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HELIANTHUS ANNUUS AND DOWNY MILDEW

Helianthus annuus, the common sunflower, is an [annual](#) species of [sunflower](#) grown as a crop for its edible oil and edible fruits ([sunflower seeds](#)). This species of sunflower is also used as bird food, as livestock forage (as a meal or –a [silage](#) plant), a

and in some industrial applications. The plant was first domesticated in the [Americas](#). Wild *Helianthus annuus* is a widely branched annual plant with many flower heads. The domestic sunflower, however, possesses a single large [inflorescence](#) (flower head) atop an unbranched stem. The name sunflower may derive from the flower's head's shape, which resembles the sun, or from the false impression that the blooming plant appears to slowly turn its flower towards the sun as the latter moves across the sky on a daily basis.

[Sunflower seeds](#) were brought to Europe from the Americas in the 16th century, where, along with [sunflower oil](#), they became a widespread cooking ingredient.

Sunflower was first domesticated in what is now the southeastern US, roughly 5000 years ago, there is evidence that it was first domesticated in Mexico around 2600 BC. These crops were found in Tabasco, Mexico at the San Andres dig site. The earliest known examples in the United States of a fully domesticated sunflower have been found in Tennessee, and date to around 2300 BC.[1]

Many [indigenous American peoples](#) used the sunflower as the symbol of their [solar deity](#), including the [Aztecs](#) and the [Otomi](#) of Mexico and the [Incas](#) in

South America. In 1510 early Spanish explorers encountered the sunflower in the Americas and carried its seeds back to Europe. Of the four plants known to have been domesticated in what is now the eastern continental United States and to have become important agricultural commodities, the sunflower is currently the most economically important.[2]

During the 18th century, the use of sunflower oil became very popular in Russia, particularly with members of the Russian Orthodox Church, because sunflower oil was one of the few oils that was allowed during [Lent](#), according to some [fasting traditions](#).[3]

Among the [Zuni people](#), the fresh or dried root is chewed by the medicine man before sucking venom from a snakebite and applying a [poultice](#) to the wound. This compound poultice of the root is applied with much ceremony to rattlesnake bites. Blossoms are also used ceremonially for anthropic worship.[4] [5]

One of the major threat that Sunflowers face today is Fusarium. Fusarium is a filamentous fungi that is found largely in soil and plants. It is a pathogen that over the years has caused increasing amount of damage and loss of sunflower crops, some as extensive as 80 percent of damaged crops.

Apart from Fusarium, [Downy mildew](#) is another disease that sunflowers are susceptible to. Its susceptibility to Downy mildew is particular high due to the sunflower's way of growth and development. Sunflower seeds are generally planted only an inch deep in the ground. When such shallow planting is done in moist and soaked earth or soil, it increases the chances of diseases such as Downy mildew. [6]

Downy mildew of sunflowers is caused by the soil-borne fungal pathogen *Plasmopara halstedii*.

Downy mildew can be characterized broadly by two different types of symptoms: systemic and secondary. Systemic symptoms occur when seedlings are infected through the developing roots and the disease usually will kill plants, causing a reduction in stand sometimes resulting in sizeable blank spots in the field. If infected seedlings do survive, symptoms of systemic infection may be first

witnessed on the cotyledons or the first true leaves and are characterized by a thickening and yellowing (chlorosis) of leaves. Chlorosis usually borders the veins of the leaves but can be present on the whole leaf. White cottony masses (fungal mycelium and spores) appear on the underside of infected leaves and are a good diagnostic sign of the disease. Systemically infected plants usually are severely dwarfed and seed production will be reduced if the plant reaches maturity. Rare delayed systemic infections also can be seen in sunflower fields. These plants (six- to eight-leaf stage) will be moderately. Planting downy mildew-resistant hybrids is very important to manage downy mildew. However, due to the development of new races, resistance may not be a sufficient management tool in all fields.

Although crop rotation is important for other sunflower diseases such as sclerotinia, rust and phomopsis, rotation has a minimal effect on downy mildew management. Overwintering oospores will survive in the soil up to 10 years, rendering rotation practices impractical for downy mildew management.

Fungicide seed treatments can be an effective management tool for downy mildew. However, the downy mildew pathogen has developed resistance to two of the most commonly used fungicides, metalaxyl and mefenoxam. This fungicide resistance is classified as rate insensitive, meaning that once the downy mildew develops resistance, no amount of seed treatment will give disease control.

Foliar fungicide sprays are ineffective for the systemic infection of downy mildew, and none are recommended for such use. Foliar fungicide use for secondary infection is not economical since yield loss does not occur.

Wild and volunteer sunflowers are hosts of the downy mildew pathogen, and elimination can reduce the inoculum effectively. Additionally, elimination of wild and volunteer sunflowers can reduce inoculum of other economic sunflower diseases, including rust and sclerotinia.[7]

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