

**Update on Strawberry Collapse  
Problems in California  
Caused by *Macrophomina***

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# Recent developments

- Dieback/collapse first noticed in 2005.
- Increasing incidence through 2011.
- Not associated with *Phytophthora*, *Verticillium*, or other pathogens.
- In fields without MB/CP flat fumigation
- Two pathogens responsible:
  - *Macrophomina phaseolina*
  - *Fusarium oxysporum* f. sp. *fragariae*

# Recent developments

- **Distribution:**
  - Initially in southern CA (Orange, Ventura)
  - Now occurring in other parts of CA
- **Symptoms:**
  - Plant wilting
  - Poor growth
  - Plant collapse and death
  - Discoloration of crowns

***Macrophomina  
phaseolina***

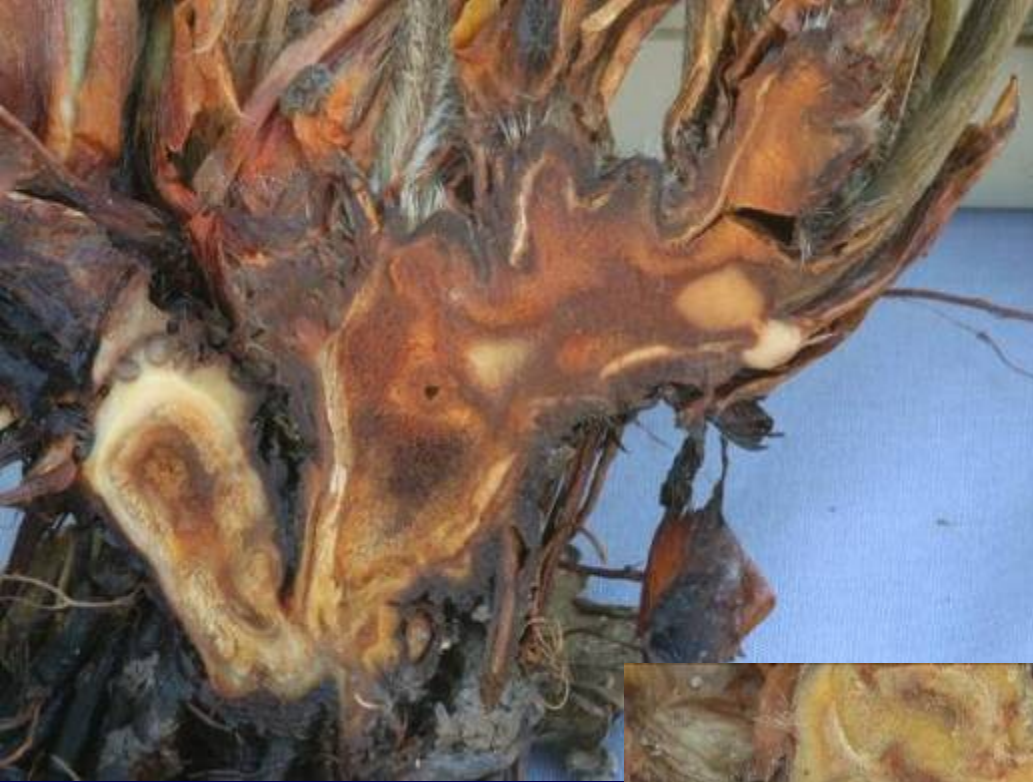






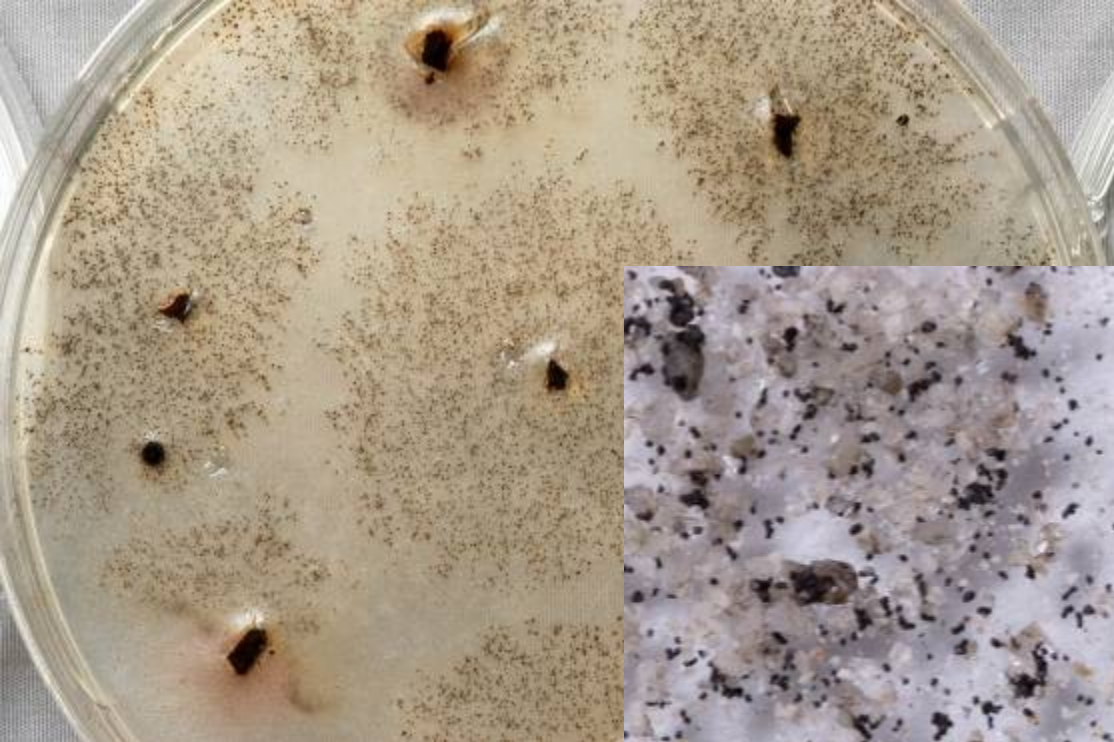
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M. p.





# Distribution

- ***Macrophomina* on strawberry:**  
Australia, Egypt, France, India, Israel, Spain, USA (CA, FL, IL).
- **California strawberry:**
  - 2005-2009: Orange, Ventura, Santa Barbara, San Luis Obispo, Alameda, Sacramento counties
  - 2010-2011: Santa Clara, Santa Cruz, Monterey counties



# The march of *Macrophomina*



# The march of *Macrophomina*





# Diagnosis

?



# Diagnostic challenge I: identical symptoms

<u>Symptoms</u>	<u>Macroph.</u>	<u>Fusarium</u>
Poor growth	yes	yes
Stunting	yes	yes
Dieback	yes	yes
Plant collapse	yes	yes
Crown discolored	yes	yes
Stress related	yes	yes



# Diagnostic challenge II: similar symptoms

<u>Symptoms</u>	<u>Mac.</u>	<u>Fus.</u>	<u>Verticillium</u>	<u>Phytoph.</u>
Poor growth	yes	yes	yes	yes
Stunting	yes	yes	yes	yes
Dieback	yes	yes	yes	yes
Pl. collapse	yes	yes	yes	yes
Crown discolor	yes	yes	yes	yes
Stress	yes	yes	yes	no
Assoc. w/ H <sub>2</sub> O	no	no	no	yes

# Cultivar susceptibility: *Macrophomina*

<u>Cultivar</u>	<u>Mean Disease Severity</u>	
Seascape	2.9	a
Ventana	3.9	b
Albion	4.0	b
Camarosa	4.2	bc
Diamante	4.9	c
	LSD (P=0.05)	0.8

Severity scale: 1=no symptoms, 2=a few lvs showing decline, 3=slight plant dieback, 4=moderate dieback, 5=complete collapse.



# Inoculations: *Macrophomina* isolate 3



**Albion**

**Ventana**

**Seascape**

# Cultivar comparisons

<u>Cultivar</u>	<u>Macroph.</u>	<u>Fusarium</u>
Chandler	resistant	susceptible
Seascape	resistant	susceptible
Monterey	susceptible	resistant
San Andreas	susceptible	resistant
Ventana	susceptible	resistant

\* Resistant ≠ Immune

# Field trials: Bed fumigation treatments

**MeBr/Pic (50/50), 200 lb**

**MeBr/Pic (50/50), 300 lb**

**InLine (32/62), 300 lb**

**InLine (32/62), 400 lb**

**Midas EC (33/67), 200 lb**

**Midas EC (33/67), 300 lb**

**Pic Chlor EC, 200 lb**

**Pic Chlor EC, 300 lb**

**Pic 60, 300 lb**

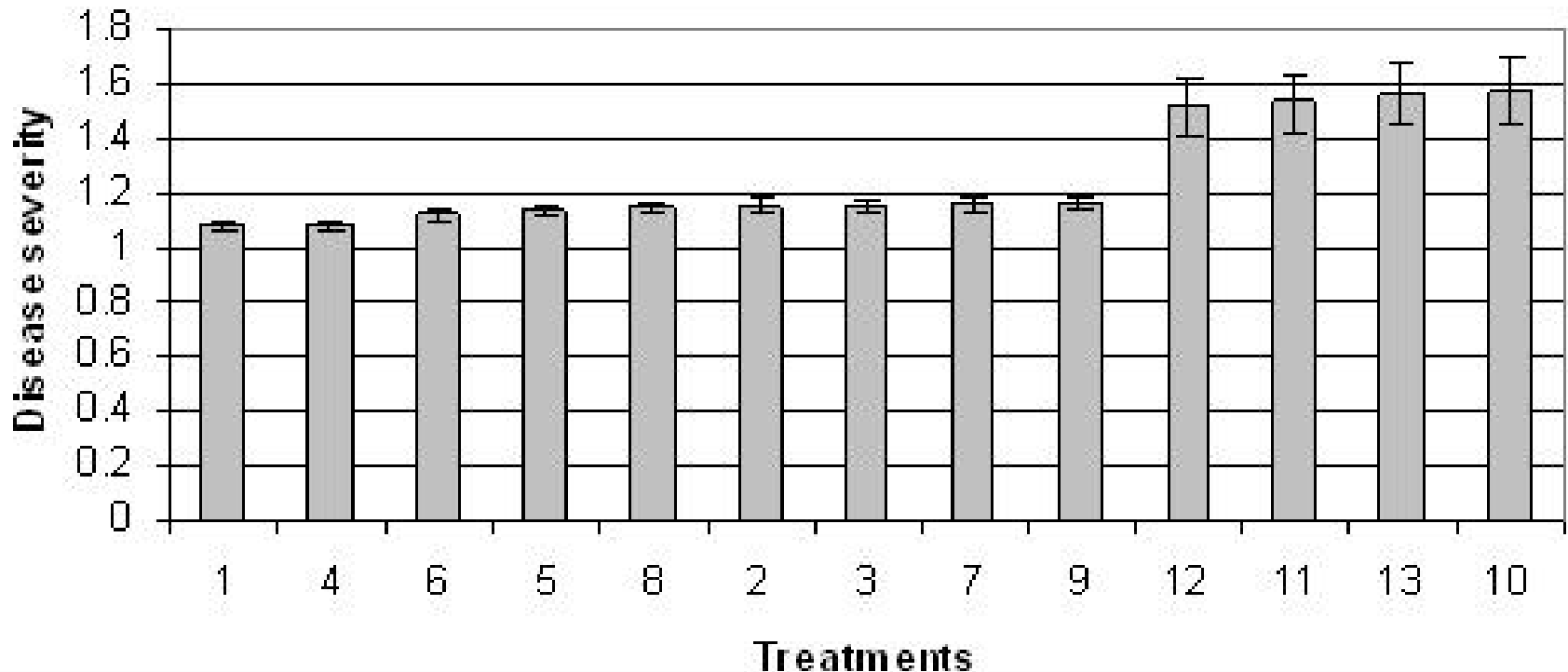
**Untreated**

**(Topsin M 4.5F post-plant applications)**





# Bed fumigation field study



**Disease severity scale:**

**1 = no symptoms; 2 = slight stunting and decline;**

**3 = significant stunting and decline; 4 = collapse and death**

# Management

- **Site selection:** avoid infested fields.
- **Crop rotation:** plant non-hosts.
- **Pre-plant fumigation:** still useful.
- **Sanitation:** don't move infested mud, contaminated equipment.
- **“Resistance”:** use tolerant (?) cultivars.
- **Production:** reduce plant stress.

# Summary

- *Macrophomina* is a recent soilborne concern for CA growers.
- Now present in various strawberry producing regions.
- Field diagnosis is not possible.
- Likely to be a persistent problem.
- Management strategies will be similar for dealing other soilborne pathogens.



# **Acknowledgments**

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