Disease Alert

Fusarium Bud Blight and Head Blight Contamination in Stored Hemp: Avoid Postharvest and Storage Molds. Beware of Mycotoxins.

Authors: Nicole Gauthier, Desiree Szarka, Henry Smith, Misbakhul Munir
University of Kentucky, Department of Plant Pathology

Fusarium Molds in Stored Hemp

A recent survey of stored hemp in Kentucky revealed frequent presence of Fusarium molds in stored floral and grain hemp. These molds were identified as the same *Fusarium* spp. that cause bud blight and head blight in field hemp. It is likely that infection occurred in the field, and moldy growth increased under humid storage conditions.

The 2020-2021 study included over 300 samples originating from 17 field sites across Kentucky. Postharvest samples ranged from whole plants hanging in barns to ground materials stored in super sacks. A total of 18 samples were taken from each field site (origin), and all fields (100%) had at least one sample positive for *Fusarium* spp. An average of 39% of samples (from each field site) tested positive, ranging from 11% to 47% incidence.

Fusarium spp. recovered from these samples included *F. armeniacum, F. equiseti, F. fujikuroi, F. graminearum, F. incarnatum. F. solani,* and *F. sporotrichioides*. These species are known to produce dangerous mycotoxins (e.g. DON, NIV, and T-2) in cereals and other grains, and toxin levels are highly regulated in food and feed products. Research is ongoing to determine whether these fungal species produce toxins in hemp. Currently, there are no testing labs or regulations for Fusarium-toxins on hemp products. Current recommendations are to reduce the infected materials going into storage and to maintain proper storage conditions to prevent fungal growth and spread.

Fusarium Bud Blight and Head Blight in the Field

Fusarium head blight (FHB, also called scab in wheat and Gibberella ear rot in corn) is a serious disease of cereals and corn around the world. The disease also affects other cereal grains and grasses. Losses result from combinations of direct yield impacts caused by blighting and reduction in crop value caused by mycotoxin contamination. Fusarium bud blight and head blight on hemp has been confirmed on cultivars grown for grain and fiber, as well as for floral tissue (cannabinoid production). The disease is an emerging concern in hemp production across the eastern US and may increase in importance as the hemp market expands in the great plains, midwestern, and other regions of the US.

Symptoms: Fusarium head blight is characterized by necrosis or blighting of parts or whole flower/seed heads. Symptom development often occurs after plants begin to flower. *Fusarium* spp. can infect seeds, bracts, peduncles, and sugar leaves. Cultivars with short internodes and dense buds may be more susceptible to infection. The interior tissues closest to the stem are often the first to develop signs of infection. Fungi can rapidly colonize tissue within dense heads. Infection can spread to nearby buds and to individual flowers or seeds. Seeds may also be infected directly through stigmas or become infected indirectly by spread from infected bracts. Infected seeds are often brittle and smaller in size than healthy seed, and they can contain visible mycelia when cracked open.

During periods of high humidity and excess rainfall, fungal growth is visible without magnification, and orange to pink-colored spore structures may develop. Necrosis of peduncles and bracts may result in seed drop. Under wet or humid conditions, fungi continue to colonize, and eventually entire buds can become blighted. Head blight symptoms are similar to damage caused by budworms (corn earworm, fall armyworm) or to shattering of over-mature seeds.

Disease Cycle: Limited information is available on the disease cycle of FHB on hemp. In wheat and cereals, *Fusarium* spp. can overwinter in crop residues. Spores are released in spring and infect wheat during anthesis (flowering); this is believed to be the primary mode for infection of cereal crops. Infection is favored by high moisture or humidity (>90%) and temperatures between 60^{o} and 85^{o}F. Corn can become infected through silks when weather is cool and wet. Orange to pink-colored spore structures develop on symptomatic plant and grain tissues, and spores are released; secondary infections can then occur. Sources for infection in hemp crops are currently under investigation. As field-grown hemp is a warm season crop and is usually planted at or after wheat harvest, it is likely that the primary source of *Fusarium* on hemp is spores disseminated via wind and water from wheat, other cereals, or graminicolous hosts. There is likely a delay from time of infection to symptom development.

Managing Fusarium Bud Blight and Head Blight in the Field

Resistant cultivars are currently not available; however, cultivars with longer internodes between individual buds may allow for better air circulation and decrease humidity within the flower/seed heads. Increased plant and row spacing improves air circulation and can reduce canopy humidity. No conventional fungicides are labeled for control of *Fusarium* on hemp at this time. Management of budworms may reduce wounds and consequently reduce infections by *Fusarium* spp. There is no research available on the role of cereals or corn in the infection cycle of *Fusarium* on hemp, but it is likely that inoculum buildup can occur when hemp is rotated with other crops that are susceptible to the disease or when grassy weeds are not controlled.

Management information will be updated as more information is available. Research is ongoing.

Managing Fusarium in Storage

Avoid storing infected plant material; keep “suspicious” materials away from asymptomatic (healthy) materials. Monitor relative humidity in storage facilities, coolers, and containers. Check moisture regularly, particularly as temperature fluctuation can cause moisture migration. Maintain good air circulation to reduce moisture and lower humidity. Relative humidity should remain below 70% to reduce fungal growth and spread. Note: Specific drying conditions, including temperature and moisture levels, are often determined by grower contracts. Contact ngauthier@uky.edu for testing (KY, only).