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# Protecting Chrysanthemums From Disease

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Chrysanthemums need protection from a number of diseases including leaf and flower blights, powdery mildew, stunt crown gall, rust, nematode and several rots and wilts. This list shouldn't discourage prospective chrysanthemum growers, because following good cultural practices and taking a few preventive steps will hold disease problems to a minimum. Also, one treatment often prevents several diseases, so the job isn't as difficult as it may seem at first.

The first step in disease prevention is to divide old clumps of mums each spring, or to start with new disease-free plants. Plant chrysanthemums in well-drained soil in a sunny location. Don't overcrowd the plants—air circulation is needed to check some diseases. Don't overwater or overstimulate mums with fertilizer. If you propagate plants by cuttings, take tip cuttings only from healthy vigorous plants and root in a sterile medium.

Rotate your garden plantings, putting mums in the same location no more than once in 3 to 5 years. If practical, avoid setting closely related plants (members of the Compositae family) since many of these are susceptible to diseases attacking chrysanthemums. Their presence might nullify any beneficial effects of rotation. Keep weeds out of the garden area as they may serve as disease hosts. A thick mulch around plants helps keep down weeds and also keeps rain from splashing on the plants.

Don't splash water on foliage when watering. Inoculum of some diseases is spread by water and moisture speeds development of some leaf disease organisms. Through the growing season, promptly destroy plants affected by any of the diseases mentioned. Pick off and burn fading flower heads and cut off and burn all flowers in the fall after blooming.

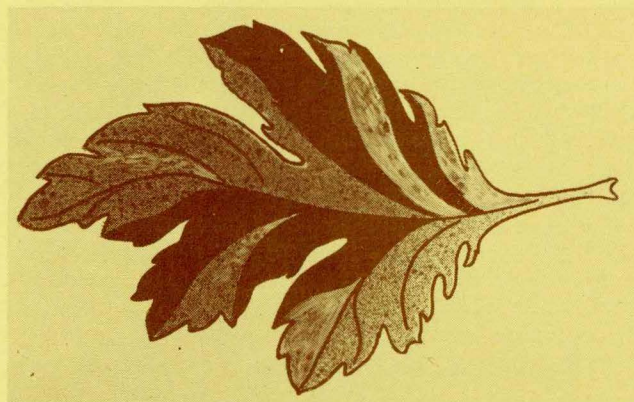
During rainy weather, spray chrysanthemums with fungicides at least once a week from mid-spring to frost. Use insecticides to control leafhoppers, aphids, plant bugs, leaf chewing insects and other pests. These insects may carry disease from plant to plant in addition to the feeding damage they do. Because chrysanthemum foliage is difficult to wet, add 1/2 to 1 teaspoon of a liquid household detergent to each gallon of spray mixture.

These general steps will help greatly in avoiding disease problems. But it is not always possible to prevent all diseases attacking mums. Here is a look at the major diseases with their symptoms and specific control measures in case you need to take further steps.

## Foliar or Leaf Nematodes

The foliar or leaf nematode is widespread and serious on

chrysanthemums. Symptoms first appear as fan-shaped or angular, yellow-brown to gray blotches bounded by the larger veins. Typically, the lower leaves are involved first. Infested leaves shrivel, die, gradually turn black and cling to the stem. Microscopic nematodes (eel worms) are spread upwards onto the plant by splashing water and may swim further up the stem if a suitable film of water is present. Infested flowers usually will not develop normally.



AN ARTIST'S drawing of a chrysanthemum leaf illustrates the symptoms of attack by the chrysanthemum foliar nematode. Note the fan-shaped areas affected. These are usually dark brown in color.

**Control**—Pick off and burn infested leaves and the next two leaves above. Burn all plant tops and other debris in the fall. Take cuttings only from disease-free plants. Space plants to allow for free air circulation so plants dry off as soon as possible following rain. Avoid wetting foliage when watering.

## Wilts and Rots

A number of wilts and rots attack mums. Soil-borne fungi such as *Verticillium*, *Rhizoctonia*, and *Fusarium* can cause root and stem rots and wilts. These fungi also may attack cuttings.

Infected plants may be stunted and have droopy lower leaves which turn a pale, gray-green color, then become pale yellow. Often the disease starts on one side of a plant. Gradually the whole plant turns yellow and dies. Stems may be discolored near the soil line. Interior of the stem may be rotted or show brown streaks when cut diagonally. Roots are often decayed, causing plants, particularly cuttings, to wilt and collapse. Blossoms may turn brown or fail to open. These problems are most common on heavy, wet, cold soils.

**Control**—Dig and burn infected plants, removing as much

Prepared by A.H. Epstein, extension plant pathologist, and S.O. Ryan, extension entomologist.

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of the root system as possible. Rotating plantings in the garden helps because the fungi may live in the soil several years. If you cannot rotate your plants, fumigate the soil with chemicals such as chloropicrin, sodium n-methyldithiocarbamate (SMDC, Vapam, or VPM), or Mylone, following manufacturer's directions. If propagating your own plants, dip cut ends in ferbam, zineb, captan or thiram solutions (1½ to 2 tablespoons per gallon of water) or captan dust before placing in rooting medium. Indexed, disease-free planting material is available from nurseries.

For stem and cutting rots, drench infected areas of soil with a mixture of PCNB-75 and captan 50 or use a Dexon soil drench according to directions. A mixture of PCNB and Dexon (35-35) also is effective.

### Leaf Diseases

Leaf diseases on mums are common and often serious. They include leaf blight, blotch, and leaf spot. There are several types of leaf spot caused by different fungi.

Most of these diseases first appear as spots on the leaves. Spots are small to large, round to irregular, grayish-brown, dark brown or black. When infection is severe, the spots may run together, forming large irregular blotches. Infected leaves later turn yellow; then brown, shrivel and die. Usually the lower-most leaves are attacked first. Dead leaves commonly cling to the stems for several weeks or more. Leaf spot fungi live over winter in dead leaves. Spores may be airborne, carried by insects, or spread by splashing water.

**Control**—If practical, pick off and burn the first infected leaves in the spring or early summer. If the disease is severe, protect plants during spring and summer wet periods by spraying at weekly intervals until bloom. Use ferbam, Bravo, Polyram, captan, folpet, thiram, maneb or zineb.

Start spray applications when first spots appear. Be sure to cover both upper and lower leaf surfaces with spray. After bloom, collect and burn all above-ground plant parts.

In greenhouses, avoid wetting the foliage, keep humidity down, and prevent overcrowding plants. Don't work among wet plants, and mulch to keep water from splashing over lower leaves.

### Powdery Mildew

As the name implies, powdery mildew appears as a white powdery growth on leaves and stems. It causes curling, distortion and stunting of the leaves. With severe infections, leaves may wither and drop prematurely. Mildew, like leaf spots, usually appears first on lower leaves and moves upward on the plant, starting in mid or late summer.

**Control**—If the disease becomes serious, spray with Benlate, wettable sulfur, karathane or cycloheximide (Actidione). Follow manufacturer's directions. Any of these materials may be mixed with chemicals to control leaf spot, insects or mites. Do not apply sulfur when air temperature is above 85 degrees Fahrenheit.

### Aster Yellows

Aster yellows causes leaves to become yellowish and edges may turn brown. Plants are stunted and "bushy" with upright spindly shoots. Flowers are dwarfed, few in number, may be aborted, or turn a sickly green color. Symptoms vary greatly, depending on age of the plant when infected, the variety and other factors.

**Control**—Destroy the first infected plants as soon as the

disease appears. Spray once a week with an insecticide (57 percent malathion or 50W Sevin) to control leafhoppers which transmit the causal mycoplasma. Perennial weeds frequently harbor the disease organism, so keep the garden clean. Some growers use fine cheesecloth (22 threads per inch) or wire mesh (18 wire per inch) as "tents" to keep leafhoppers away.

### Stunt

Stunt, a virus disease, causes various symptoms including severe stunting, bushiness, abnormal upright growth and early flowering. Leaves are pale green and smaller than normal. Fewer flowers are produced and these are dwarfed and often off-color. Pink, red and bronze flowers are bleached. The virus is carried in infected plants and cuttings in the same manner as the aster yellows mycoplasma.

**Control**—Buy virus-free stock and propagate only from known virus-free plants. Discard all plants showing suspicious symptoms. The virus can be transmitted by the knife used in cuttings. Steam soil before replanting mums in the greenhouse. Weekly applications of insecticides such as malathion or 50W Sevin will control leafhoppers which transmit the disease.

### Rust

Rust begins with pinhead size, chocolate brown, powdery pustules on the underside of leaves. Infected leaves wither and fall prematurely. If severe, plants are stunted, weakened and may not bloom properly. Varieties differ greatly in susceptibility.

**Control**—Use the same cultural practices described for leaf blight. Ferbam, thiram, zineb, maneb and Polyram are effective fungicides when applied at 7- to 10-day intervals.

### Crown Gall—bacterium (*Agrobacterium tunefaciens*)

Symptoms of crown gall first appear as swollen, white to greenish, "cauliflower-like" galls on stems near the soil line. Galls may later rot, permitting other pathogenic organisms to invade and kill the plant. Shoot growth is often stimulated below the infection area resulting in very dense, spindly growth.

**Control**—Use disease-free stock. Plant only where crown gall has not been a problem for the past 3 years, or in fumigated soil. Avoid wounding plants when cultivating.

### Flower Blight

Symptoms of flower blight include small to large, water-soaked tan to brown spots occurring on the flower petals in humid weather. Infected areas may be covered with a coarse tan-gray mold growth in damp weather. The disease often is seen on fading heads.

**Control**—Destroy fading flowers promptly. Space plants to improve air circulation and keep down weeds. Spray buds and blooms lightly with Bravo, maneb, zineb or captan at 3- to 4-day intervals where the disease has been a problem.

### Root Knot Nematode

Plants lack vigor and may be pale in color when affected by root knot nematode. Knots or swellings are present on the roots.

**Control**—Use nematode-free planting stock and rotate the planting site. If practical, plant in soil which has been fumigated with chemicals such as chloropicrin, SMDC or Mylone.

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