

**Strawberry Plant Collapse
Diseases Reach
California Central Coast**

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Recent Soilborne Issues in CA

- Dieback/collapse first noticed in 2005.
- Increasing incidence through 2010.
- Not associated with *Phytophthora*, *Verticillium*, or other pathogens.
- In fields without MB/CP flat fume trt.
- Two pathogens responsible:
 - *Macrophomina phaseolina*
 - *Fusarium oxysporum* f. sp. *fragariae*

Recent Soilborne Issues in CA

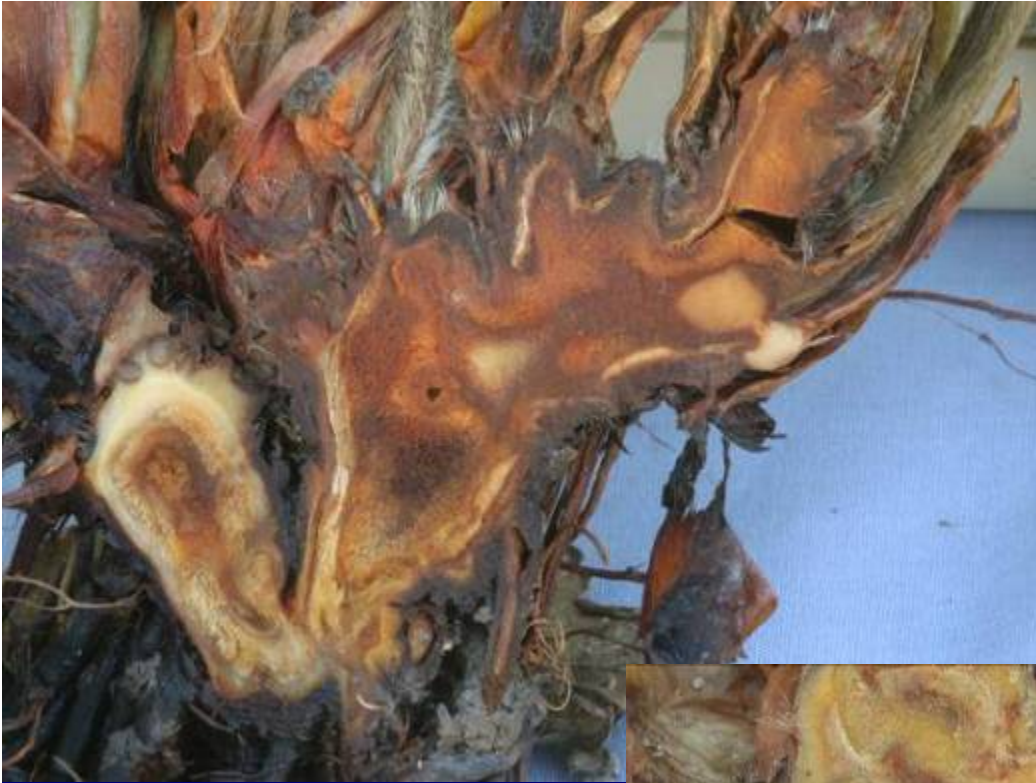
- **Distribution:**
 - Initially in southern CA (Orange, Ventura)
 - Now occurring in other parts of CA
- **Symptoms:**
 - Plant wilting
 - Poor growth
 - Plant collapse and death
 - Discoloration of crowns

***Macrophomina
phaseolina***

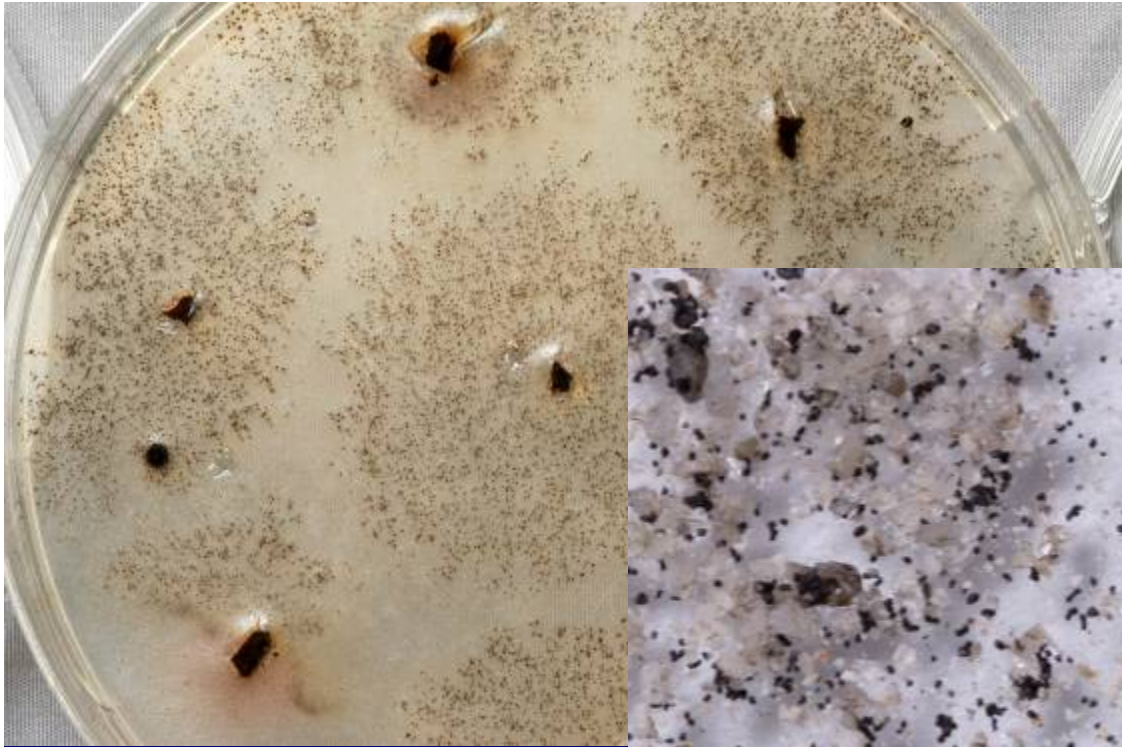




M. p.



M. p.





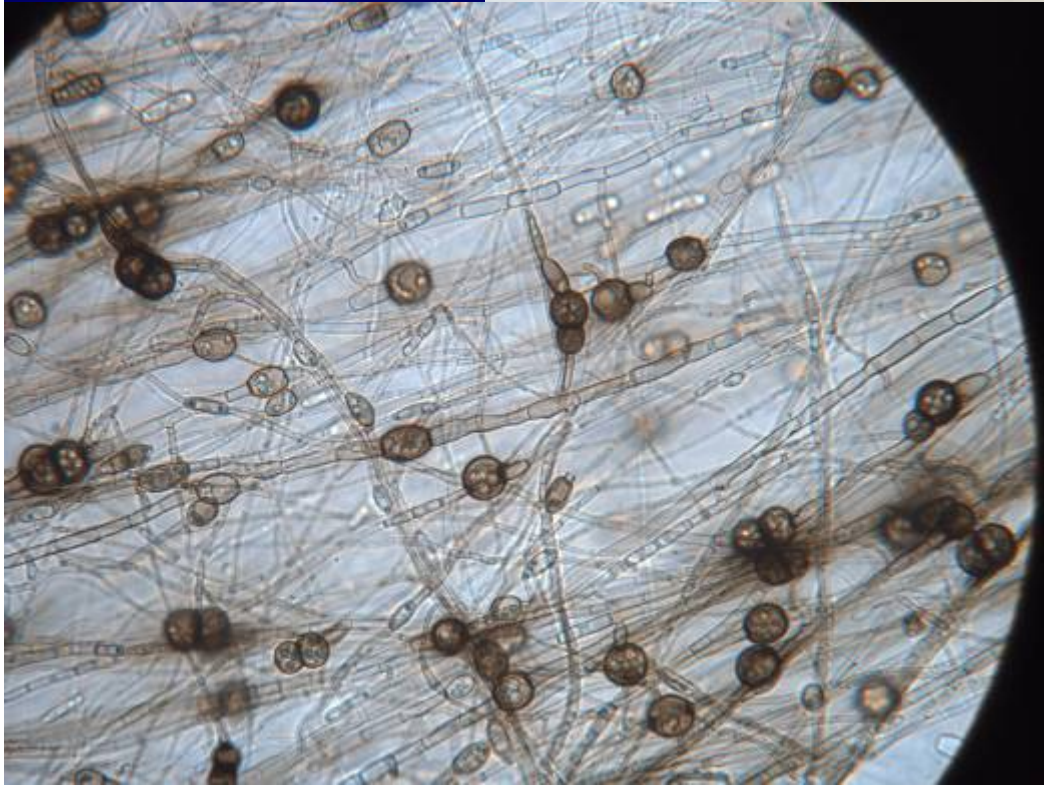
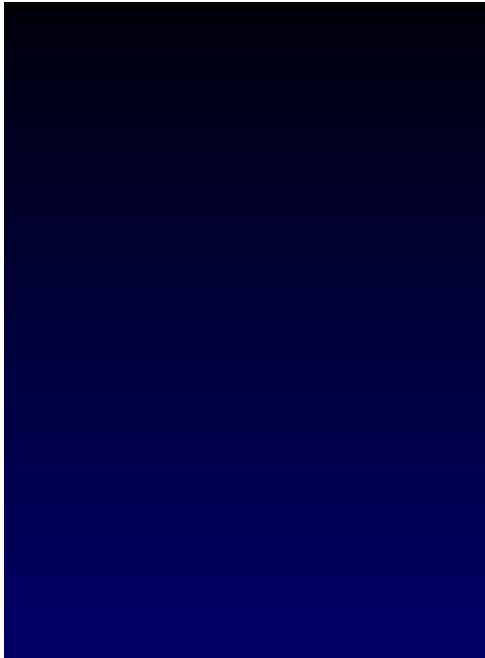
**Fusarium oxysporum
f. sp. fragariae**



Fof



Fof



Distribution as of 2010

- *Macrophomina*: Egypt, France, India, Israel, Spain, USA (CA, FL, IL).
 - CA: Orange, Ventura, Santa Barbara, San Luis Obispo, Alameda, Sacramento, **Santa Clara**, **Santa Cruz** counties
- *Fusarium*: Argentina, Australia, China, S. Korea, Spain, Japan, USA (CA, SC)
 - CA: Ventura, **Monterey** counties

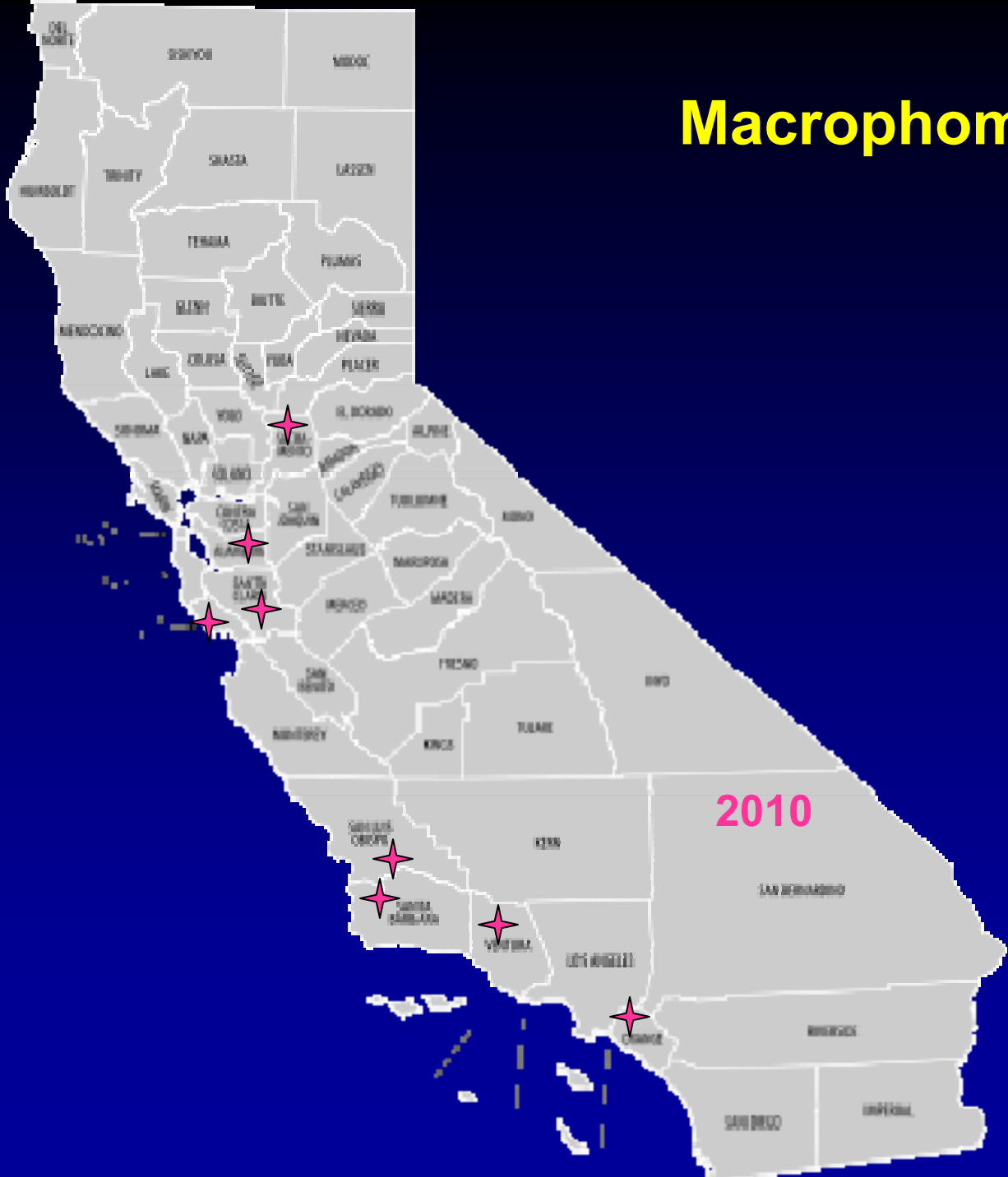
Macrophomina



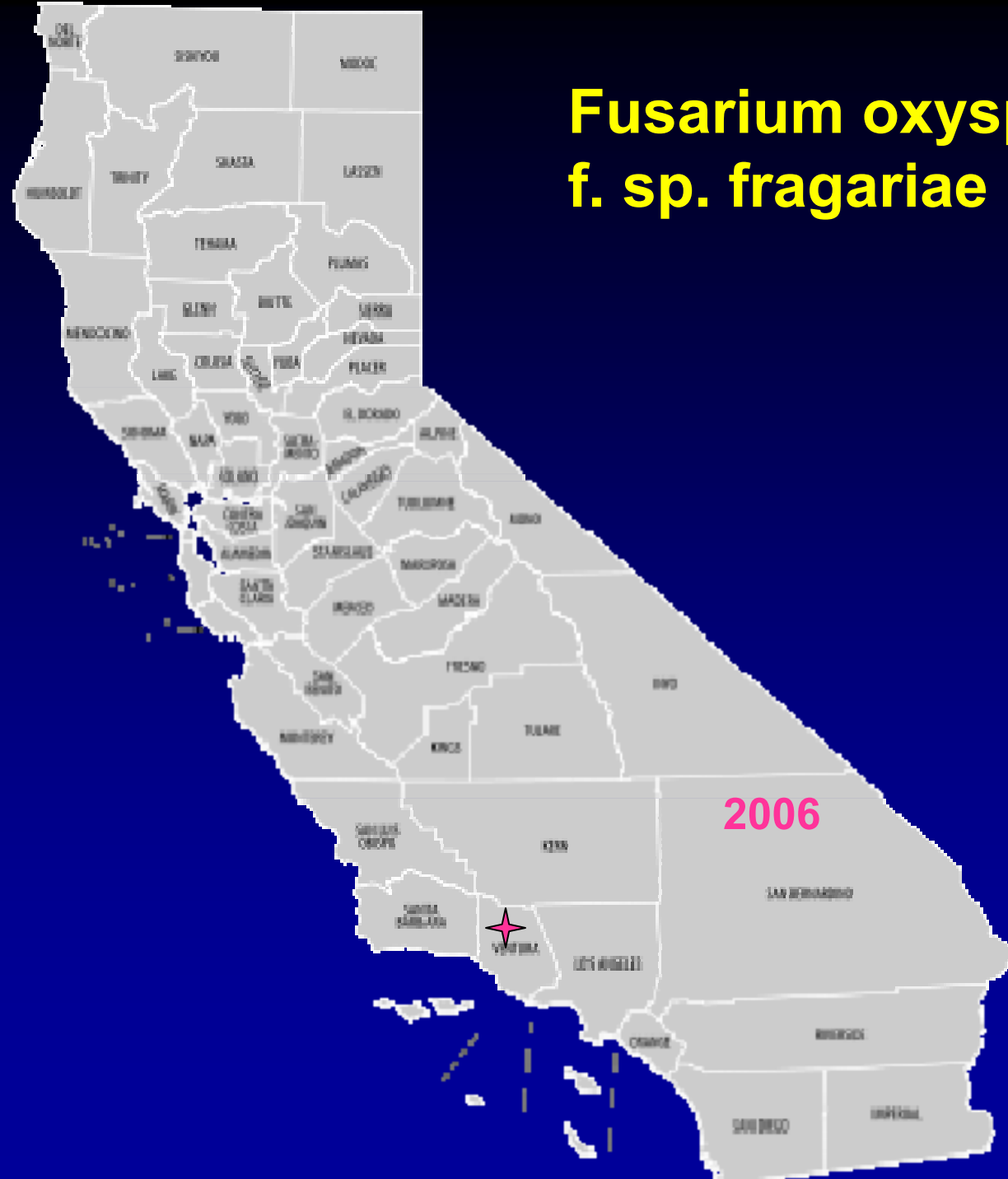
Macrophomina



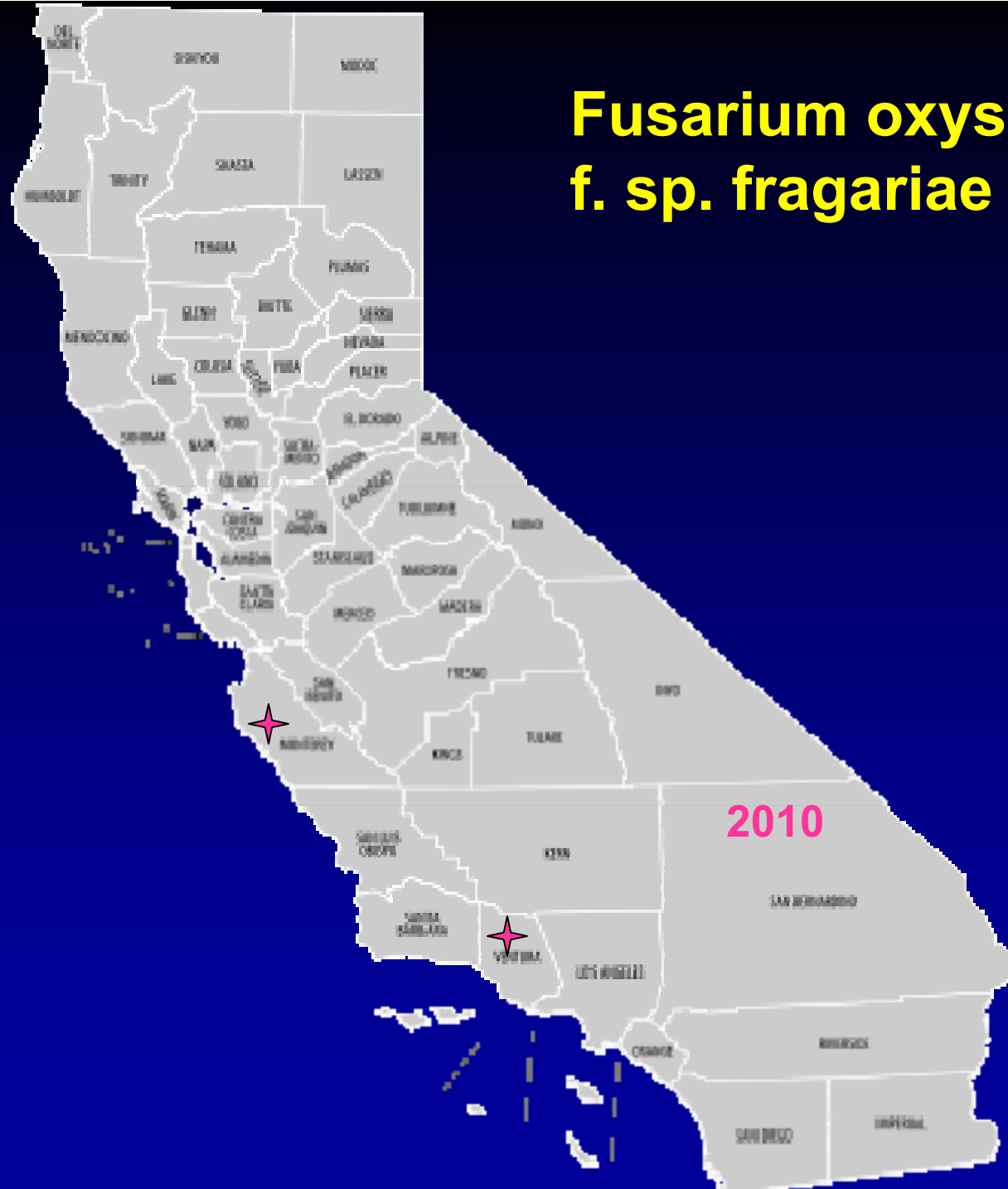
Macrophomina



Fusarium oxysporum f. sp. fragariae



Fusarium oxysporum f. sp. fragariae



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

Soilborne Pathogens: Control strategies based on biology

<u>Biology</u>	<u>Macroph.</u>	<u>Fusarium</u>
Soilborne fungus	yes	yes
Long persistence	yes	yes
Spread via soil	yes	yes
Host specific-straw.	(no)	yes
Broad host range	(yes)	no

Management

- **Select sites without history of problem.**
- **Crop rotation away from strawberry.**
- **Fumigation (but which materials?).**
- **Plant a resistant strawberry cultivar.**
- **Avoid stressing plants.**
- **Avoid moving infested soil.**

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: Soil 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

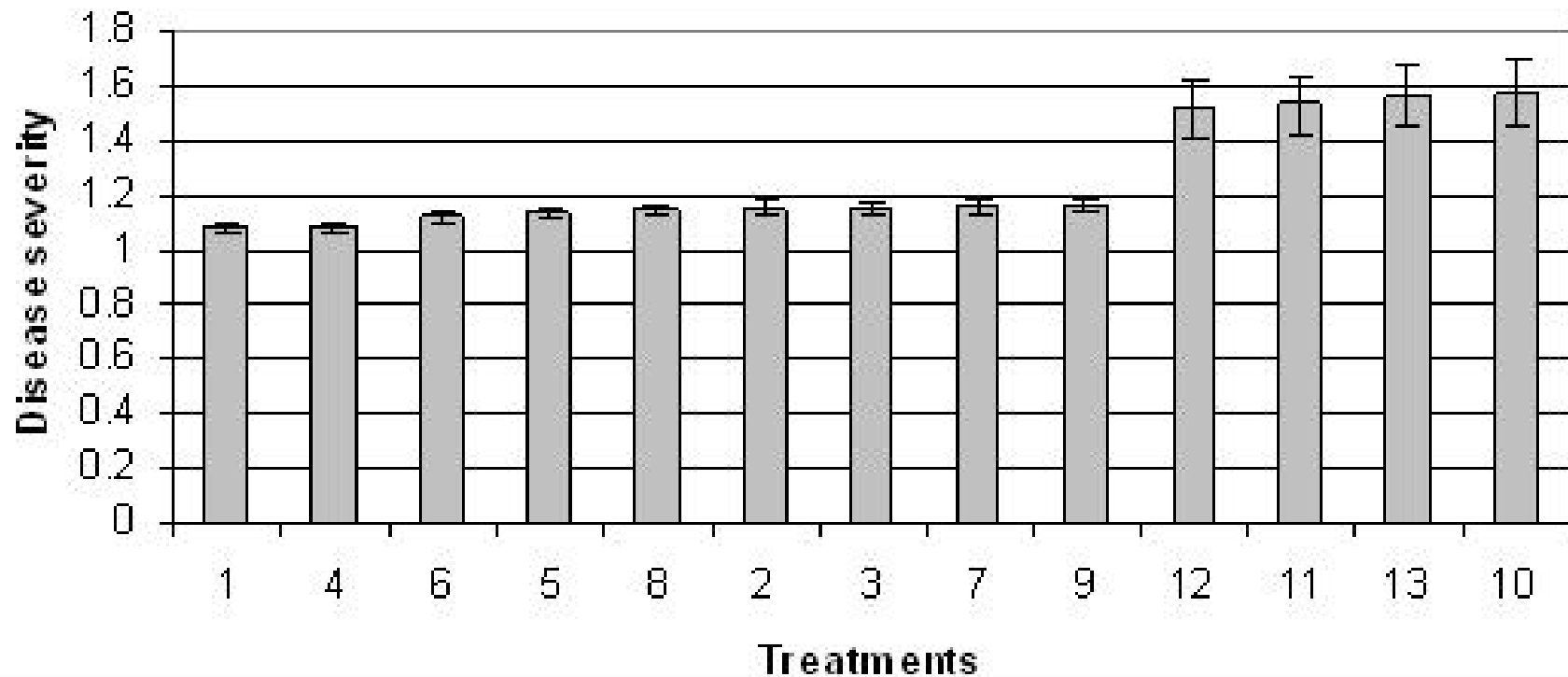
Pic 60, 300 lb

Untreated

(Topsin M 4.5F post-plant applications)



Field fumigation study: 2009 (*Macroph.* & *Fus.*)



Disease severity scale:

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

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

Summary

- *Macrophomina* and *Fusarium* are new soilborne concerns for CA growers.
- Present in central coast CA.
- Field diagnosis is not possible.
- Likely to be a persistent problem.
- Management strategies will be similar for dealing other soilborne pathogens.

Acknowledgments

- **Strawberry growers in California**
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