

Managing Phytophthora Blight of Vegetable

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25 January 2022

Phytophthora Blight

(*Phytophthora capsici*)

Importance:

- *P. capsici* was identified by Leonian in 1922 in New Mexico (USA) on pepper
- Now, worldwide occurrence
- Affects >50 species in 15 plant families
- Important on peppers and cucurbits
- Causes up to 100% crop losses

Managing Phytophthora Blight of Peppers



Phytophthora blight of bell pepper

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Phytophthora blight on chili pepper

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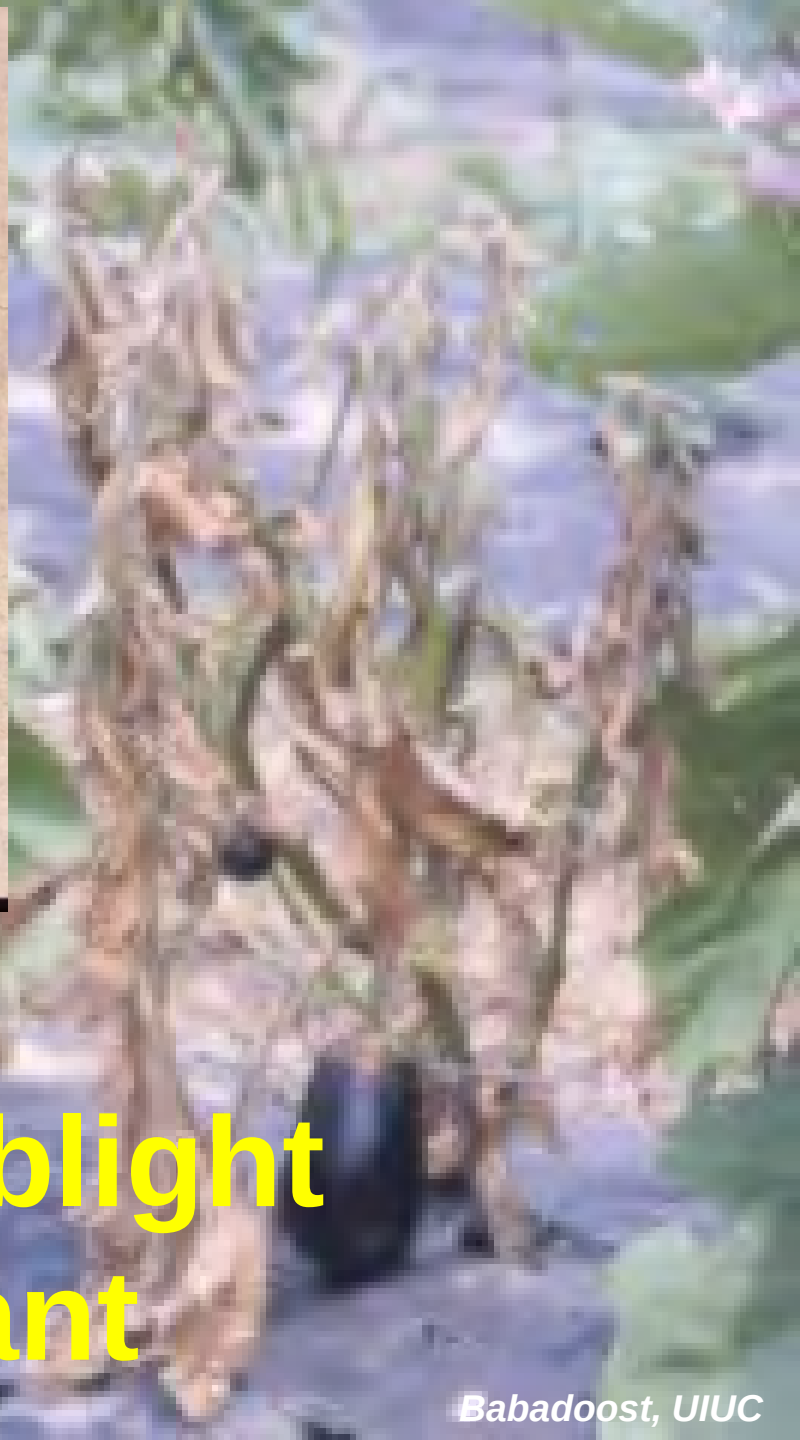
Phytophthora blight of pepper, 100% crop losses





Phytophthora blight of pepper

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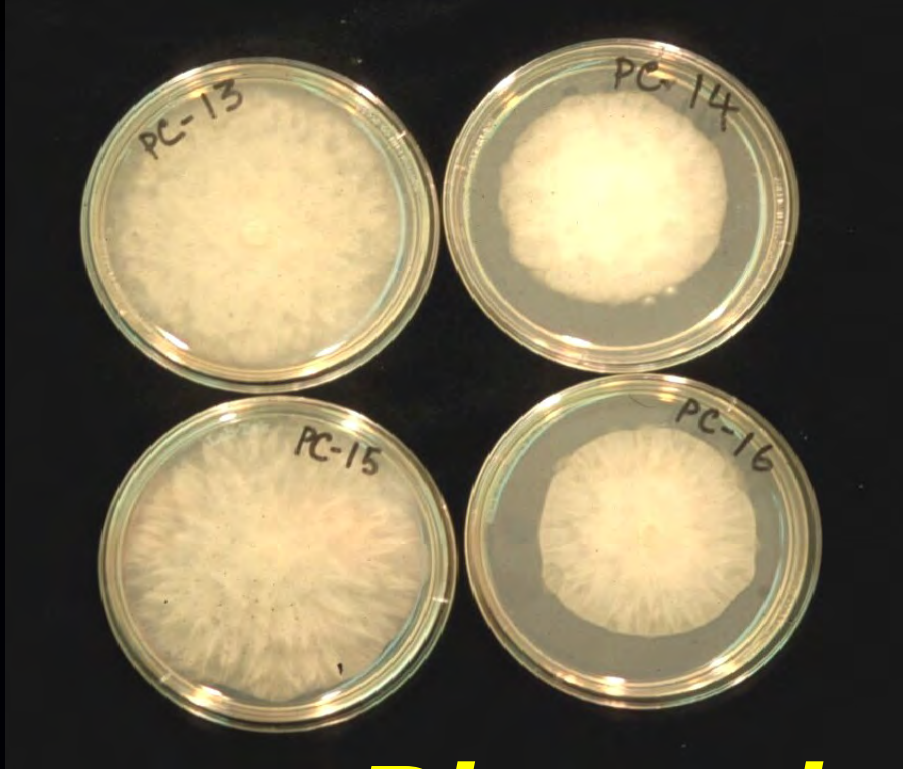


**Phytophthora foliage blight
and fruit rot of eggplant**

Phytophthora Blight

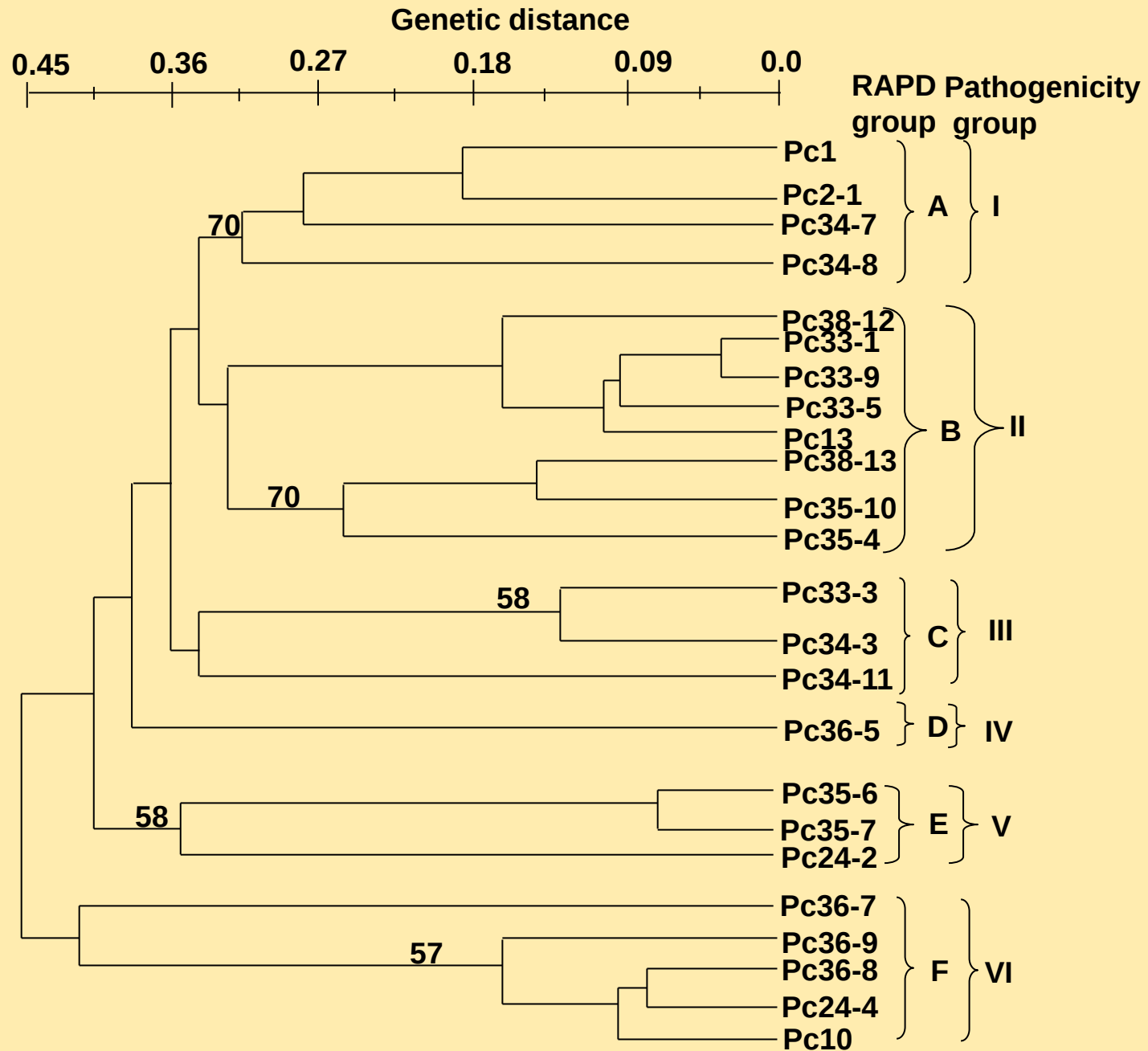
(Phytophthora capsici)

- An oomycete pathogen
- Genetic and pathogenic variations
- Multi-cycle disease
- Survival: oospores and mycelium
- Favorable conditions: moist & warm



Phytophthora capsici





Phytophthora Blight of Peppers (Management)

- **Resistant cultivars**
- **Red-light induced resistance**
- **Cultural practices**
- **Chemical control**



Evaluating pepper cultivars for
resistance to *Phytophthora capsici*

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**Evaluating pepper cultivars for resistance
to *Phytophthora capsici***

Evaluating pepper cultivars for resistance to *Phytophthora capsici*





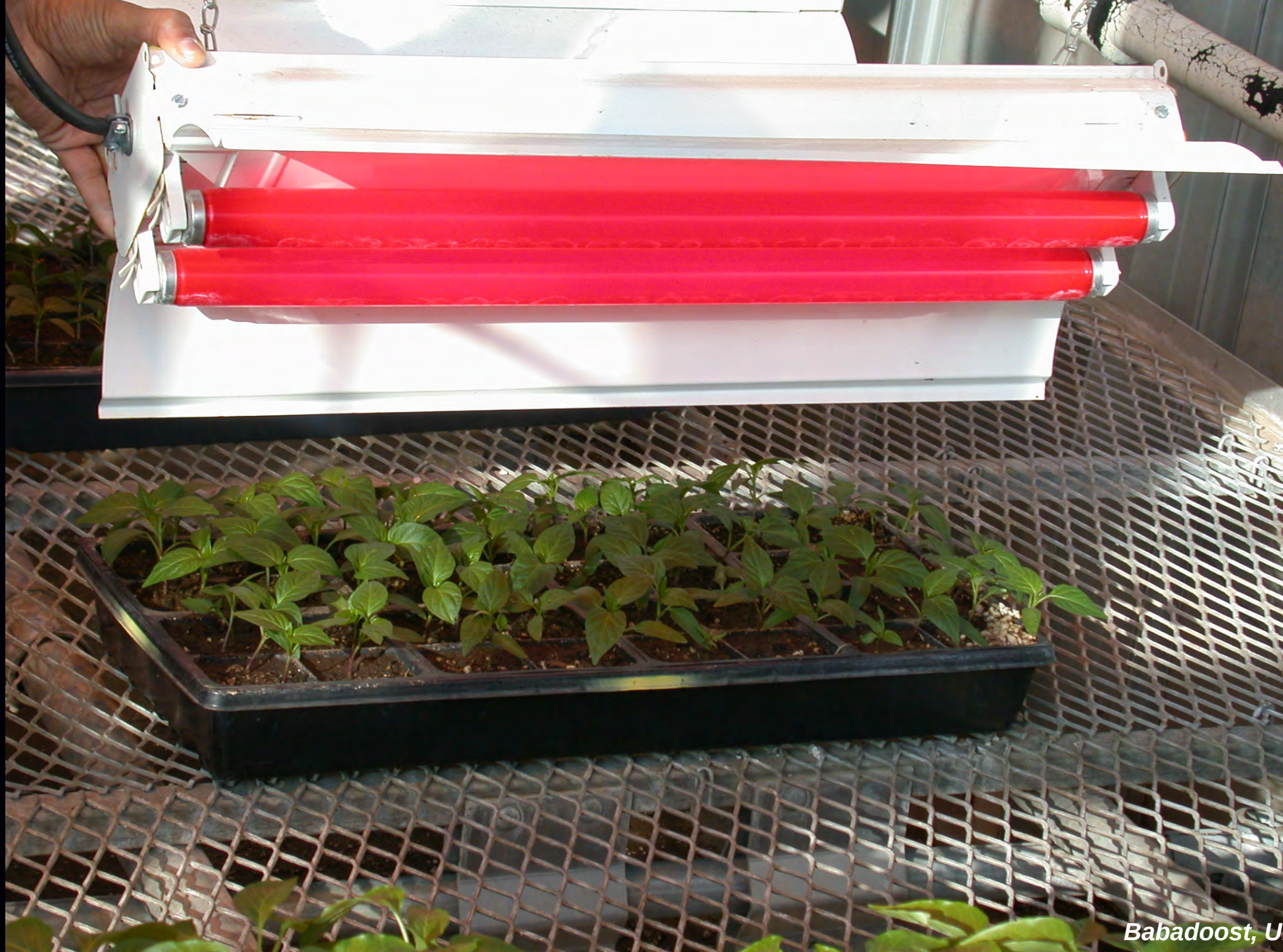
Conclusions

Greenhouse and field trials showed that following bell pepper cultivars are resistant/tolerant to *Phytophthora capsici* (Illinois Isolates)

- Alliance
- Aristotle
- Emerald Isle
- Enza
- Intruder
- Paladin
- Reinger
- Revolution

Phytophthora Blight of Peppers (Management)

- Resistant cultivars
- **Red-light induced resistance**
- Cultural practices
- Chemical control





Natural Light

Red Light



Phytophthora Blight Management (Red-Light Treatment,) - Greenhouse

Grow seedling under red light ($\lambda = \sim 650$ nm) for 4 weeks – resistance induced

	Seedling death (%)
Red-light	36
Natural light	100

Phytophthora Blight Management (Red-Light Treatment)

- Greenhouse: **Good effect**
- Field: **Inconsistent results**

Phytophthora Blight of Peppers (Management)

- Resistant cultivars
- Red-light induced resistance
- **Cultural practices**
- Chemical control

Phytophthora Blight of Peppers (Management)

- **Cultural practices**
 - ❖ **Raised bed, light soil, low moisture**
 - ❖ **Crop rotation**
 - ✓ Host range of the pathogen
 - ✓ Survival of the pathogen in soil

Phytophthora Blight Management

(Host Range: 36 Crops and 9 Weed Species)

Host

Cantaloupe Cucumber Gourd

Eggplant pepper Beet

Pumpkin Squash Radish

Zucchini Watermelon Turnip

Honeydew Swiss-chard Carrot

Spinach Nightshade Onion

Green bean Lima bean Tomato

Velvet-leaf Snow pea Tobacco

Non-Host

Corn Pigweed Soybean

Broccoli Kale Cabbage

Crabgrass Basil Chives

Sandbur Celery Dill

Wheat Water hemp Barley

Cocklebur Lamb's-quarters

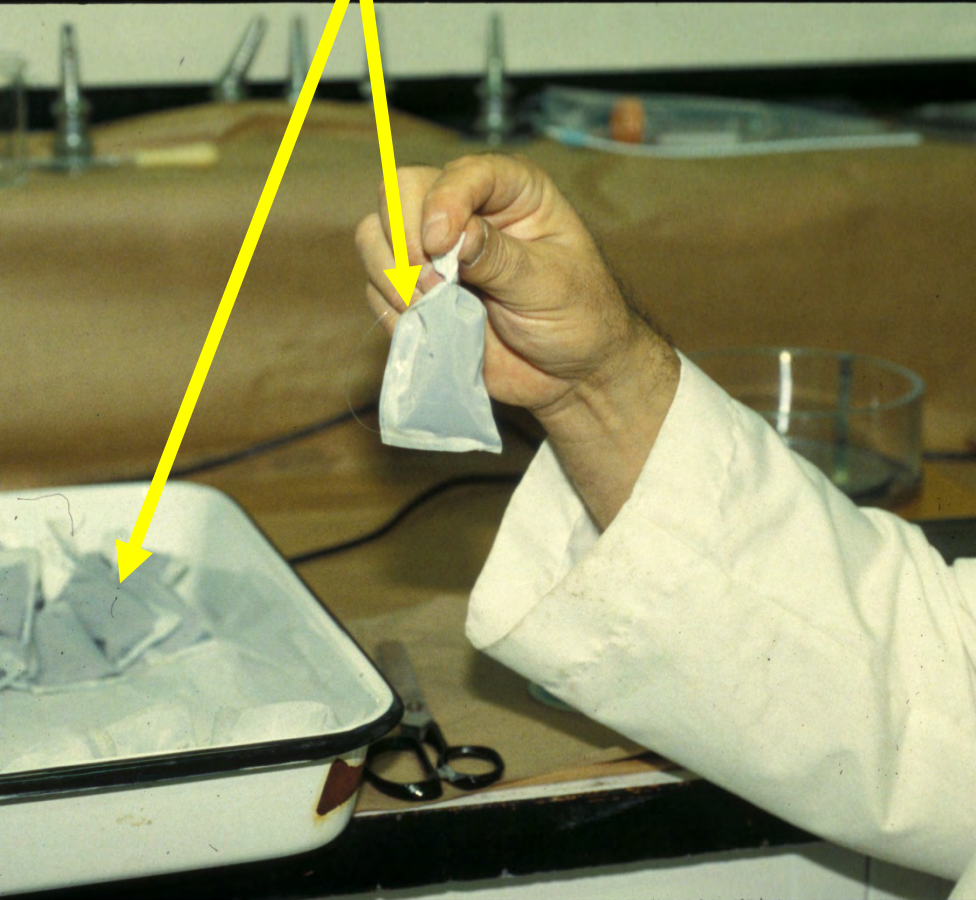
Mustard Cauliflower Kohlrabi

Parsley Puncture vine

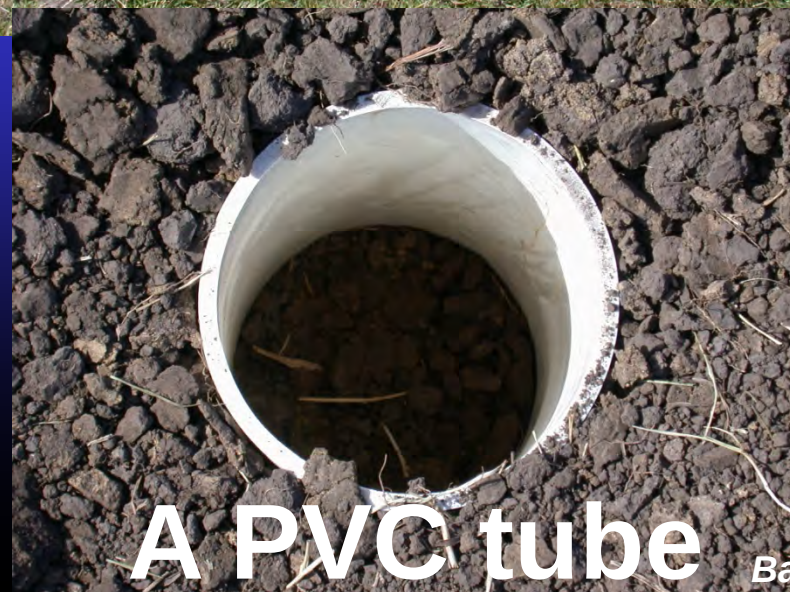
Phytophthora Blight of Peppers (Management)

- Survival of *Phytophthora capsici* in soil
 - 5,000 oospores/ g soil
 - 4 soil types x 3 depths (2, 10, 25 cm) for 4 years

Infested soil in mesh bags



The experimental site



A PVC tube

% Oospores recovered

Depth:

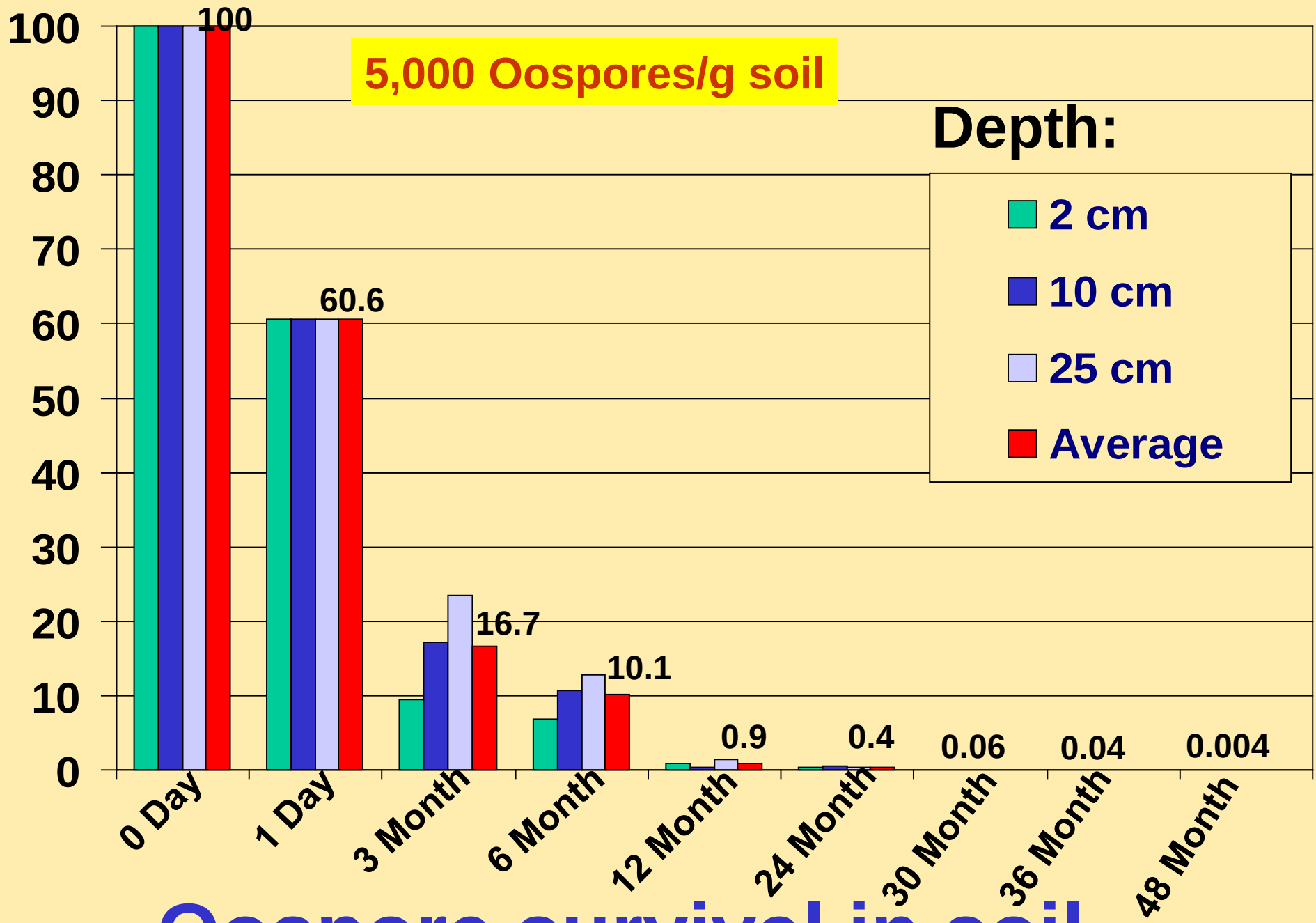
- 2 cm
- 10 cm
- 25 cm
- Average

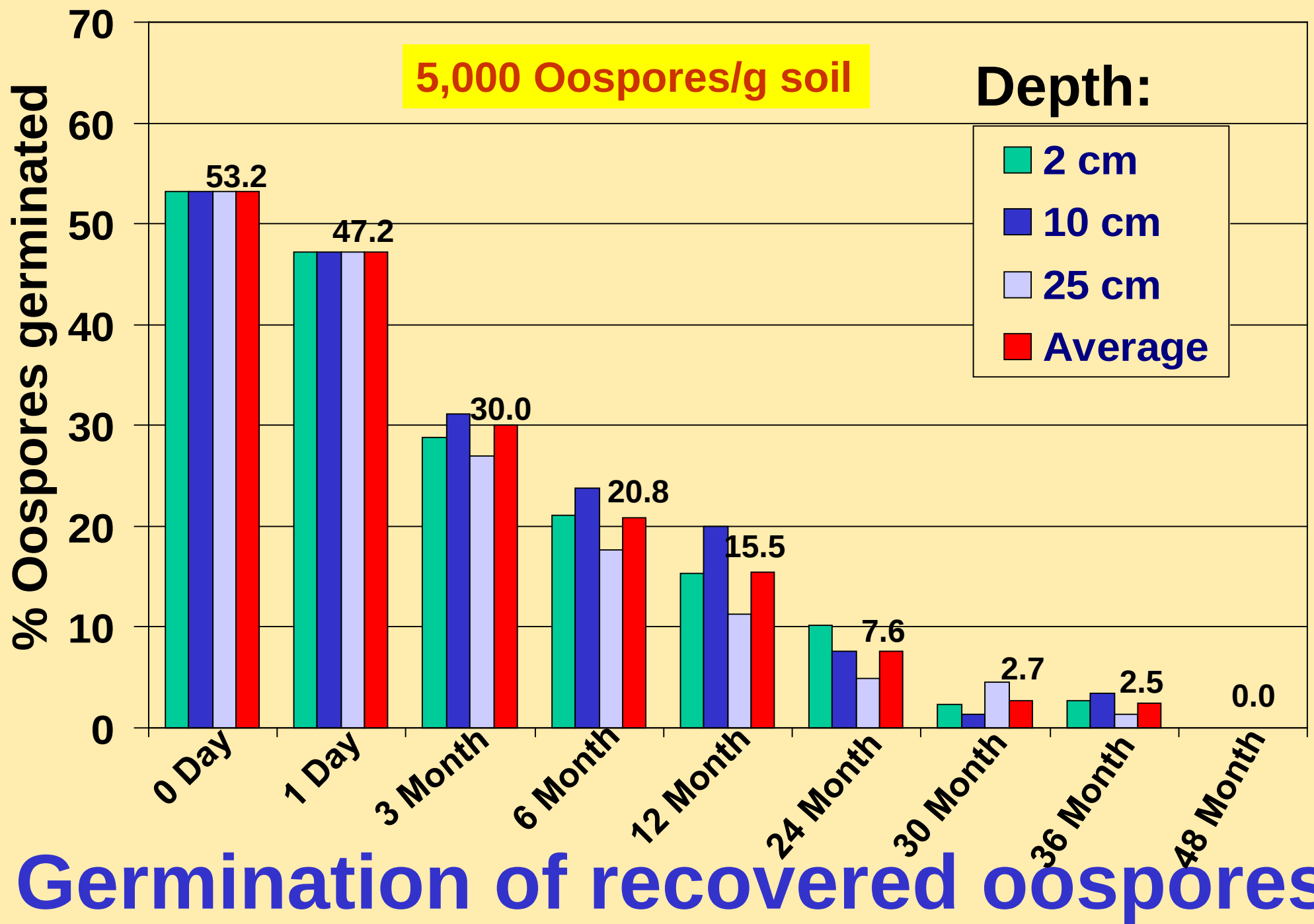
5,000 Oospores/g soil

0 Day 1 Day 3 Month 6 Month 12 Month 24 Month 30 Month 36 Month 48 Month

Oospore survival in soil

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Conclusions

(Cultural Practices: Crop Rotations)

- ≥ 3 years crop rotations with non-host plants and effective weed control is necessary for managing *Phytophthora* blight (***Phytophthora capsici***)

Phytophthora Blight of Peppers (Management)

- Resistant cultivars
- Red-light induced resistance
- Cultural practices
- **Chemical control**

Phytophthora Blight of Vegetables (Chemical Control)

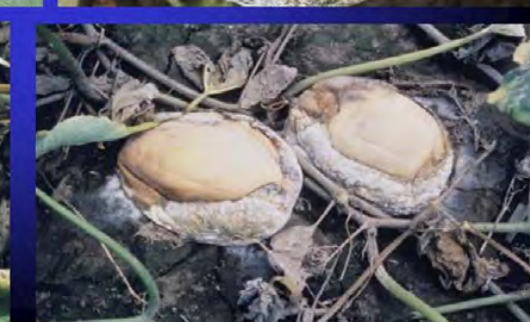
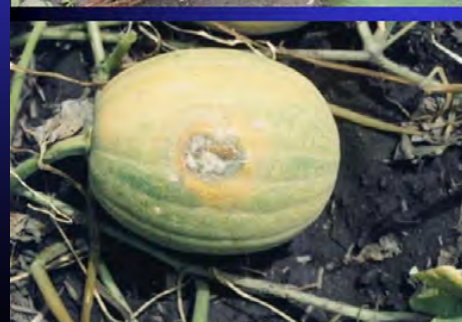
- Since 2000, we have been testing almost all available fungicides with potential effect on oomycetes for control of *Phytophthora capsici*

**Will Provide Effective Fungicides at
the End**

Managing Phytophthora Blight

- **Recommended practices**
 - ❖ **Plant resistant cultivars**
 - ❖ **≥3 years of effective crop rotations**
 - ❖ **Grow on raised beds**
 - ❖ **Avoid using contaminated water**
 - ❖ **Fungicide applications (7-day, alternate)**
 - ❖ **Tolerant cultivars with fungicides**

Managing Phytophthora Blight of Cucurbits



Phytophthora blight of pumpkins



Phytophthora fruit rot of cucurbits

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Managing Phytophthora Blight of Cucurbits

- **Plant resistance:**
 - No cucurbit cultivar resistant to *P. capsici* is available**



For control of seedling death:

Seed treatment with Apron XL LS (0.64 fl oz/ 100 lb seed) prior sowing seeds. Seed treatment protect plants for 5 weeks.



For control vine and fruit infection:

Fungicide spray-applications beginning at the first sign of the disease. Apply fungicide at 7-day intervals. Effective fungicide: Orondis Ultra, Revus, Ranman, Elumin, and Presidio.

Managing Phytophthora Blight of Cucurbits

➤ Minimize inoculum build up (early season)

❖ Remove or
disk
small area
with
Phytophthora
infected
plants





Pumpkin fruit rot in bins in storage,
caused by *Phytophthora capsici*

Pumpkin fruit rot in the field,
caused by *Phytophthora capsici*

Sanitation: If you touch an infected fruit,
decontaminate your hands (soap or
ethanol) before touching uninfected
fruits.

Managing Phytophthora Blight of Cucurbits

➤ Recommended practices

- ❖ **≥3 years of crop rotations/weed control**
- ❖ **Seed treatment with Apron XL LS
(0.64 fl oz/100 lb seed)**
- ❖ **Avoid using contaminated water**
- ❖ **Disk localized infected plants (spot)**
- ❖ **Fungicide spray applications**
- ❖ **Sanitation during harvest**

Fungicides for Phytophthora Blight

<u>Name</u>	<u>FRAC Code</u>
Cyazofamid (Ranman)	21
Dimethomorph (Forum)	40
Dimethomorph + Ametoctradin (Zampro)	40, 45
Famoxadon + Cymoxanil (Tanos)	11, 27
Fluazinam (Omega 500F)	29
Fluopicolide (Presidio)	43
Mandipropamid (Revus)	40
Metalaxyl (RGEC, RG Copper)	4
Oxathiapiprolin (Orondis)	49
Phosphonates (ProPhyt,)	33
Zoxamide + mancozeb (Gavel 75DF)	22, M

Fungicides for Phytophthora Blight

➤ Recommended fungicide sprays

- ❖ Orondis Ultra (FRACs: 40, 49)
- ❖ Revus: (FRAC: 40)
- ❖ Ranman (FRAC: 21) + Silwet L-77
- ❖ Elumin (FRAC: 22)
- ❖ Presidio (FRAC: 43)

Spray at weekly schedule

Follow label directions



Drip-Delivery

Fungicide Application for Control of *Phytophthora capsici* in yellow squash

2021 Inoculation, Fungicide	Application method	Asymptomatic plants (%)
No inoculation, no fungicide	_____	87.50 a
Inoculated, no fungicide	_____	0.00 c
Inoculated, Orondis Ultra	Sprenc	75.00 a
Inoculated, Orondis Ultra	Drench	72.00 a
Inoculated, Orondis Ultra	Drip-delivered	12.50 c
Inoculated, Presidio	Drip-delivered	37.50 b

Fungicides for Phytophthora Blight

- **Ground application: Good for peppers and cucurbits**
- **Air application: Good for cucurbits; Not good for peppers**
- **Infected parts of plants:**
 - ❖ **Peppers: Roots, foliage & fruits**
 - ❖ **Cucurbits: Foliage & Fruits**

Thank You
Comments/ Questions

**Recovered
mesh bags
with soil
infested with
oospores**



Phytophthora Blight of Peppers (Management)

- **Resistant cultivars**
- **Red-light induced resistance**
- **Cultural practices**
- **Chemical control**