

PHYTOPHTHORA MANAGEMENT IN VINE CROPS

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Michigan growers producing cucumbers, squash, pumpkins, peppers, eggplants and tomatoes have reported significant losses due to Phytophthora blight in recent years. In most cases, the fungus *Phytophthora capsici* is responsible. Infected plants often have brown to black discolored roots and crowns. The disease is more easily seen on infected fruit, initially as dark, watersoaked lesions which may develop a distinctive white ‘powdered sugar’ layer of spores on the surface of the fruit. Infection of fruit is especially troublesome as the infection may occur days before the symptoms become visible.

Control: Crop rotation reduces the number of pathogen spores remaining in a field. A minimum of 3 years crop rotation to hosts other than those listed in the table below is recommended to avoid buildup of *P. capsici* spores. Good drainage is important in managing this disease. Susceptible crops should be planted on well drained sites and in raised beds. However, even plants growing on well drained fields on raised beds may have severe disease if rainfall is heavy. Fungicides are most effective used with appropriate fungicide rotation. Growers should avoid relying on a single fungicide, to delay development of fungicide resistance with *P. capsici*. Crop rotation may help to lower *Phytophthora* levels in a field, but planting any of the susceptible vegetable crops into a field with a history of *Phytophthora* is risky.

Common vegetable hosts affected by *P. capsici*

Cucumber	Bell pepper
Pumpkin	Hot pepper
Summer squash	Tomato
Winter squash and gourds	Eggplant
Zucchini	Watermelon

Control Strategies Preplant:

- Consider a preplant banded fungicide application for fields with known problems with *P. capsici*.
- Plant susceptible crops in well drained fields.
- Utilize raised beds (6" minimum) whenever possible.
- Do not plant in lowlying areas of the field.
- Do not irrigate a field with water that contains runoff from fields with a history of *Phytophthora* disease.

Control Strategies Production:

- Monitor fields for disease, including damping off, plant stunting, root and crown rot.
- Irrigate conservatively and, if possible, do not irrigate prior to harvest.

- Plow under portions of the field with diseased plants, including healthy plants that border diseased areas.
- Remove diseased fruit from the field.
- Never dump culls or diseased fruit from other fields or farms into production fields. Once *P. capsici* is introduced, it may remain indefinitely.
- Apply fungicide preventively, especially for known problem fields.
- Rotate the types of fungicides used.

Control Strategies Postharvest:

- Harvest fruit as soon as possible from problem fields.
- Keep harvested fruit dry and cool.

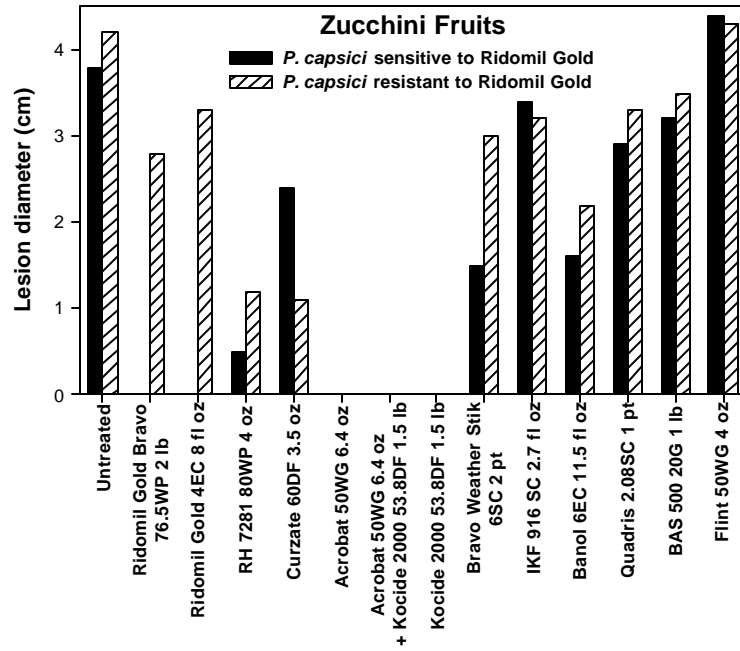
Raised Bed Study: This study was conducted at a cooperator’s farm on a sandy clay loam soil known to have a history of *Phytophthora capsici*, and previously planted to squash. The field was cultivated, and drip irrigation installed. Some plots were formed into raised beds, compost was added and incorporated to some plots, and some plots were covered with plastic on 21 May. Zucchini ‘Spineless Beauty’ was transplanted in the field on 30 May. Some plots were covered with straw on 15 Jun. Plots consisted of one 15foot row, with 5 feet between rows and 15 inches between plants. Fruits from the center 5 plants of the treatment row were harvested 11 times from 3 to 30 July. Number and weight of infected and total fruit was recorded at harvest and after four days storage at room temperature. Stand count was recorded on 27 July.

All treatments on raised beds significantly increased stand count and number of healthy fruit harvested compared to the treatment on flat ground (see table, below).

Treatment	Stand count	Number healthy fruit at harvest
Flat bed	7.5 b*	18.8 b
Raised bed	13.5 a	30.7 a
Raised bed, black plastic	13.8 a	32.8 a
Raised bed, black plastic, 1" straw	13.5 a	33.2 a
Raised bed, black plastic, 2 ton/A compost	12 a	39 a
Raised bed, black plastic, 2 ton/A compost, 1" straw	13.2 a	35.2 a

* Column means with a letter in common are not significantly different (StudentNewmanKeuls; $P=0.05$).

Fungicide Study: The isolate of *P. capsici* that is sensitive to Ridomil Gold, did not form lesions on zucchini fruits treated with Ridomil Gold Bravo or Ridomil Gold 4EC (see graph). Other treatments that kept fruit healthy included Acrobat alone and Acrobat + Kocide. When fruits were inoculated with the isolate of *P. capsici* resistant to Ridomil Gold fungicide, fruit became diseased. Two treatments completely prevented disease on zucchini fruits: Acrobat alone and Acrobat + Kocide.



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