

CIRCULAR PP-570



PLANT PATHOLOGY

SUNFLOWER DISEASES

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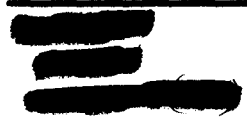
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SUNFLOWER DISEASES

Sunflowers are used in the cropping sequence in North Dakota. However, the total oil and confectionery acreage planted varies from year to year. Because the value of the sunflower crop depends on yield and quality, disease control is important. All of the present commercially grown varieties are susceptible to one or more of the four major diseases of sunflower: rust, downy mildew, stalk and head rot, and leaf mottle or Verticillium wilt. However, the sunflower grower can lessen the chances of major losses from disease by using several management practices. Cropping practices recommended are:

1. Use high quality, disease-free seed.
2. A four year crop rotation.
3. Use presently available resistant varieties.
4. Avoid planting sunflowers on land with poor surface drainage.
5. Early season elimination of volunteer sunflowers in grain or fallow fields.
6. Control wild sunflowers around the farmstead.

Symptoms, signs, effects, disease cycle and specific controls for these four diseases are discussed separately.

RUST (PUCCINIA HELIANTHI)

Rust is present in most fields. North Dakota and Manitoba, Canada have had severe losses due to rust infestations on susceptible varieties. Controlled inoculations of rust onto susceptible varieties reduce the yield by 1/3 to 1/2. Rusted volunteer and wild sunflowers are sources of the disease for commercial fields. Spores produced on wild or volunteer sunflower plant parts (residue) are blown to newly emerged volunteers. The rust that grows on these volunteers spreads to commercial fields. The summer spore (red) stage of rust repeats itself every 10 days (Fig. 1). Winter spores (black) germinate in spring on sunflower debris and infect the volunteer and wild sunflower plants.

The summer spore (red) stage develops in 6-8 days after infection. Spores generally develop at about 64° F.

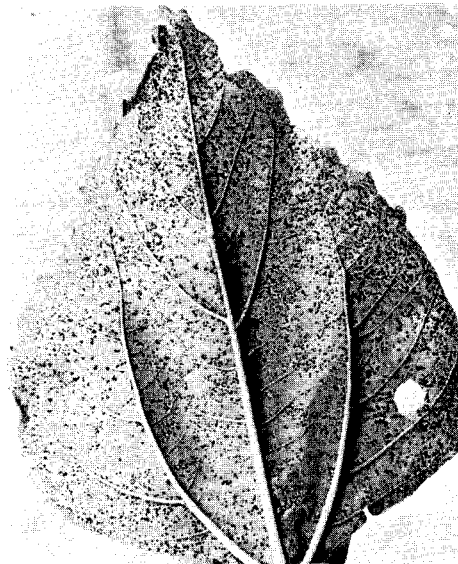


Figure 1. Summer spore (red) stage of rust

Control

Most oil type varieties have field resistance to rust. All other types are susceptible. Destroy volunteer and wild sunflowers before planting sunflowers.

DOWNY MILDEW (PLASMOPORA HALSTEDII)

Symptoms of downy mildew vary, depending on the age of the sunflower plant when infected. The most obvious symptom is dwarfed plants which fail to head fully (Fig. 2). This type of damage occurs when the seedling is infected very early and the fungus develops a systemic type of infection. The leaves of these plants show the "oak leaf" pattern near the midrib and a white cottony growth on the underside of the leaves. Some plants resist this dwarfing effect and grow to full height but they have very erect "bird platform" heads with mostly sterile seeds. Secondary infection results in yellow spots on leaves.

The fungus overwinters in infected plant debris as resistant winter spores. The winter spores germinate in spring and produce secondary swimming spores when free water is sufficient. The swimming spores infect seedlings (systemic infection). The fungus develops in the stem and leaves and produces the white, cottony growth of spores on the underside of the leaves. Secondary infection of leaves occurs from these spores.



Figure 2. Downy mildew infected plants are dwarfed

Control

Control wild sunflower plant debris and follow a long rotation practice to avoid this disease. Avoid planting fields lying lower than and adjacent to previously cropped fields. Use resistant varieties when available. The fungus is both externally and internally seed borne. The North Dakota State Seed Department refuses certification of fields with five per cent or more diseased plants.

STALK AND HEAD ROT (SCLEROTINIA SCLEROTIUM)

This fungus attacks field beans, sugarbeets, soybean, safflower, flax, potatoes, rape, mustard and sunflower. It survives the winter and non-crop years as sclerotia in soil and plant debris. Sclerotia are small grayish-black bodies of fungal mycelium which can withstand severe weather conditions.

In spring and summer sclerotia produce mushroom-like growths that contain numerous spores. These spores (seeds) are blown to plants where infection occurs. Early symptoms of the rot are soft, water-soaked spots on stems, leaves or heads. Later the plant tissues dry out and become pinkish. A white cottony mold forms on or under the plant. The sclerotia develop in this cottony mold (Fig. 3).



Figure 3. Sclerotia produced in stalks. Note shredded pith. (X)

Control

Sclerotia of the fungus contaminate seed lots, and fungus spores may be seed-borne, but chemical seed treatment does not prevent disease. Alternating cereal grains with sunflowers gives some control. Avoid planting in rotations with field beans. Use herbicides or cultural methods to eliminate undesirable host plants such as pigweed, lambsquarters, volunteer sunflowers, etc. Plowing sclerotia into the soil prevents their germination.

**LEAF MOTTLE OR VERTICILLIUM WILT
(VERTICILLIUM ALBO-ATRUM)**

Symptoms of this fungus disease are chlorotic yellowed areas along the veins of lower leaves and brown necrotic areas along veins as infection gets older. This mottling spreads towards the base of the infected leaf and from the lower to the upper leaves. On severely infected plants, lower leaves may be dead and dry. The middle leaves show brown areas with green along the veins and upper leaves often appear healthy.

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Figure 4. Cross section of infected sunflower petiole (right); healthy (left).

Associated with this disease is a condition known as premature ripening in which heads lack firmness. Typically leaf mottle is found in scattered plants throughout the field. The fungus is soil- and seed-borne and has a wide host range. Potato is especially susceptible.

Control

Disease-free seed and a four year or longer crop rotation with a cereal crop helps control this disease. Avoid planting sunflowers in any rotation with potatoes or red clover. Use resistant varieties when available.

SUMMARY

Sunflowers are attacked by four major fungal diseases: rust, downy mildew, stem rot and leaf mottle. All presently grown commercial varieties are susceptible to one or more of the diseases. Damage due to disease can be lessened by crop management practices involving a four to five year rotation, using good quality, disease-free seed and eliminating wild sunflowers and volunteers. Use resistant varieties if available.

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