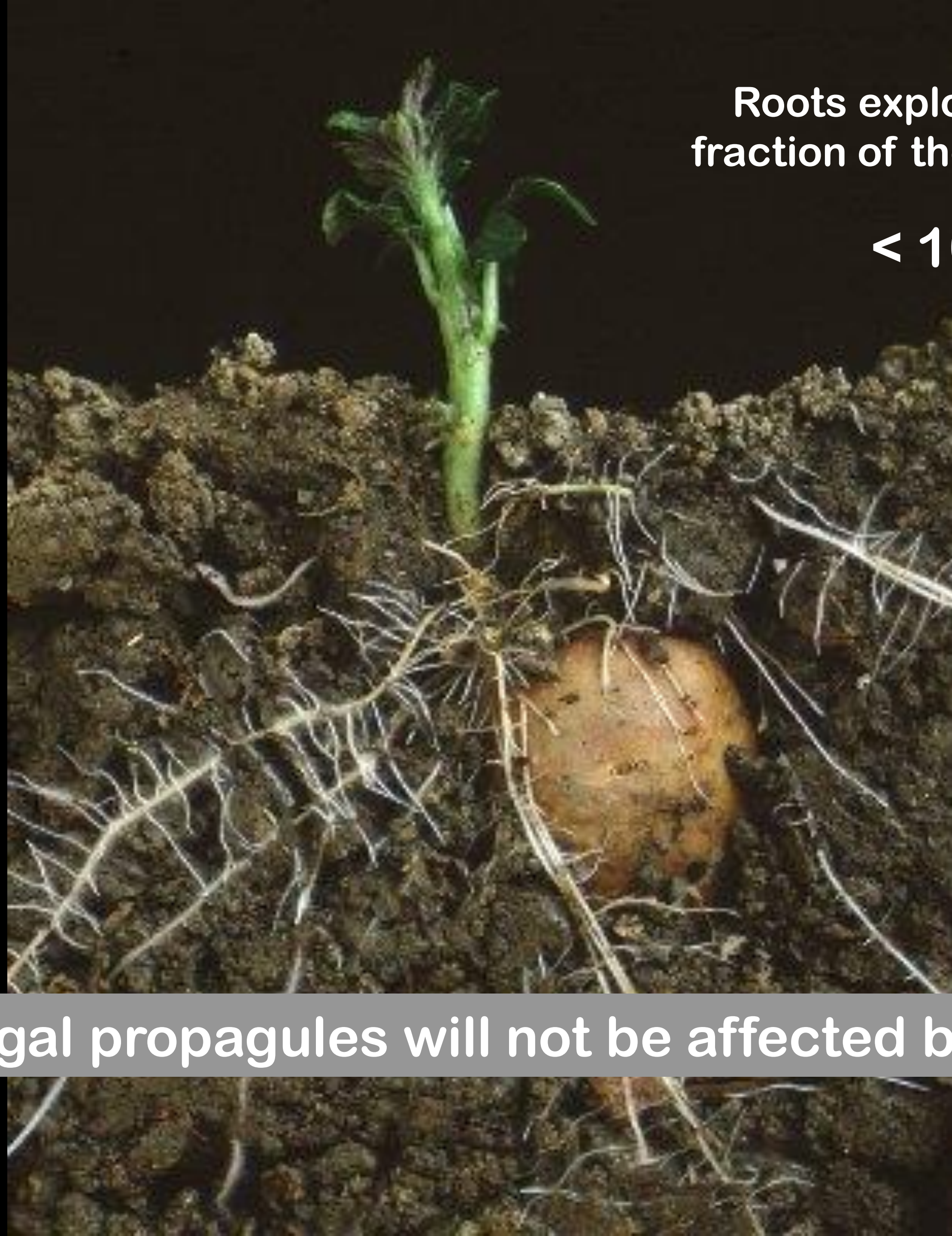


The Fusarium wilt pathogen will infect roots of most crops

Cortical colonies return few propagules to the soil

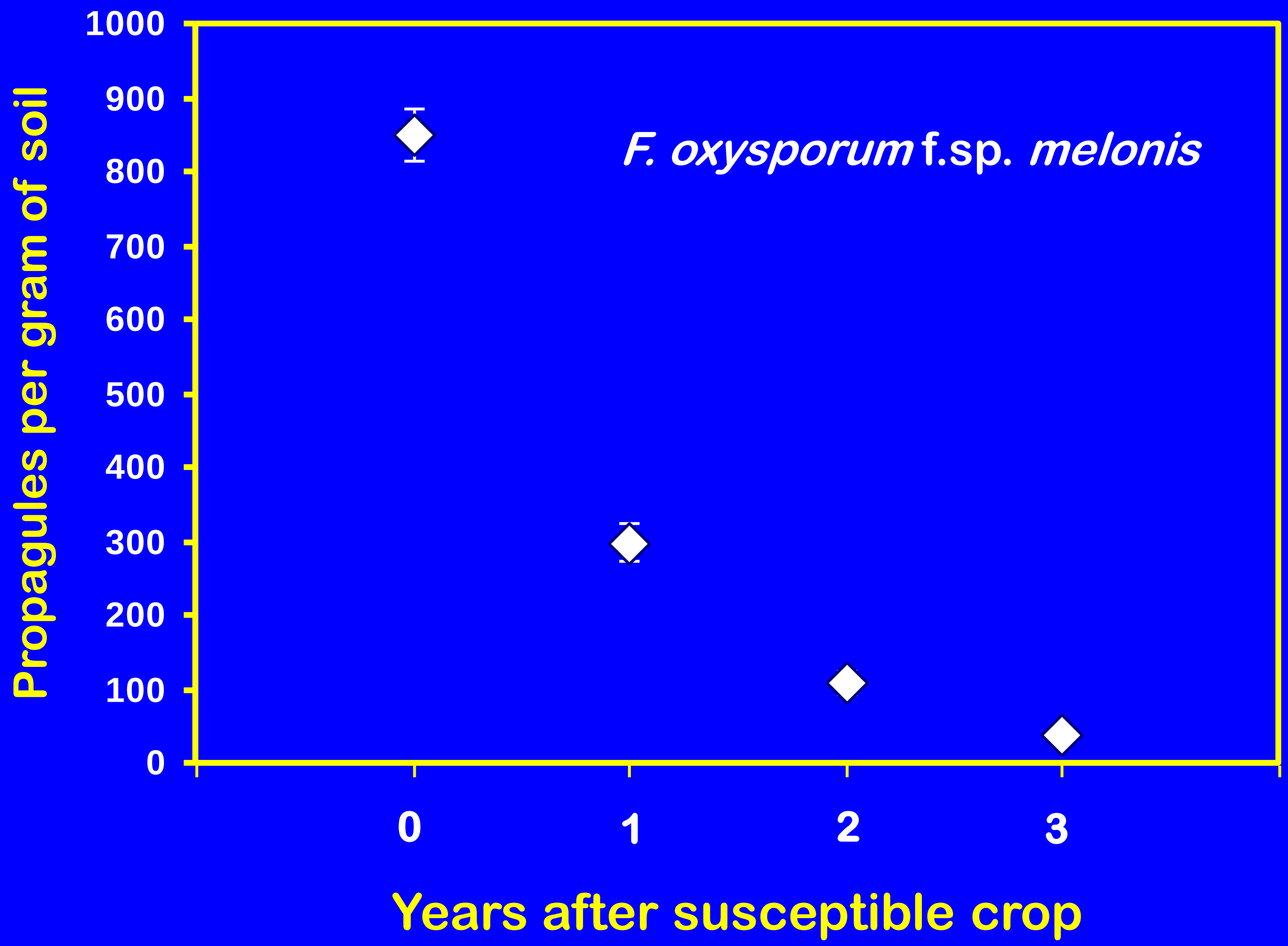
Roots explore a small fraction of the soil volume

< 10%



Most fungal propagules will not be affected by the crop

Pathogen population in soil



Two or three years out of a susceptible crop may be sufficient to reduce inoculum to levels that will not produce significant damage

If rotation crops do not support extensive development

What determines the rate of attrition?

Microbial activity

Removes organic matter that
protects pathogen propagules

Warmer is better

Wet is better

Promoting decline in inoculum

Solarization to heat soil

Promoting decline in inoculum

Solarization to heat soil

Cover soil with clear plastic tarp

Thermal inactivation of fungal propagules

Favor growth of antagonistic microbes

Adaptation of Soil Solarization to the Integrated Management of Soilborne Pests of Tomato Under Humid Conditions

D. O. Chellemi, S. M. Olson, D. J. Mitchell, I. Secker, and R. McSorley

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Accepted for publication 22 November 1996.

Tarped for 40 – 55 days

Summer in Florida

Control of Fusarium wilt = soil fumigation

100 °F at 12 inches

Anaerobic soil disinfestation

Incorporate substrate

Rice hulls / grape pomace

Tarp and irrigate to achieve anaerobic conditions

Lack of oxygen

Altered microbial community

Best with high ambient temperatures

Genetic resistance to Fusarium wilt

Resistance overcome by new pathogenic race

Durability of resistance cannot be predicted

A pathogenic race may be present before the resistance gene it overcomes has been deployed

Movement of pre-existing forms is often the cause of failures in genetic resistance

Sanitation

Soil on equipment

Pathogens may be present where no plants show symptoms

Minimize increase in pathogen population

Most inoculum is
produced above-ground

Composting will kill pathogens

Most inoculum is produced above-ground

Composting will kill pathogens

Temperature should reach 131°F for ≥ 15 days

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