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Robert M. Harveson

University of Nebraska-Lincoln, rharveson2@unl.edu

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Rhizopus Head Rot of Sunflower

Robert M. Harveson, Extension Plant Pathologist

Sunflower production in the Central High Plains (Colorado, Nebraska, and Wyoming) has increased in recent years. Sunflower is well adapted to this region and can be successfully cultivated in both dryland and irrigated areas. As would be expected, the increase in production acreage also increases the potential for disease problems. This is further compounded by the presence of native sunflower plants that may serve as reservoirs for disease-causing pathogens and insects.

Yield-limiting disease problems can be broadly divided into two major categories: nonparasitic and parasitic. Nonparasitic disorders include weather related problems such as hail and wind injury, herbicide damage, nutritional or fertility deficiencies, or mechanical damage from birds or insects. Parasitic disorders include those caused by fungi, bacteria, viruses, nematodes, or phytoplasmas. Most common diseases affecting sunflowers in this region are caused by fungi, and are generally more severe in irrigated production than in dryland conditions.

Head rot of sunflower is a disease caused by various species of the fungal genus *Rhizopus*, including *R. stolonifer*, *R. arrhizus*, *R. oryzae*, and *R. microsporus*. *Rhizopus* is well known for causing soft rots of fruits, vegetables, and root crops, usually in storage situations. Head rot is one of the few diseases caused by this group of fungi that occurs in field crops. It has historically been considered to be of minor importance in the United States and Canada; however, in a recent survey of sunflower diseases in California, *Rhizopus* head rot was found to be the most severe and commonly occurring disease. It has also been documented as causing severe damage annually in Israel. Under the right environmental conditions, it can be a serious disease in the High Plains and has been known to cause up to 100 percent losses in certain fields.

Rhizopus is a commonly occurring organism present in soils and as airborne spores. It is carried to sunflower plants via air currents. Under conditions of high humidity, it can initiate infection through wounds created by hail, birds, or insects. It first appears as dark spots on the back of ripening heads, followed by a watery, soft rot that later turns dark brown. As the disease progresses, heads dry prematurely, shrivel, and tissues appear to shred. Inside the shredded heads the fungus can be observed as coarse, threadlike mycelial strands that later are followed by the appearance of small, black dots about the size of pinheads. The disease also can be recognized on the flower side of the heads by the appearance of a grayish, fuzzy substance covered with small dark dots. These dark fruiting bodies are

sacks filled with spores that are easily broken open and released through wind currents to infect neighboring plants. Symptoms often can seem to appear simultaneously on opposite sides of the head. The disease has also been shown to cause a systemic effect on the plant on the side where the head became infected. If the peduncle becomes infected, heads can completely fall off. This disease is more severe in warm, humid environments, especially under irrigation.

Even though spores of *Rhizopus* spp. are found everywhere, mechanical injury on heads is a prerequisite for infection and disease development. In Israel, it was determined that bird feeding on seed heads was the primary method for disease spread and development. The incidence and severity of the disease in Texas was highly correlated with sunflower head moth (*Homoeosoma electellum*) infestation. Severe hailstorms also can significantly increase the potential for yield losses due to head rot.

Damage and economic losses are highly dependent on the creation of wounds, the environmental conditions present, and the time of the season that wounding and infection occur. Research has shown that head rot rarely occurs before flowering, so it appears that mature tissues are required to support the growth of *Rhizopus* spp. Yields are negatively affected because infected seed fail to fill properly and have reduced weights. This can affect profits for confectionery seed growers since payment is based on seed size. Yields also can be affected even if infection occurs late in the season. Seeds may fall to the ground from shredded heads, or those that remain may be bitter or produce no or poor quality oil.

Disease Management Strategies

Following are several strategies to manage the disease:

- Avoid mechanical damage after flowering.
- Control head moth infestation before or at flowering.
- Rogue wild sunflowers that may serve as reservoirs for insects and pathogens before they produce seed.
- Control bird feeding:
 - Select varieties with head types that turn down after flowering.
 - Avoid planting sunflowers near water that consistently harbors many birds.

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