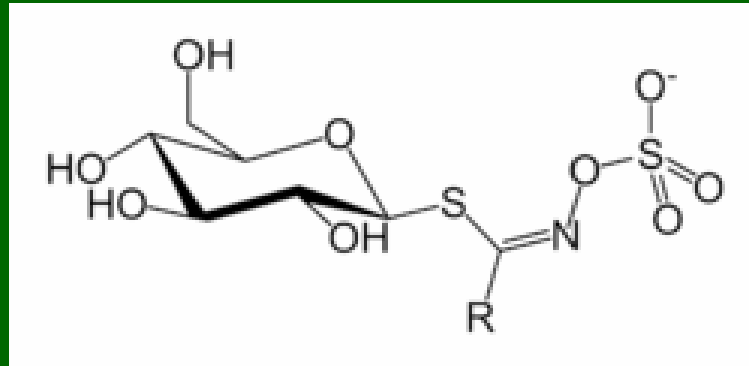


Effect of Glucosinolate Exposure on *Sclerotinia sclerotiorum* and *Phytophthora capsici*

Michael Bomford,
Amy Bateman, Paul
Vincelli, Brian Geier,
George Antonious



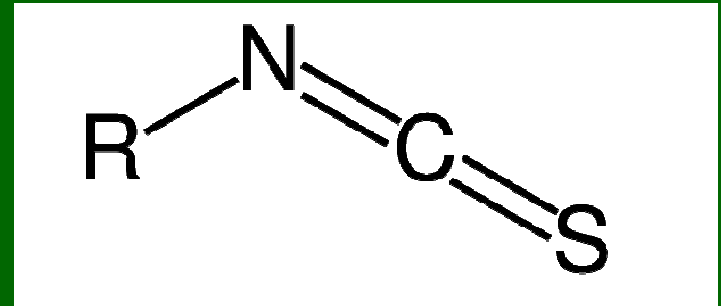
Glucosinolates



- Product of brassica plants
- Feeding deterrent, stimulent
- Source of bitter taste of mustards
- Anti-cancer effect in humans
- Bred out of many crops to avoid negative effects on foragers

Biofumigation

- Incorporation of brassica cover crops / green manures
- Glucosinolates break down into volatile isothiocyanates
 - Natural fumigant – antifungal properties
- Question: Can biofumigation control soil-borne fungal pathogens in Kentucky?



Sclerotinia sclerotiorum

- Thrives in cool, moist conditions
- Persists in soil as sclerotia



- White mold of lettuce
- Broad host range
- Problem in solar-heated high tunnels used for season extension

Phytophthora capsici

- Soil-borne organism that causes various symptoms
 - Damping off, root rot, crown rot, stem rot, fruit rot
- Broad host range: pepper, tomato, eggplant, cucurbits
- Thrives in warm, moist conditions

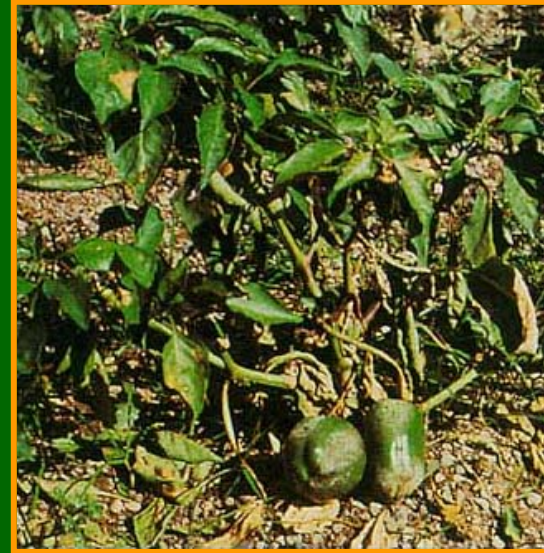
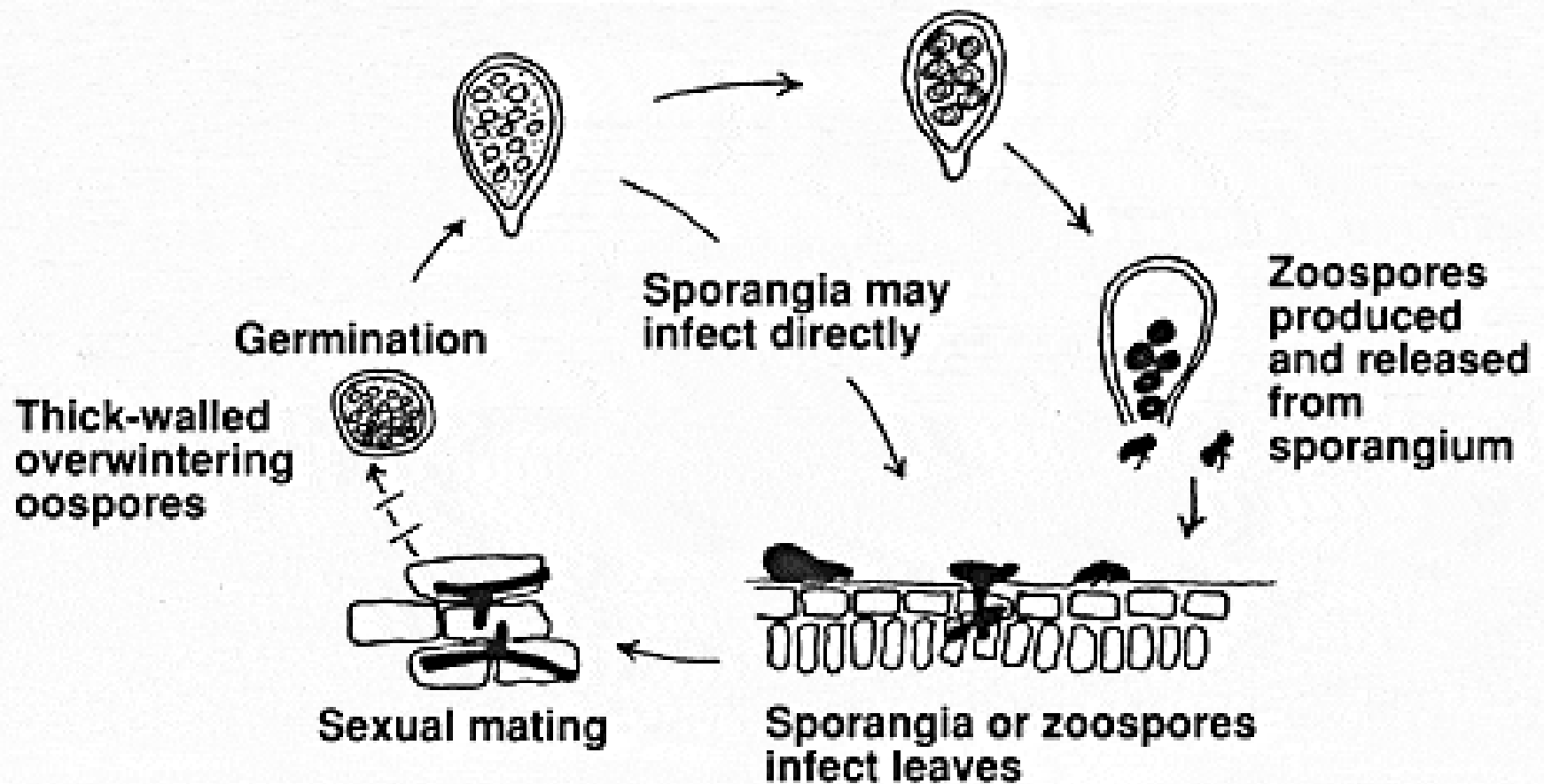


Fig. 8 Disease cycle of *Phytophthora* blight of pepper caused by *Phytophthora capsici*.

Sporangia form on diseased seedlings and leaves and are spread by wind, water, etc.





Objective:

“Find good mustard for biofumigation”

- Evaluated 47 brassica accessions for suitability as a cover crop in field and high tunnel
 - *Brassica juncea* (Indian mustard),
B. napus (Rape),
B. carinata (Ethiopian mustard),
Eruca sativa (Arugula)
 - Survival, days to maturity, biomass production,
- Determined glucosinolate content of most promising accessions (Antonious 2008)



Methods

- MeOH tissue extract
 - 0, 0.25, 0.5, 1.0, and 2.0 g f.w.
- Placed in scintillation vials for 24 h with
 - equivalent amount of myrosinase
 - 15 *S. sclerotiorum* sclerotia
 - sterile soil (4 mL total)
- Plated onto Petri dishes with 40 mL sterile soil for 6 wk germination at 16 °C



ID	Accession	Species
8	Ames 8657	<i>B. juncea</i>
9	Ames 8660	<i>B. juncea</i>
10	Ames 8674	<i>B. juncea</i>
12	Ames 8754	<i>B. juncea</i>
19*	PI 120923	<i>B. juncea</i>
21	PI 180417	<i>B. juncea</i>
22	PI 603015	<i>B. juncea</i>
27*	PI 169083	<i>B. napus</i>
43*	PI 633215	<i>Eruca sativa</i>
45	Pacific Gold	<i>B. juncea</i>
47*	Ida Gold	<i>B. campestris</i>

*Field-grown accession tested in addition to high tunnel grown accession

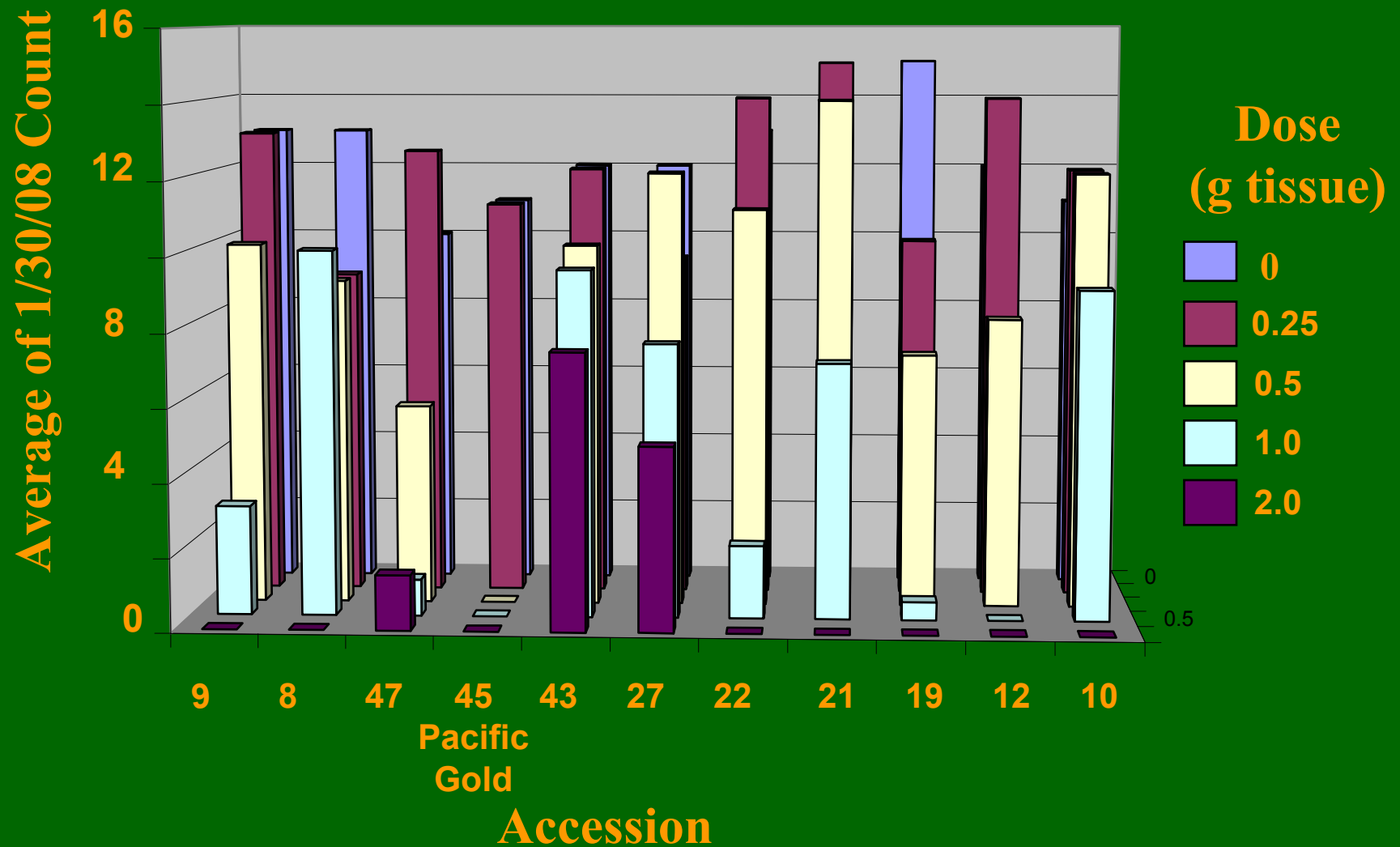
Methods

- MeOH tissue extract
 - 0, 0.25, 0.5, 1.0, and 2.0 g f.w.
- Placed in dark sealed culture flasks for 2 wk with
 - equivalent amount of myrosinase
 - 20 *P. capsici* oospores
 - sterile soil (4 mL total)
- Oospore germination tallied

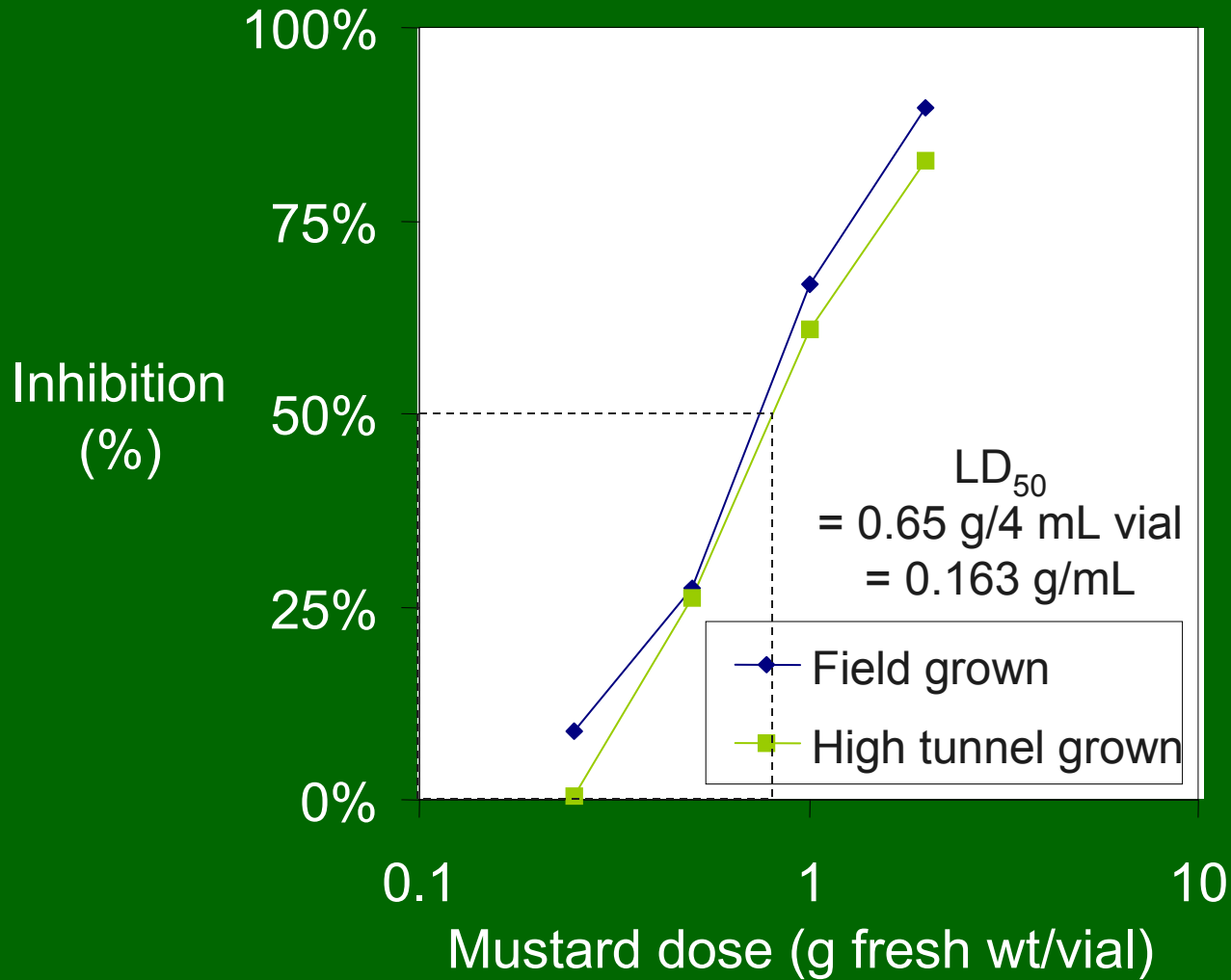
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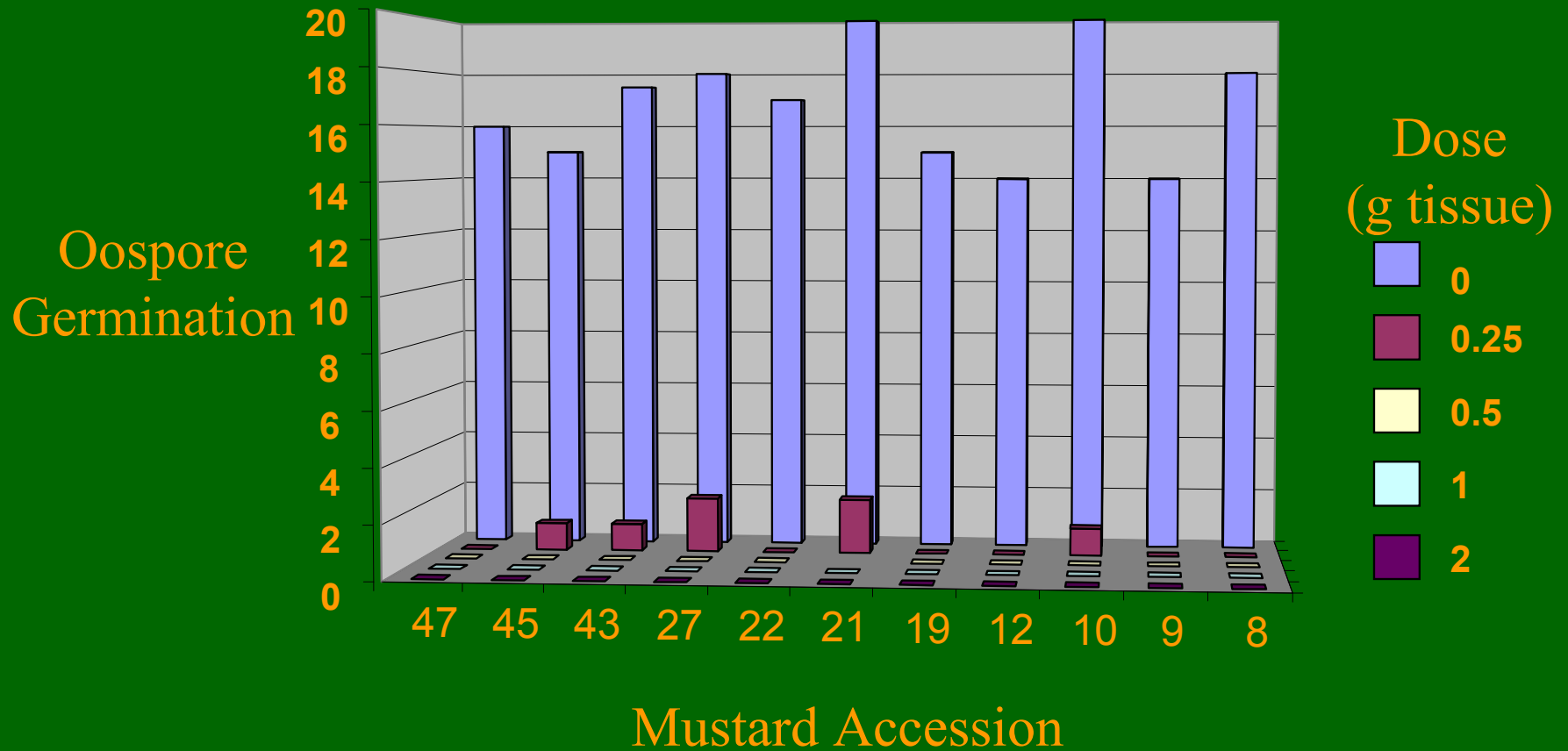
Results: *S. sclerotiorum* Germination (of 15) After Exposure to Mustard Extracts



Results: *S. sclerotiorum* Inhibition



Results: *P. capsici* Oospore Germination (of 20) After Exposure to Mustard Extracts



Results and Conclusions

- 24 h exposure to extracts from 0.65 g mustard tissue per 4 mL vial (0.163 g/mL) reduced *S. sclerotiorum* sclerotial germination by 50%
- ‘Pacific Gold’ gave the best reduction in *S. sclerotiorum* germination
- *P. capsici* oospore germination was completely inhibited by exposure to extracts > 0.5 g mustard tissue / 4 mL substrate (0.12 g/mL).
- *P. capsici* oospores are more sensitive to mustard extracts than *S. sclerotiorum* sclerotia.
- More research is needed to apply these results in the field.

