

**Disease Management for
Organic Strawberries:
1. Foliar and Fruit Problems**

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

Fruit

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







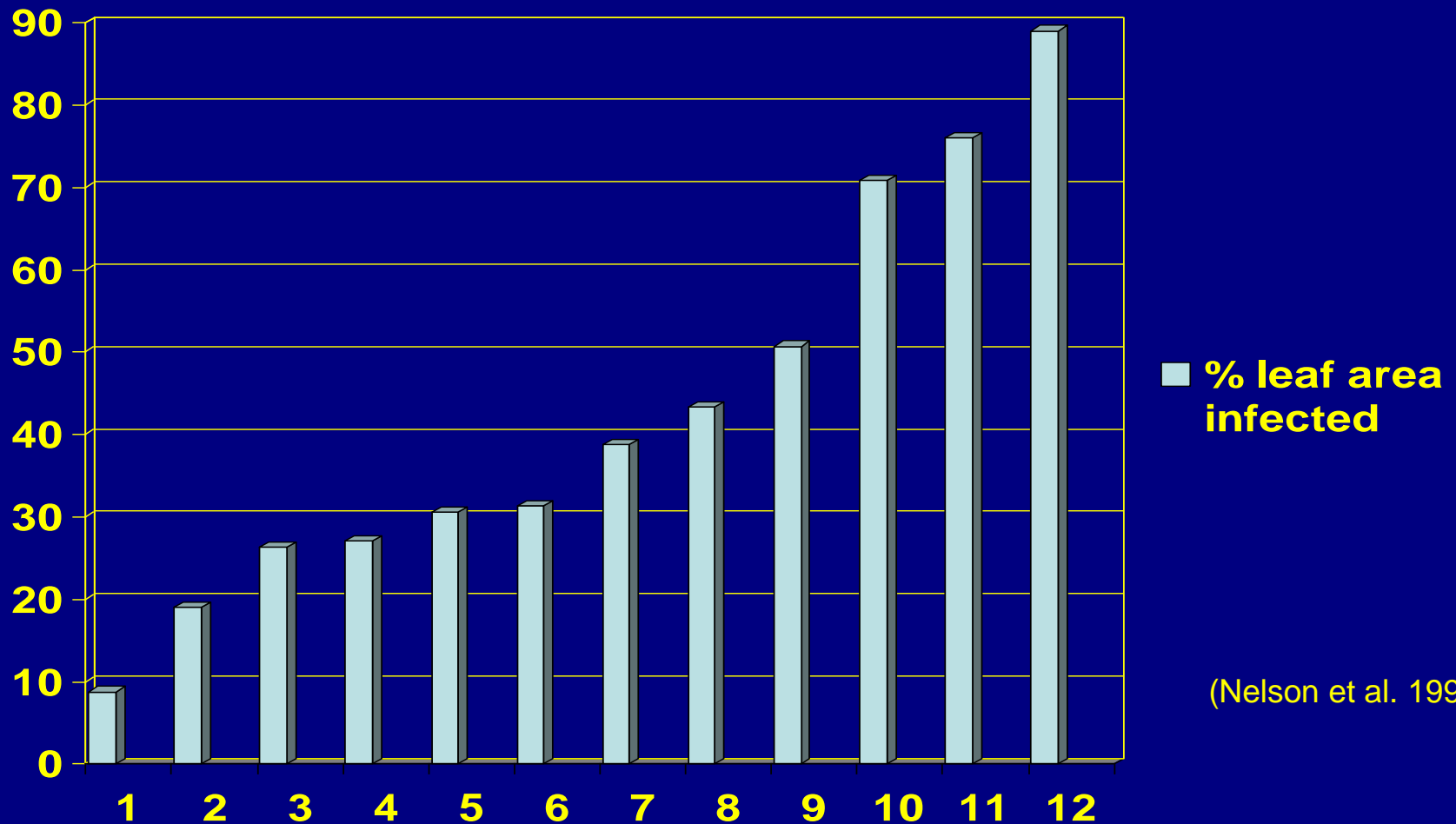
Limited Management Choices

- **Resistant cultivars: lacking**
- **Exclusion: helps with a few diseases**
- **Spray materials: most partially effective (exception: sulfur for pm)**
- **Cultural practices: helpful**

Resistance

- **True genetic resistance: lacking**
- **Differential susceptibility**
- **Simulated resistance/tolerance**
 - **Environmental factors**
 - **Plant architecture**

Relative susceptibility of strawberry cvs. to powdery mildew



(Nelson et al. 1996)



Exclusion

- **Exclusion = do not bring the problem into the field.**
 - **Plant “disease free” transplants**
 - **Plant “pathogen free” transplants**
 - **Avoid bringing in infested soil**

Spray Materials

- **Inorganics**
 - Sulfur, copper, bicarbonates
- **Organics**
 - Oils, plant extracts, compost extracts
- **Microbials**
 - Biocontrol agents, antagonists

Cultural Practices

- **Crop rotation**
- **Site selection (microclimate)**
- **Sanitation**
- **Drip irrigation**
- **Plant density considerations**
- **Other**

Disease Management for Organic Strawberries: 2. Soilborne Problems

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Soilborne Pathogens

- **Major pathogens**
 - **Verticillium**
 - **Phytophthora**
 - **Colletotrichum**
- **Minor pathogens**
 - **Rhizoctonia**
 - **Cylindrocarpon**
 - **Macrophomina ***
 - **others**

Verticillium wilt





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



Macrophomina phaseolina



Strawberry as a Host

- **Perennials: slow growing and exposed to pathogens for a long time**
- **Transplants: exposed at trans. stage**
- **Undergoes prolonged physiological stress during fruiting**
- **No completely resistant cultivars**
- **Some differences in susceptibility**

Soilborne Pathogens

- **Persistent, long term residents in soil**
- **Survive without a strawberry host**
- **Populations slowly decline in absence of host**
- **Different strains may exist**
- **Live in complex ecological systems**

Managing Soilborne Problems

- **Site selection: avoid problems**
- **Exclusion: transplants, infested soil**
- **Crop rotation**
- **Use less susceptible cultivars**
- **Proper cultural practices**
- **Biofumigation: broccoli rotation**



Verticillium Host Ranges

<u>V. source</u>	<u>lettuce</u>	<u>strawb</u>	<u>pepper</u>	<u>cauliflower</u>
lettuce	++++	+++	+	0
strawberry	+++	++++	+	+
pepper	+	+	++++	+
pepper*	+++	+++	++++	+
cauliflower	0	+	+	++++

+++ / ++++ = very good host

+ = not a very good host

0 = not a host

* = unusual pepper isolate



Field Context Case Study

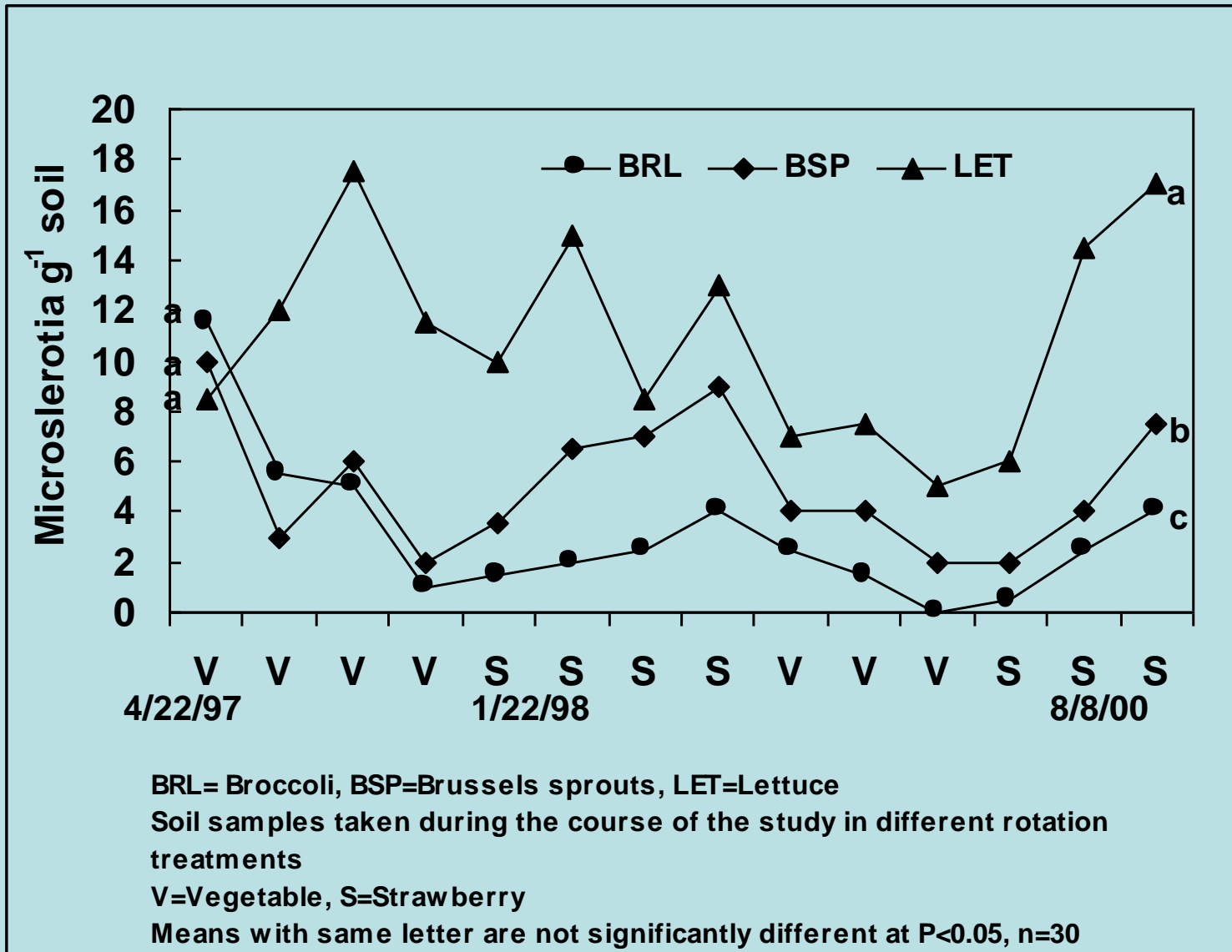
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Straw yes	A	Caul no		Lett no	B	Straw no
Spin no	Straw no	Straw yes		Straw no	Caul yes	Caul yes
			Previous Vert y/n?			

Field Context Case Study

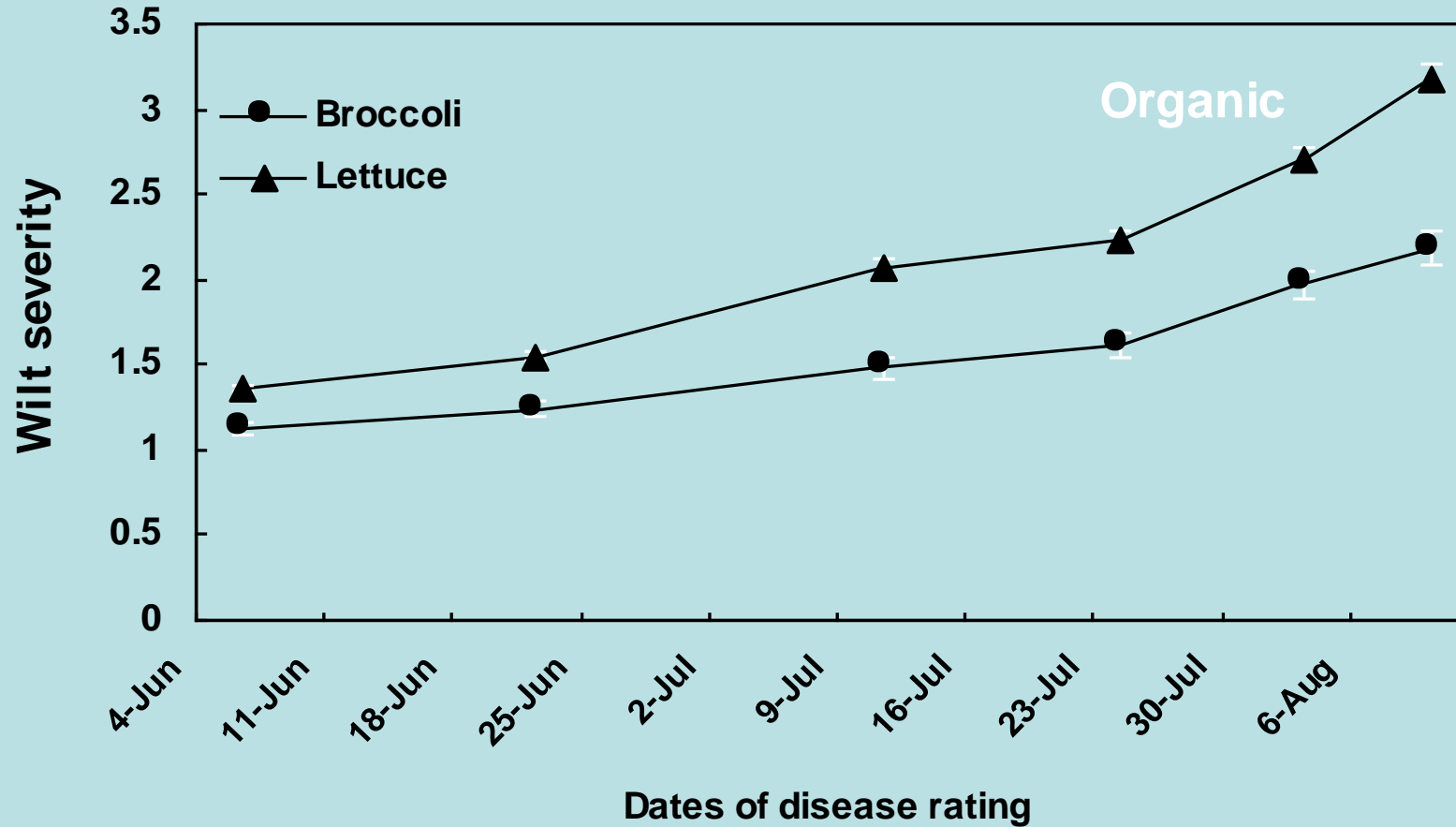
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Crop rotation effects on Verticillium in soil



Crop rotation effects on Verticillium wilt severity of strawberry





USDA