

# Fusarium wilt of tomato in California

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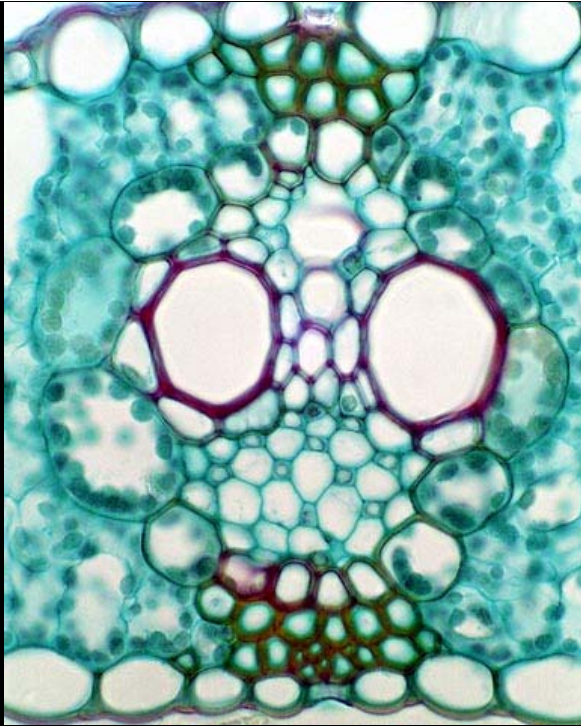
**Fusarium wilt**



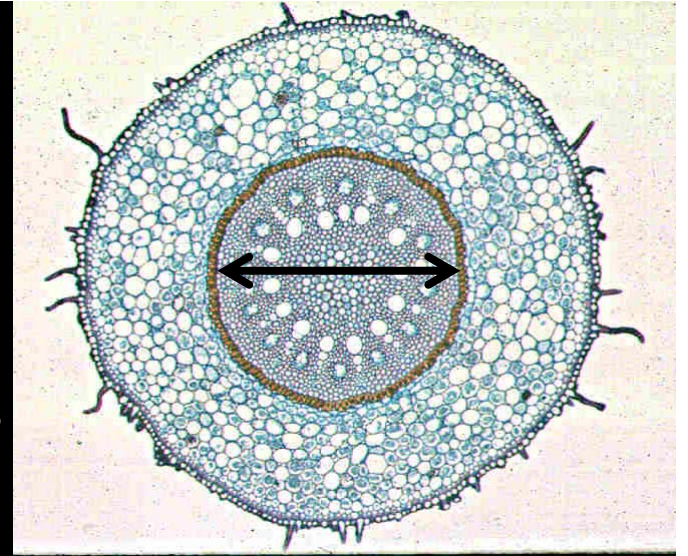
**Foot rot**



**Crown rot**



← Pathogenic strains  
colonize xylem vessels



*Fusarium oxysporum*

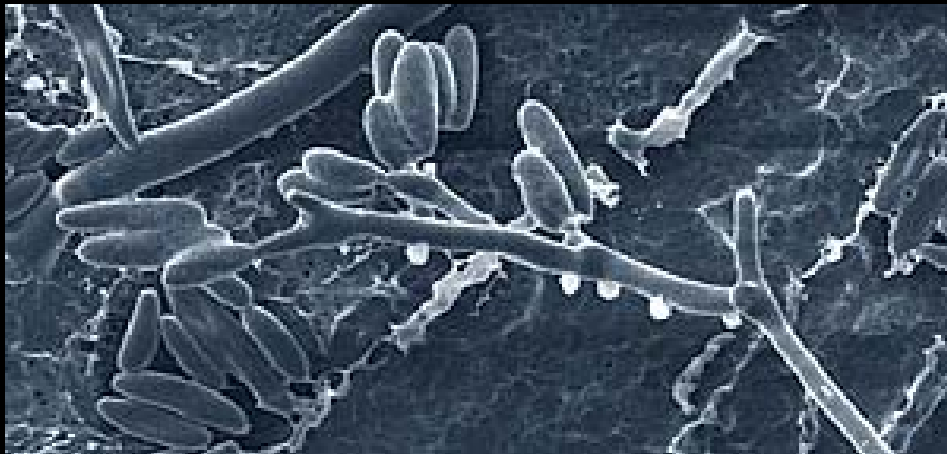




**Interruption of water  
flow causes wilting**



**Discolored vascular tissue**



**Microconidia carried  
upward in xylem vessels**

# Origin of Fusarium wilt

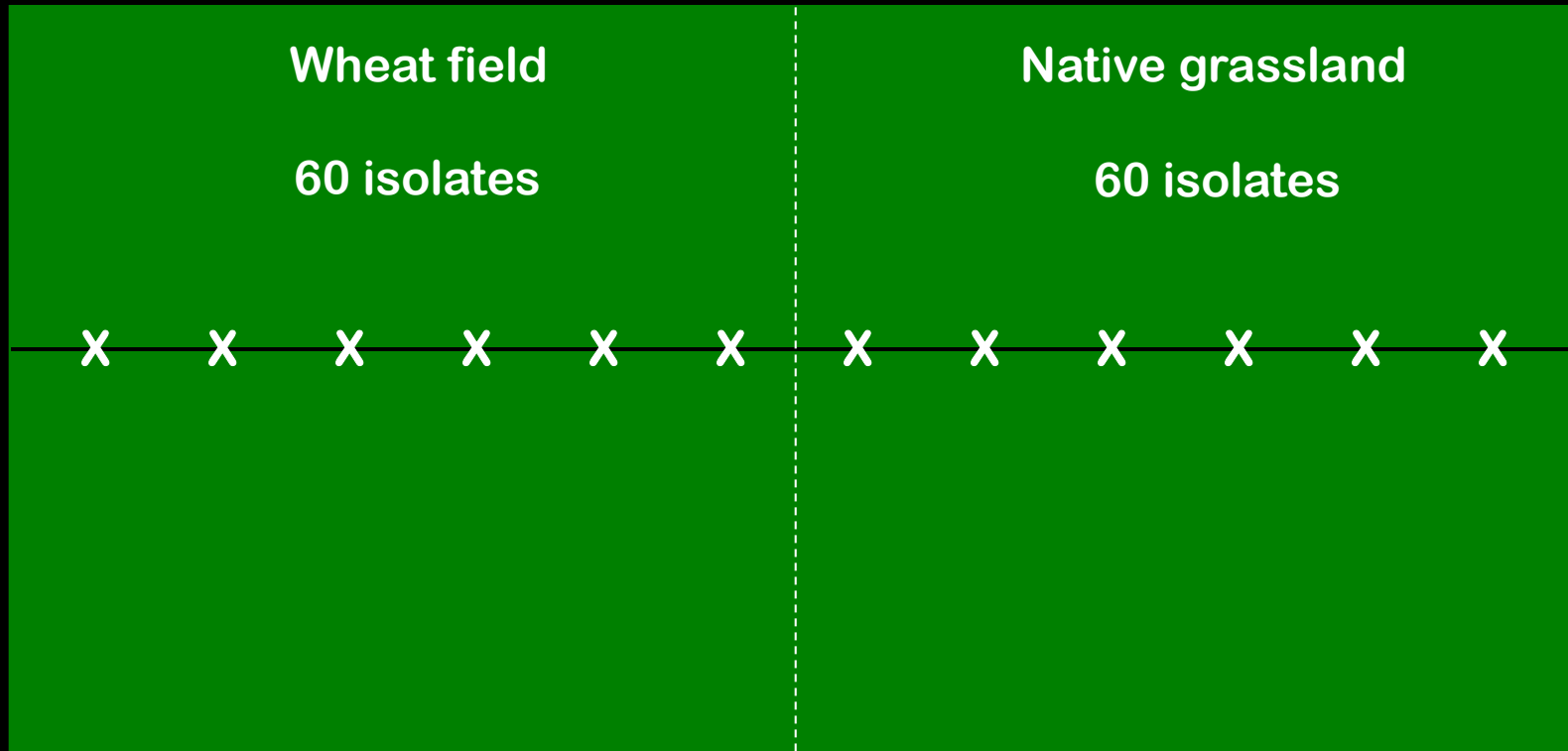
*Fusarium oxysporum* is common in arable soils



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





## **De novo origin is a rare event**

**Most new occurrences are  
introductions of existing strains**

**Moved with infested soil**

**or seed**

**New races can emerge from pre-existing races**

# **Origin of Race 3 of *Fusarium oxysporum* f. sp. *lycopersici* at a Single Site in California**

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**Independent origin of race 3 from race 2 in:**

**California**

**Florida**

**Mexico**

**Australia**



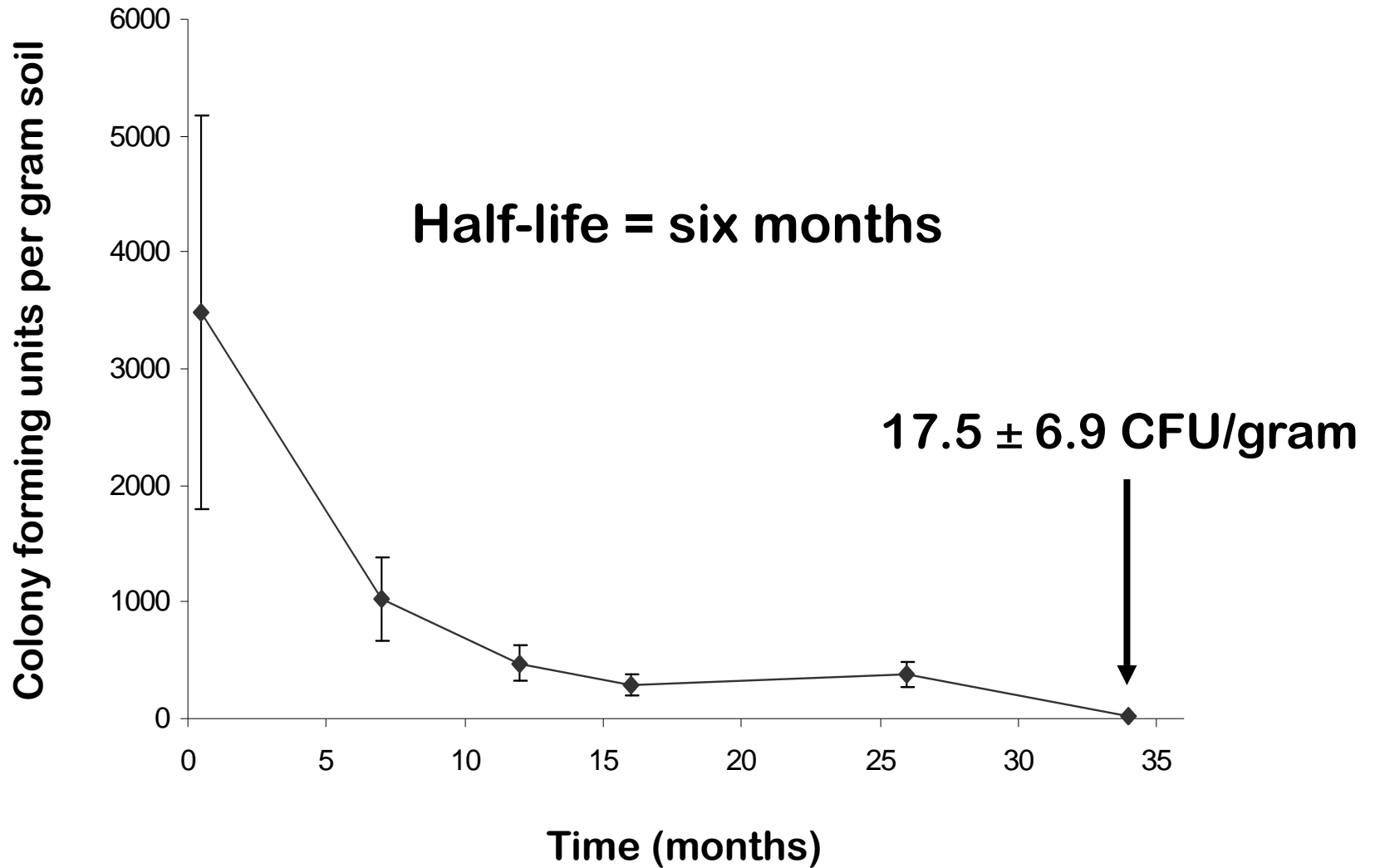
## Crop rotation

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**



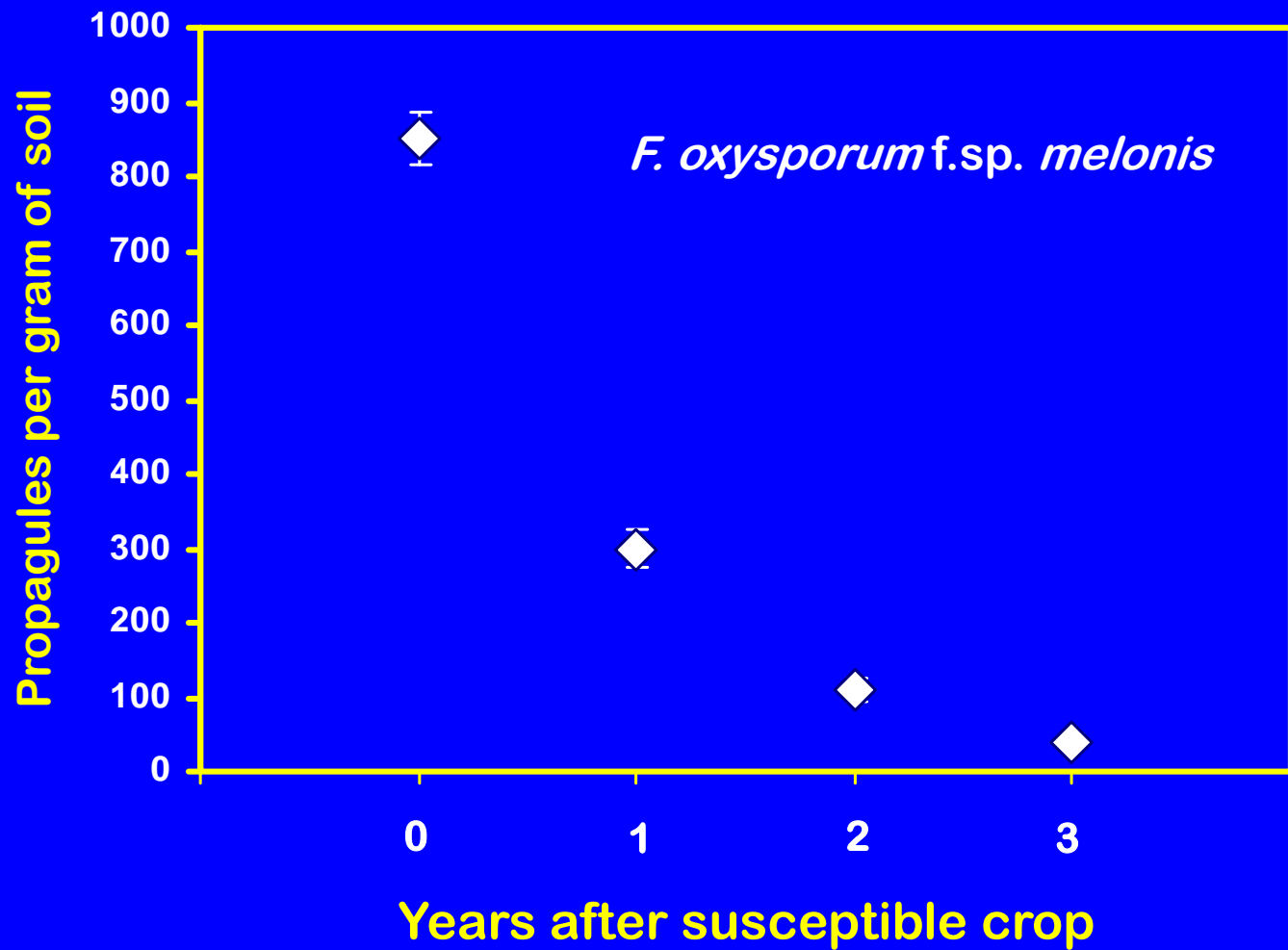


Roots explore a small  
fraction of the soil volume

< 10%

Most fungal propagules will not be affected by the crop

# Pathogen population in soil





# What determines the rate of attrition?

**Microbial activity**

**Removes organic matter that  
protects pathogen propagules**

**Warmer is better**

**Wet is better**

**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**

# 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**