Martin-Gatton
College of Agriculture, Food and Environment
Cooperative Extension Service

Plant Pathology Fact Sheet **PPFS-AG-H-02**

Fusarium Head Blight of Hemp

Henry Smith
Plant Pathology
Research Analyst

Misbah Munir
Plant Pathology
Postdoctoral Scholar

Kim Leonberger
Plant Pathology
Extension Associate

Nicole Gauthier
Plant Pathology
Extension Specialist

Importance

Fusarium head blight (FHB) is a common disease of hemp that poses a significant threat both to cannabinoid/flower and grain producers. The disease causes severe blighting of floral tissues that can result in direct yield losses and rejection by processors. The FHB causal fungi can also potentially contaminate harvested grain and flowers with mycotoxins that are harmful to humans and livestock.

Symptoms

FHB is characterized by extensive necrosis and blighting of individual flowers or entire heads (Figure 1A). Sugar leaves (trichome covered leaves within flower heads) can become blighted, reducing cannabinoid yield. In grain production, extensive blighting may result in premature seed drop. Symptoms typically appear late in the production cycle, after flowers form. The interior tissues closest to the stem and those within compact buds are often the first to show symptoms (Figure 1B).

Figure 1. (A) Grain hemp with Fusarium head blight (FHB) damage (*left*) compared to a normal plant (*right*). **(B)** Interior tissues of compact buds are often first to show FHB symptoms.

Once harvested, infected grain can be brittle, lighter in color, and may have black fungal bodies (perithecia) on the outside of the seed coat (Figure 2).

FHB symptoms can look similar to corn earworm damage or senescent tissue. Corn earworm damage can be identified by the presence of frass and lack of mature grain/trichomes. Often the worm itself will be within the floral tissue. FHB infected plants will not have feeding damage, and frass will not be present.

Cause & Disease Development

FHB is caused by multiple species of *Fusarium* fungi including, *F. avenaceum, F. graminearum, F. sporotrichioides,* and members of the *Fusarium incarnatum-equiseti* complex. Often, more than one species can colonize tissue simultaneously. These *Fusarium* spp. have a wide host range and are most often found on monocots, including corn, wheat, and gramineous weeds.

The fungi overwinter on crop residues left in the field from the previous season or on weed hosts. In spring when temperatures reach 60°F, *Fusarium* spp. emerge from infected crop residue and release spores (ascospores). These spores are then dispersed by wind or rain onto hemp.

The precise timing (plant growth stage and calendar period) for *Fusarium* infection is still under investigation. However, it has been documented that as the season progresses, FHB incidence and severity increase. In addition, asymptomatic infection has been observed as early as the initiation of flower bud formation, especially when favorable environmental conditions occur during this time. When temperatures are moderate (75°F to 86°F) and conditions are wet or humidity is high (greater than 90%), FHB fungi colonize quickly, and necrosis becomes visible within 5 days after infection. Overwintering structures (perithecia) form on infected debris as temperatures drop in autumn.

Disease Management

FHB in cereal crops is managed by tolerant cultivars (varieties) and fungicide applications. However, as of this publication, there are no FHB-resistant cultivars available. Additionally, no conventional fungicides are labeled for use on hemp. Researchers are currently investigating disease resistance in commercial hemp cultivars and efficacy of cultural practices and biological control products. Recommendations presented here are based on efficacy in other fungal disease systems and in FHB management in cereals.

Figure 2. Black fungal structures (perithecia) on the outside of harvested grain are an indicator of Fusarium head blight infection (*right*), in contrast to healthy hemp seed (*left*).

Field management

Cultural Management

- Increase plant spacing or reduce seeding density to improve air circulation, lower humidity within canopies, and decrease leaf wetness (e.g., after a rain event).
- Plant cultivars with a less compact bud structure to improve air flow within heads.
- Reduce field residue prior to planting. Till to bury infected residue at least 4 inches.
- Control gramineous weeds within and adjacent to field plots throughout the season.
- Rotate away from major FHB host crops (hemp, cereals, corn) to a non-host for at least 2 to 3 years. Nonhost crops include alfalfa and vegetables.

Biological Control Products

- Currently, limited pesticides are registered for hemp in the U.S. Most registered fungicides are biological or biorational products. A list of approved products for Kentucky growers is provided by the Kentucky Department of Agriculture in the *Kentucky Hemp and Pesticides* publication. Studies are ongoing to identify effective biological and biorational fungicides and appropriate application timings.

- Insecticide products targeted toward corn earworm (*Helicoverpa zea*) may reduce wounding on buds and can potentially reduce *Fusarium* infections and FHB development.

Postharvest management

Causal *Fusarium* spp. can continue to colonize and damage floral and grain material during storage.

- Avoid harvesting diseased floral or grain material.
- Dry grain and floral material prior to long-term storage. Floral material should be dried at 60% humidity and 60°F to 70°F, and grain should be dried to 8% or 9% moisture at temperatures below 120°F.
- Remove diseased plants from storage if fungal contamination is identified.
- Avoid storage in warm or humid environments.

Additional Resources

- Hemp Research, Extension, and Education (UK)
https://hemp.ca.uky.edu/
- Plant Pathology Extension Publications (UK)
https://plantpathology.ca.uky.edu/extension/publications
- Hemp Collaboration Website
https://blogs.cornell.edu/s1084hemp/
- Kentucky Hemp and Pesticides (KDA)
https://www.kyagr.com/consumer/documents/ES_AGR_PesticidesandHemp.pdf

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