# Managing *Phytophthora* on Cucumber

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Historically, Michigan producers grow over 75,000 acres of vegetables that are susceptible to *Phytophthora capsici*, including cucumber, zucchini, summer and winter squash, watermelon, cantaloupe, pumpkin, pepper, eggplant, tomato, and succulent bean. The pathogen may overwinter in the soil and persist for >10 years. *Phytophthora capsici* is favored by rain and warm temperatures and spreads readily via water. It has also been found in irrigation ponds and surface water sources.

## Recognizing *Phytophthora* on CUCUMBER

- Water-soaked lesions on fruits
- "Powdered sugar" layer of *Phytophthora* spores on fruits and stems

*Phytophthora* symptoms on cucumber seedlings include damping-off and death. The roots of mature cucumber plants appear to be relatively tolerant to *Phytophthora*, but rain may still splash soil with spores onto the foliage and fruit, causing infection. After a fruit becomes infected, it can take up to 2 days for the infected tissue to develop a dark green, water-soaking. Lesions get larger over time, and by 3 days, white spores resembling powdered sugar may form on the fruit surface, followed by fruit rot. Generally lesions are larger and increase in size more quickly at higher temperatures. It is possible to harvest healthy-appearing but infected cucumber fruits, which deteriorate days later in transit or storage.

The best way to prevent crop infection is to avoid planting in a field that has a history of *Phytophthora*. Cultural methods to manage disease include planting into raised beds with black plastic mulch to increase drainage and reduce excess soil moisture and fruits in direct contact with the soil. Increasing row spacing is also suggested to limit conditions favorable to *Phytophthora*. Reducing the plant population in the field can increase fungicide coverage on fruit.

*Phytophthora* can move through water, so it is ideal to plant into well-drained, tiled fields. Surface water should not be used to irrigate as *Phytophthora* can travel in water runoff to creeks, rivers and ponds. ponds. If overhead irrigation must be used, reduced irrigation during fruiting has

**Water-soaking symptoms and white *Phytophthora* spores on cucumber fruits.**

shown to limit infection while not significantly affecting yield. Early scouting is an additional element that should be used in disease management. If *Phytophthora* is found in the field, remove diseased plants and surrounding healthy-looking border plants.

In MSU trials, cucumbers treated with fungicides performed better than untreated plots. Rotate fungicides among FRAC groups to prevent the pathogen from developing resistance. Apply when fruits are 1, 3 and 5 inches in length.

**Left, cucumber fruits at 1", 3" and 5" in length. Right, cucumber fruit surface with "powdered sugar" layer of *Phytophthora* spores.**

## Management Strategies

- Plant into well-drained, tiled fields
- Use raised beds and drip irrigation
- Avoid using surface water for irrigation
- Irrigate sparingly from a well
- Rotate crops
- Scout fields regularly for *Phytophthora*
- Remove diseased plants and adjacent healthy plants
- Apply fungicides when fruits are at 1", 3" and 5" in length
- Powerwash equipment after it has been in infested fields
- Do not dump diseased culls in production fields

Since vines are somewhat tolerant to the disease while fruits are especially susceptible, fungicide sprays should target the developing fruit.

Remember that the pesticide label is the legal document on pesticide use. Read the label and follow all instructions closely. The use of a pesticide in a manner not consistent with the label can lead to the injury of crops, humans, animals, and the environment, and can also lead to civil or criminal fines and/or condemnation of the crop. Pesticides are good management tools for the control of pests on crops, but only when they are used in a safe, effective and prudent manner according to the label.

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## Preferred *Phytophthora* Fungicides for CUCUMBER

| Product | A.I. | FRAC* | Comment |
|---|---|---|---|
| Elumin | ethaboxam | 22 | Rotate between applications. Apply as a soil or foliar spray or via drip. |
| Orondis Gold 200 | oxathiapiprolin | 49 | Apply at-plant in-furrow or via drip (after plant emergence if direct-seeded). |
| Orondis Ultra | oxathiapiprolin/ mandipropamid | 49/40 | Rotate to a fungicide with a different FRAC after 2 sequential applications. Use either soil or foliar applications of oxathiapiprolin products, but not both for disease control. |
| Presidio 4SC | fluopicolide | 43 | Use in a tank mix. Apply via drip or as a foliar spray. |
| Revus 2.08SC | mandipropamid | 40 | Include surfactant. |
| **Apron XL | mefenoxam | 4 | Seed treatment. Wait 6 weeks after transplant to apply mefenoxam products. |
| **Ridomil Gold | mefenoxam | 4 | Apply as a preplant-incorporated, at-plant soil spray or via drip. |
| ***Phytophthora* 'B' Team for CUCUMBER** | | | |
| Forum 4.18SC | dimethomorph | 40 | Use in a fungicide tank mix. |
| Gavel 75DF | mancozeb/ zoxamide | M03/22 | Relatively long PHI. |
| Ranman 400SC | cyazofamid | 21 | See label about surfactant. |
| Zampro 4.4SC | ametoctradin/ dimethomorph | 45/40 | Apply via drip or as a foliar spray. |

*The FRAC code is an alphanumeric code assigned by the Fungicide Resistance Action Committee and is based on the mode of action of the active ingredient.

**While mefenoxam is not labeled for *Phytophthora*, it is labeled for control of *Pythium*. Fungicide resistance has been detected in *Phytophthora* where mefenoxam has been used frequently.