

## Powdery Mildew of Wheat

Damon Smith, UW-Madison Plant Pathology

**What is powdery mildew?** Powdery mildew is a common fungal disease of wheat in Wisconsin. The disease interferes with photosynthesis, thereby reducing plant growth, heading, and grain fill. In extreme cases, powdery mildew can result in leaf, and even plant, death. When weather is favorable and the disease occurs at flag leaf emergence or during heading, yield losses of up to 40% can occur.

**What does powdery mildew look like?** Powdery mildew typically appears



Cottony, white growth on wheat leaves is characteristic of powdery mildew. (Photo courtesy of Craig Grau)

as white, cottony patches (masses of fungal threads and spores of the causal fungus) on the upper surfaces of leaves. Patches also can occur on lower leaf surfaces, as well as on stems, seed heads and awns. Fungal growth is confined primarily to the plant surface, with only limited penetration of the fungus into plant tissue. As the fungal growth ages, it turns from white to dull gray or light brown. When fully mature, the fungus forms reproductive structures called chasmothecia, which resemble small black dots or tiny seeds, among the fungal threads.

**Where does powdery mildew come from?** Powdery mildew is caused by the fungus *Blumeria graminis* which most commonly overwinters as

ascospores (a type of spore) inside chasmothecia on wheat residue. During mild winters or when sufficient snow cover is present to provide good insulation, the fungus also survives on wheat residue as fungal threads or as conidia (a second type of spore). In the spring, both ascospores and conidia are blown onto actively growing wheat plants where infection occurs followed by development of typical cottony fungal threads. New conidia that form on infected plants can lead to additional infections throughout the wheat growing season. Once a wheat crop is harvested, volunteer wheat plants serve as a reservoir for the fungus until the next wheat crop is planted and begins to grow in the fall. The wheat powdery mildew fungus does not infect other small grains or weed grasses and these plants do not serve as a reservoir for the fungus. Similarly, fungi that cause powdery mildew on small grains other than wheat and weed grasses are unlikely to infect wheat. Moist, humid weather with widely fluctuating temperatures favors the development of powdery mildew. Long periods of excessive rain inhibit powdery mildew development by washing spores from plants before infection can occur.

**How can I save wheat plants with powdery mildew?** Careful, routine scouting of a wheat crop throughout the growing season is important to detect powdery mildew as early as possible. Frequent scouting allows for assessment of the likely impact of the disease on a wheat crop and helps to determine if and when fungicide applications are warranted. If you scout only once for powdery mildew, be sure to scout just prior to flag leaf emergence. Yield losses due to powdery mildew are greatest when the disease occurs prior to and at flag leaf emergence. Therefore, protecting the flag leaf is critical in preserving proper head development and grain fill. If powdery mildew is present at flag leaf emergence and weather is favorable for further disease development, consider applying a fungicide for control. While there are a wide variety of fungicides available labeled for control of wheat powdery mildew, products or premixes containing demethylation inhibitor group active ingredients (FRAC 3) have performed particularly well in university research trials. When using fungicides, be sure to read and follow all label instructions of the product that you select to ensure that you use it in the safest and most effective manner possible.

**How can I avoid problems with powdery mildew in the future?** Consider using wheat cultivars with powdery mildew resistance, but keep in mind that the level of powdery mildew resistance can vary widely from cultivar to cultivar. To reduce the amount of powdery mildew fungus in a field, use tillage practices (where feasible) to bury infested wheat residue, remove volunteer wheat plants, and routinely rotate wheat with other crops (e.g., corn, soybeans). Powdery mildew tends to be more severe in fields that have excess nutrients (particularly nitrogen). Therefore, fertilize (especially with nitrogen, potassium, and phosphorus) for optimal plant growth, but DO NOT overfertilize.

**For more information on powdery mildew of wheat:** Contact your county Extension agent.