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Disease Management In Home-Grown Cucumbers, Melons and Squash

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Cucurbits - cucumbers, melons, squash, pumpkins, and watermelons - are popular in the home vegetable garden. These crops may be healthy in some years, but disease can be severe in others. The best management strategy combines cultural controls to reduce disease danger and timely use of fungicides if needed. Such a program is called integrated pest management (IPM). To follow an IPM program for management of cucurbit diseases:

1. Use clean, healthy, good quality seed.
2. Use crop rotation. Whenever possible, do not plant cucurbits on or next to land that had cucurbits in the last three years.
3. Do not plant cucurbits near woods or brushy areas that may be weedy. Many weeds harbor cucurbit diseases.
4. Plant seed in the garden after soil temperatures are at least 65 degrees Fahrenheit, or set out transplants started 2 1/2 weeks earlier indoors.
5. Control all weeds in and near the cucurbit patch. Be sure to control perennial weeds, which can be a source of overwintering cucurbit disease organisms.
6. Plant several rows of corn around the cucurbit patch, or at least on the windward side. This helps keep out aphids that carry cucurbit virus diseases.
7. Control aphids and cucumber beetles. Begin control when the plants emerge from the soil.
8. Destroy volunteer cucurbit plants. These can harbor cucurbit disease organisms.
9. Do not enter the cucurbit patch to cultivate or pick while the plants are wet. Water helps spread disease.
10. Do not cultivate after the vines are 18 inches long. It is difficult to not damage plants once they are vining.
11. Remove and destroy all diseased plants.
12. Avoid poorly drained areas of the field and areas where water collects in rainy periods.
13. Remove and destroy all crop refuse in the fall. Plow or spade the soil to bury all remaining crop refuse.
14. Use disease resistant varieties, if available.
15. Use fungicides as needed or whenever rainy humid weather favors fungal diseases.

□ Bacterial Wilt

Bacterial wilt is caused by the bacterium *Erwinia tracheiphila*. The bacteria invade the vascular (water conducting) tissues of cucumber and melon plants, causing a rapid wilt of the plant. Squash and pumpkin are attacked occasionally. Progressive wilting occurs, beginning with a single leaf but soon including the entire plant (Figure 1). The

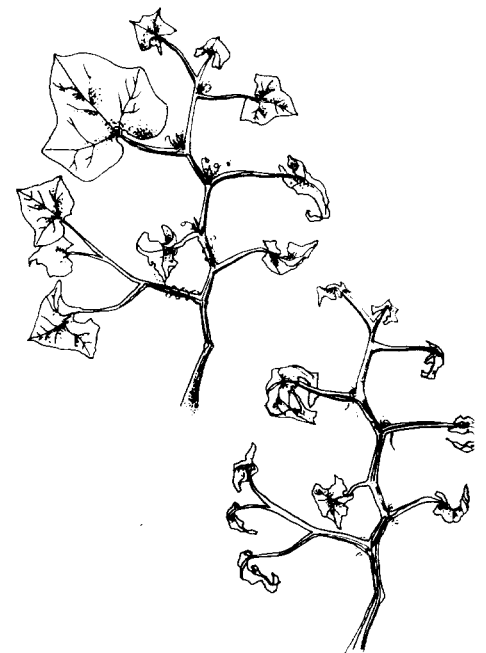


Figure 1 - Bacterial wilt of cucumber. Early symptoms on the left and advanced symptoms on the right.

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bacterial wilt organism produces a sticky substance in the vascular tissues that plugs them, preventing the transport of water. If an affected stem is cut near the ground, drops of the sticky substance can be squeezed from the stem. These droplets, after drying for several minutes, will adhere to the skin if a finger is placed on the stem's cut end and slowly removed. Fine strands up to 1/4 inch long will form when the finger is removed (Figure 2). This test works well for cucumber but is difficult to use on melon. Plant wilting and stringing of sap are diagnostic for bacterial wilt.

The bacterial wilt organism is carried from plant to plant by the striped cucumber beetle *Acalymma vittatum* (Fabricius). The bacterium enters the plant's vascular system when the plant is wet and the beetles' feeding produces wounds that reach the vascular system. The bacterium survives the winter in the beetle.

Prevent bacterial wilt by controlling the cucumber beetle. Begin control early, as cucumber beetles may attack as soon as plants emerge from the soil. Use carbaryl (Sevin), methoxychlor, or diazinon. Repeated applications of insecticides may be needed to control reinfestations of the cucumber beetle. Frequent light applications are needed when the plants are young to achieve beetle control and to avoid plant damage from the insecticide. Promptly pull up and destroy diseased plants. However, removal is not essential. If wilted plants are intertwined with healthy ones, pull up the roots of the wilted plants and let them dry out; trying to separate them from the healthy plants may injure the healthy plants. In commercial plantings the wilted vines are simply pulled up and allowed to dry out without removal from the field.

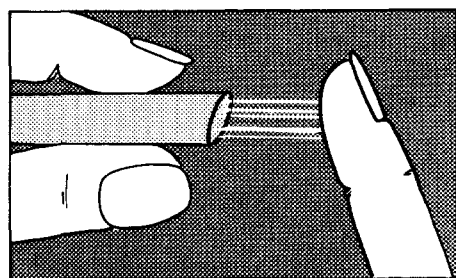


Figure 2 - Bacterial wilt: fine strands of bacterial ooze.

□ Anthracnose

Anthracnose, caused by the fungus *Colletotrichum lagenarium*, is a severe disease that spreads rapidly in warm, wet weather. The disease attacks all above-ground parts of cucumber, melon, and watermelon. First symptoms usually appear on older leaves as small yellowish circular spots (angular spots on watermelon). The dead tissues turn brown in cucumber and melon and nearly black in watermelon (Figure 3). The disease spreads to younger leaves. In warm, wet weather all the leaves may be rapidly attacked, giving the planting a "burned-out" appearance. Stems and petioles are also attacked, and light brown to black streaks develop. Circular, sunken, water-soaked spots develop on the fruit. These spots turn dark green to brown. In wet weather a pinkish ooze is produced in the spots - these are the fungus spores, which function like seeds. The spores are spread from plant to plant by running water, including splashing rain and by individuals working in the field when the vines are wet. The anthracnose fungus overwinters on seed and on diseased crop refuse.

Anthracnose control is difficult once the disease is serious. Preventive measures are important, including use of good quality seed and crop rotation. The fungicides benomyl and chlorothalonil (Ortho Multi-Purpose Fungicide Daconil 2787) help to control the disease, but must be applied at the first sign of disease or as a preventive. Other fungicides are available for commercial growers. These are listed in the North Dakota Plant Disease Control Guide, available at county offices of the NDSU Extension Service or through Extension Plant Pathology at NDSU in Fargo.

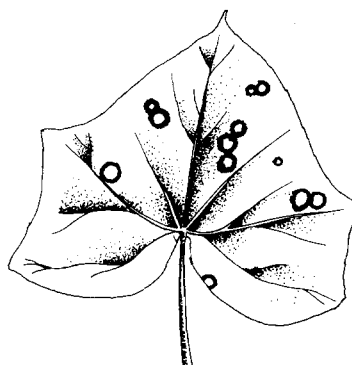


Figure 3 - Anthracnose on cucumber leaf.

□ Angular Leaf Spot

Angular leaf spot is a cucumber disease caused by the bacterium *Pseudomonas lachrymans*. The disease produces angular water-soaked leaf spots which may appear "greasy" green. The spots are restricted by the main veins. Later, the spots turn brown, dry up, and develop ragged tears in their centers (Figure 4). In rainy weather a creamy bacterial ooze forms in droplets on the spots. Stems and fruits are also infected. The spots on fruits are small and circular; later they crack open and turn white.

Angular leaf spot bacteria overwinter on the seed and on diseased cucumber refuse in the field. The bacteria are spread by splashing rain and by individuals working among the vines when they are wet. The disease is favored by warm rainy weather.

Control angular leaf spot by planting good quality seed. Destroy crop refuse in the fall. Use crop rotation - if possible, don't plant cucumbers on the same land more often than once in two-three years. Use a copper fungicide when the weather is wet and the temperatures are above 75 F. Avoid overhead irrigation.

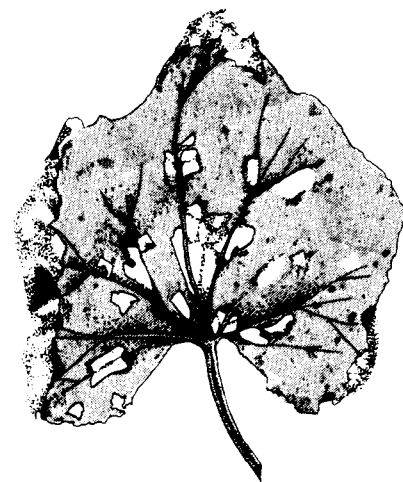


Figure 4 - Angular leaf spot on cucumber leaf.

□ Powdery Mildew

Powdery mildew, caused by the fungus *Erysiphe cichoracearum*, is common on cucumber, melon, squash, pumpkin and watermelon. Powdery white spots develop on the upper surfaces of older leaves, usually beginning at mid-season or later (Figure 5). During hot, dry weather the disease can progress rapidly, and the upper surfaces of leaves may develop a white powdery appearance. Severe powdery mildew causes the leaves to turn yellow and wither. Fruits are not infected, except for watermelon which is occasionally infected, but fruits may be distorted or sun-burned due to loss of shading leaves.

Powdery mildew may be controlled with benomyl, chlorothalonil (Ortho Multi-Purpose Fungicide Daconil 2787), or dinocap (Karathane) fungicide sprays. Apply the first spray as soon as the disease appears.

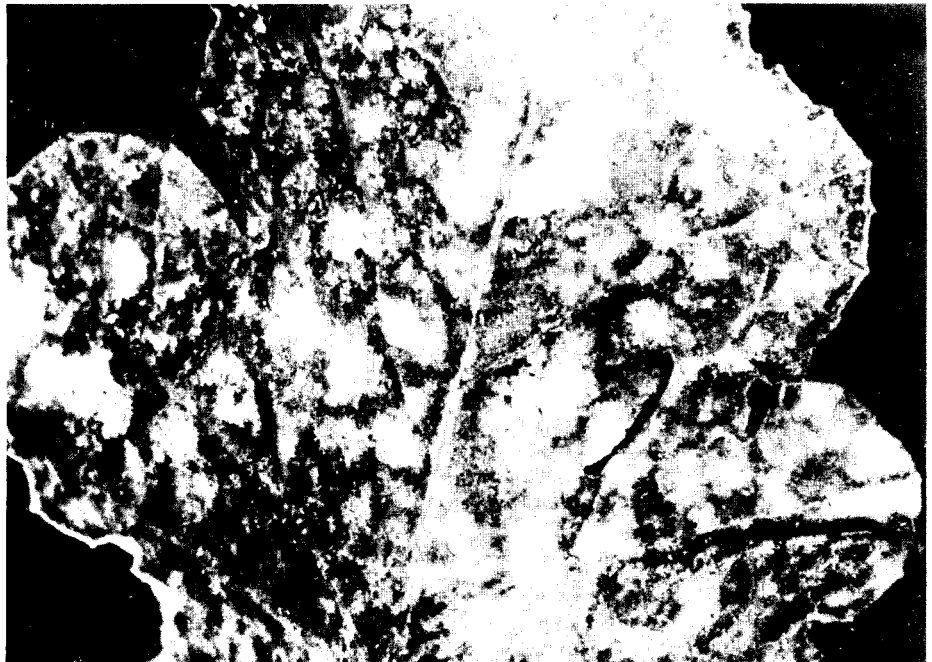


Figure 5 - Powdery mildew on melon leaf.

□ Mosaic

Mosaic is caused by cucumber mosaic virus and squash mosaic virus. A patchwork or mosaic pattern of light and dark green forms on the leaves and fruits. Leaves are small and puckered, and plants become severely stunted. Fruits develop knobs or warts and often the fruits are misshapen (Figure 6).

Cucumber mosaic is very common. In addition to the mosaic pattern the edges of the leaves turn down, and the knobs on the fruits are light yellow. The cucumber mosaic virus is transmitted from plant to plant by several different kinds of aphids. The virus infects cucumbers, melons, squash, pumpkin, pepper, spinach, tomato, and many other vegetables, flowers, and weeds. Cucumber mosaic is readily transmitted mechanically on the hands of workers in the cucurbit patch and by aphids.

Squash mosaic, caused by the squash mosaic virus, is transmitted from plant to plant by cucumber beetles. The virus infects squash, cucumber, melon, and occasionally watermelon. The virus is sometimes seed-borne.

Mosaic diseases are managed by using good quality seed and by controlling aphids and cucumber beetles throughout the season. Diazinon can be used for aphid and beetle control.

Carbaryl (Sevin) and methoxychlor will also provide beetle control. Begin insect control as soon as plants emerge from the soil. Use care in applying insecticides to tender young cucurbit plants, as they are easily injured. Do not plant cucurbits near woods, brushy areas, or other areas that are weedy. Control all weeds, especially perennial weeds. Plant several rows of corn around the cucurbit patch, or at least plant corn on the windward side. The corn helps keep out aphids. Remove and destroy diseased plants as soon as mosaic appears - this helps reduce virus spread and infected plants will not produce anyway. After handling diseased plants, wash hands with detergent and water. Detergent inactivates the virus and reduces the danger of transmitting the virus to other plants.

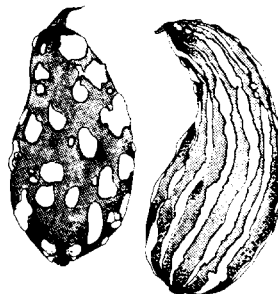


Figure 6 - Cucumber mosaic symptoms on squash.

□ Alternaria Blight

Blight, caused by the fungus *Alternaria cucumerina*, infects melon, squash, cucumber, pumpkin, and watermelon. Wet weather and temperatures of 60-90 F favor blight. Melon is quite susceptible and most commonly infected. Spots develop first on older leaves near the center of the hill. The spots are circular and appear somewhat water soaked. They enlarge rapidly up to 1/2 inch in diameter and turn light brown on melons, cucumbers and squash and dark brown to black on watermelon. Spots on the upper leaf surface may develop concentric rings, giving them a target pattern (Figure 7). Rapid defoliation

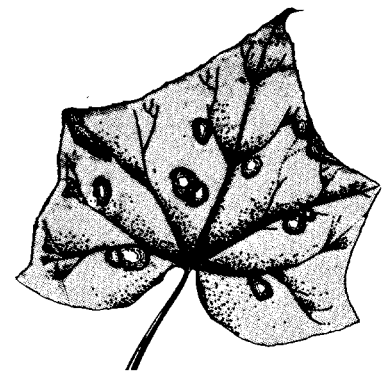


Figure 7 - Alternaria blight on cucumber leaf. Note target pattern.

tion occurs when weather favors the disease. Occasionally the fruits of melon, squash, cucumber and watermelon become infected and sunken spots develop; often these spots are covered with an olive to black mold. Severe attacks occur only when plants have been weakened by poor soil fertility, poor growing conditions, other diseases, or a heavy fruit set.

The blight fungus survives the winter in diseased cucurbit crop refuse. The fungus is spread by wind.

Control *Alternaria* blight by providing conditions for growing a healthy crop. Crop rotation and destruction of cucurbit crop refuse in the fall are important. Use good quality seed and treat the seed with a fungicide such as thiram or captan. Anilazine (Dyrene) or mancozeb (Dithane M-45 or Manzate 200) fungicide sprays also help control the disease.

Late Season Vine Collapse

Muskmelons that mature late in the season are affected in some years by late season vine collapse. The plants may suddenly wilt and die before the fruits are fully mature. Late season vine collapse usually occurs when sunny days follow cool weather. If soil temperatures drop to 50 F or below, the roots become inactive and cannot supply moisture. Plants with a good crop of fruit are easily moisture-stressed and may collapse rapidly if sunny weather follows cool weather. Losses can be minimized by not planting too many melons for late harvest.

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