

Review of Strawberry Diseases in California

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Foliar

- **Angular leaf spot**
- **Anthracnose**
- **Common leaf spot**
- **Phomopsis leaf bl.**
- **Leaf blotch**
- **Powdery mildew**

Fruit

- **Gray mold**
- **Anthracnose**
- **Rhizopus rot**
- **Mucor rot**
- **Leather rot**
- **Powdery mildew**

Foliar

- Angular leaf spot
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- Common leaf spot
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Fruit

- **Gray mold**
- **(Anthracnose)**
- Rhizopus rot
- Mucor rot
- Leather rot
- Powdery mildew

**Common
leaf spot**



Leaf blotch



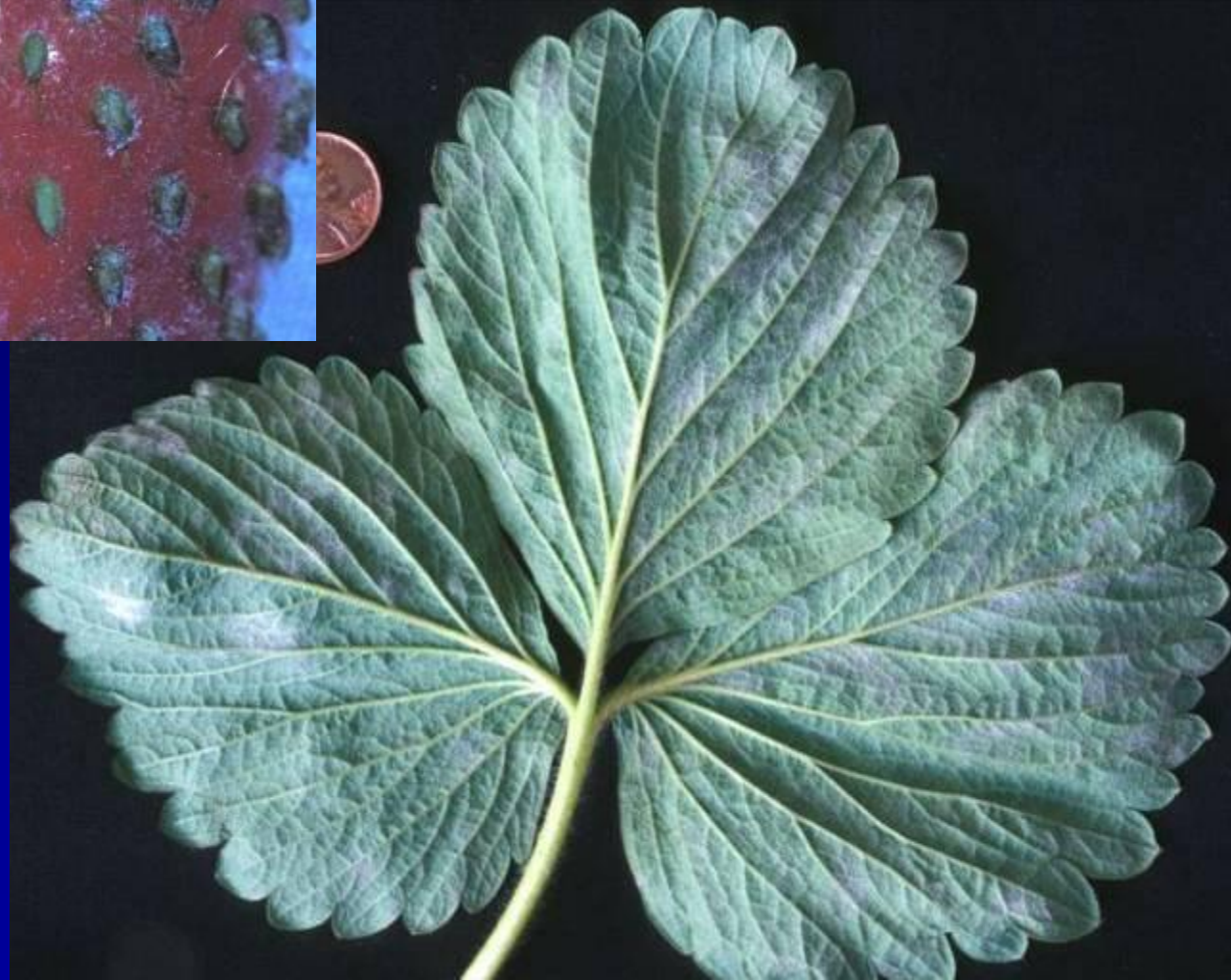
Angular leaf spot



Angular leaf spot



Powdery mildew



Gray mold



Anthracnose



Rhizopus



Mucor



Recent developments

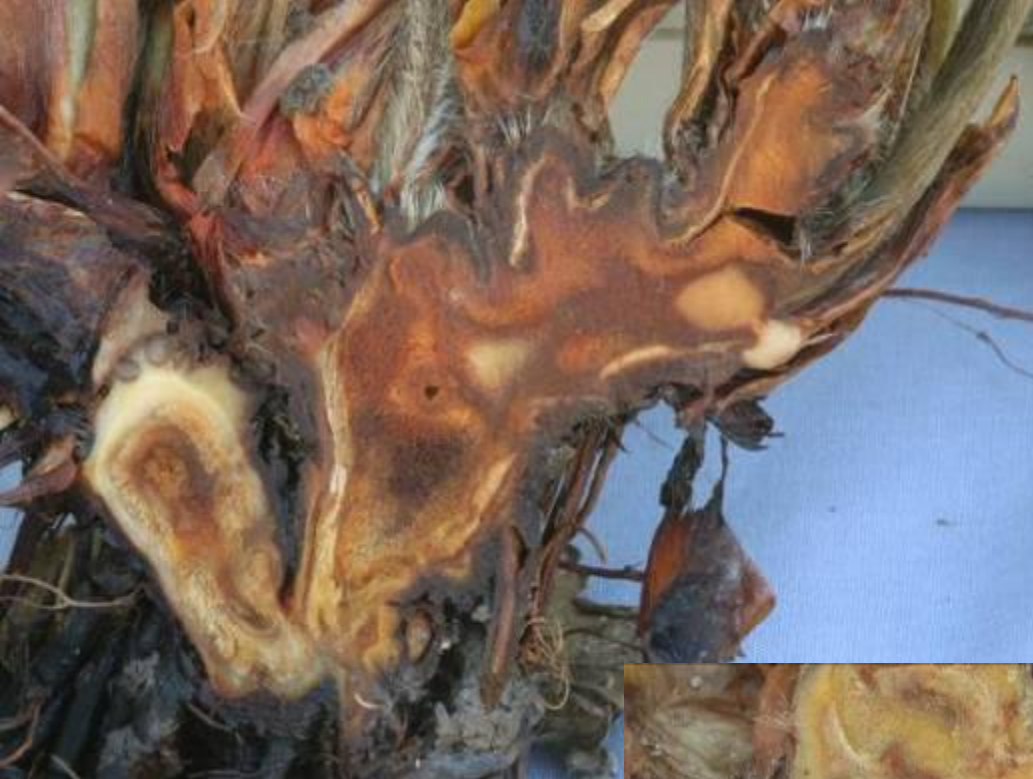
- Dieback/collapse first noticed in 2005.
- Increasing incidence through 2011.
- Not associated with *Phytophthora*, *Verticillium*, or other pathogens.
- In fields without MB/CP flat fumigation
- Two pathogens responsible:
 - *Macrophomina phaseolina*
 - *Fusarium oxysporum* f. sp. *fragariae*

Recent developments

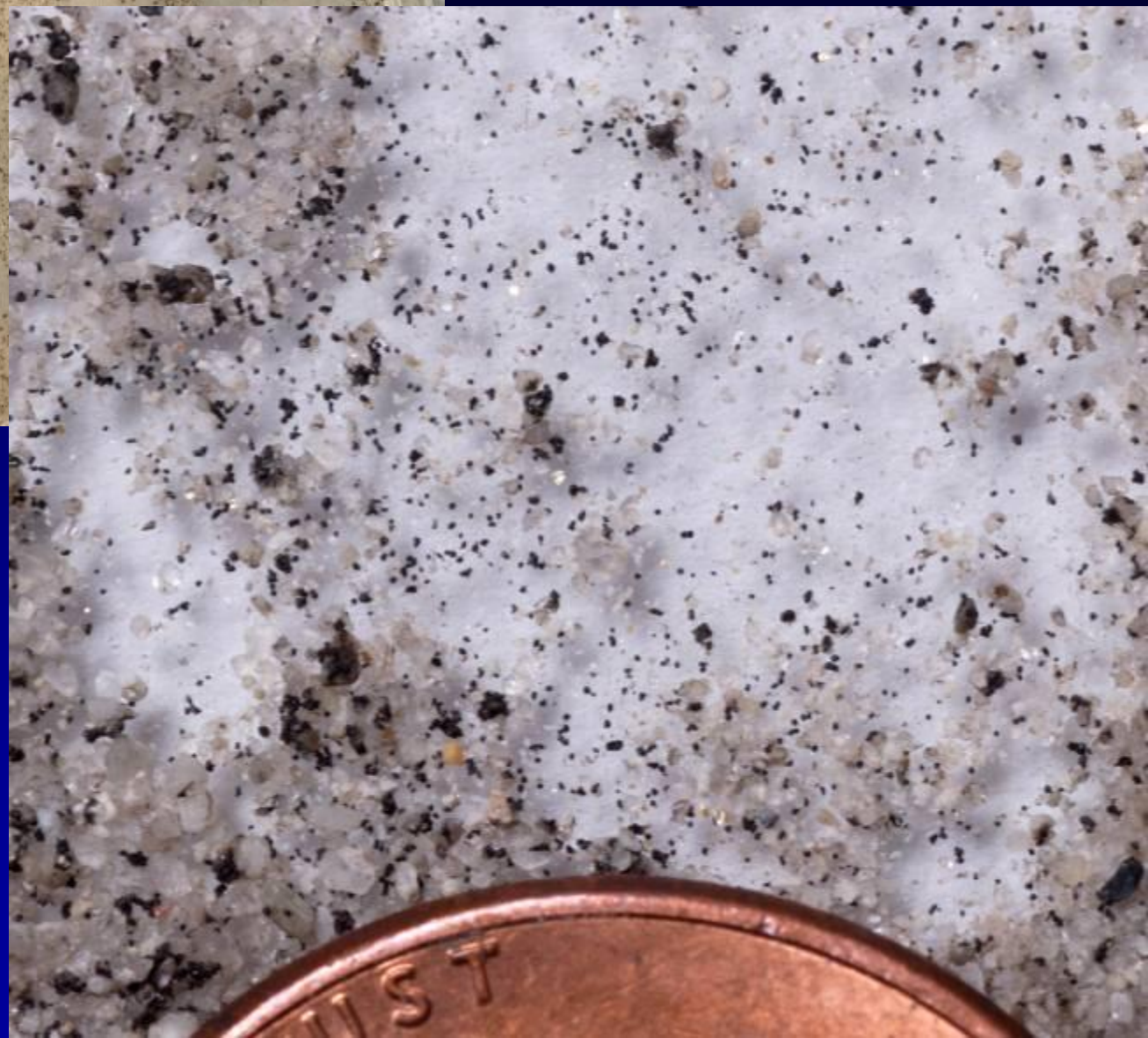
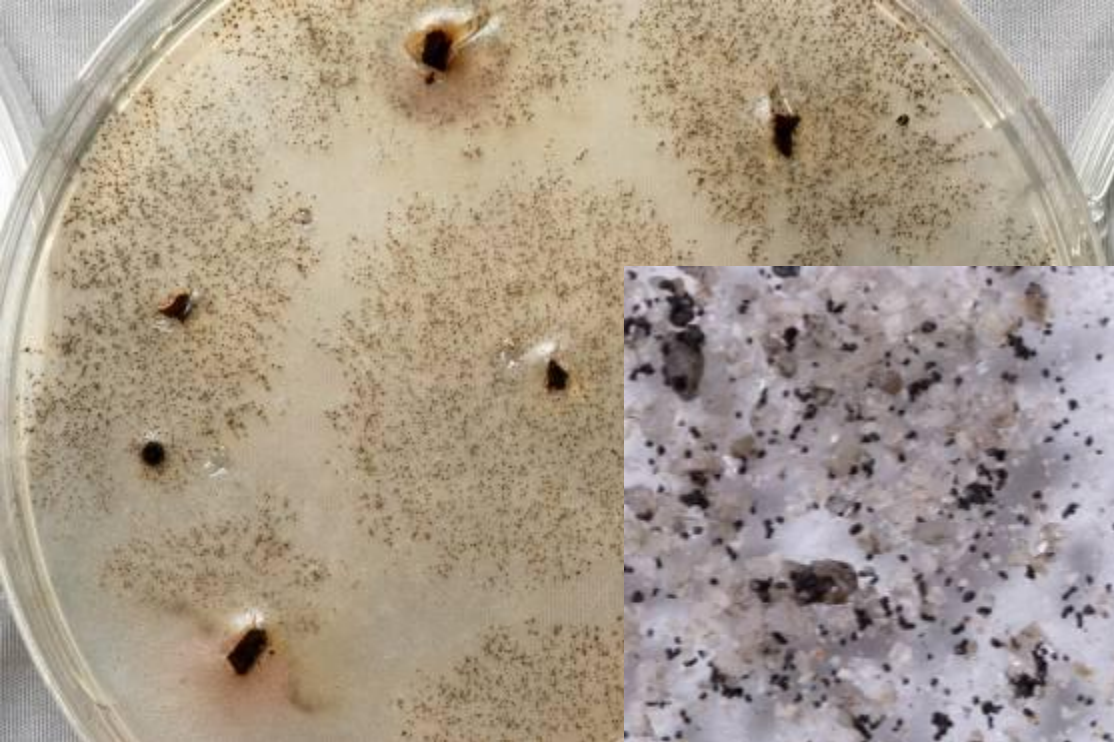
- **Distribution:**
 - Initially in southern CA (Orange, Ventura)
 - Now occurring in other parts of CA
- **Symptoms:**
 - Plant wilting
 - Poor growth
 - Plant collapse and death
 - Discoloration of crowns

Charcoal rot





M. p.



Distribution

- ***Macrophomina* on strawberry:**
Argentina, 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*

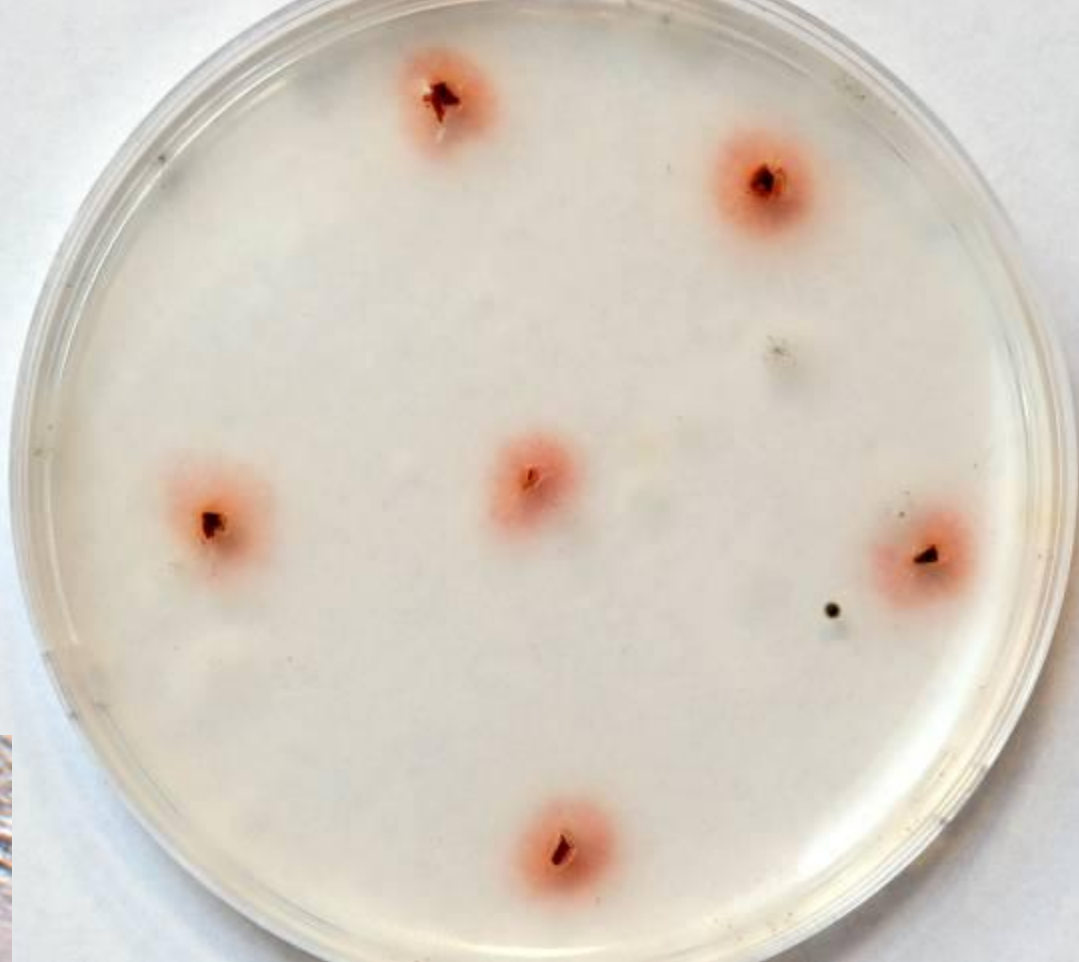


Fusarium wilt





Fof



Distribution: *Fusarium*

- ***Fusarium* on strawberry: Argentina, Australia, China, S. Korea, Spain, Japan, USA (CA, SC)**
- **California strawberry:**
 - **Ventura County**
 - **(Monterey: one corner of one field in 2009; was later fumigated)**

**Fusarium oxysporum
f. sp. fragariae**



2006



2011



**2011:
Verticillium
outbreaks?**

Verticillium wilt





**Phytophthora
root and crown
rot / fruit rot**



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	no	yes
Stress	yes	yes	yes	no
Assoc. w/ H ₂ O	no	no	no	yes

Management: soilborne diseases

- **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.



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