

A New Crop in the US Results in Both New Diseases and Familiar Ones

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Industrial hemp is growing in the US for the first time since 1957. Upon establishing a pilot research program under Section 7606 of the 2013 Farm Bill, several states have developed research programs. Kentucky has the largest and most organized of these programs, with universities and participating farmers growing from 33 acres in 2014 to over 4,000 acres in 2016.

With this newly introduced crop came new disease challenges for growers. Plant pathologists at the University of Kentucky began responding to grower inquiries in 2014, the first year the crop was grown under the program. As acreage increases, so do disease reports. In many cases, disease severity has also increased in locations where two or three consecutive hemp crops were grown. To date, over 10 fungal pathogens and one genus of oomycete have been confirmed on hemp grown for fiber, seed, and cannabinoids. Disease losses in 2016 ranged from 0 to 100%. Major yield reductions came from fungal and oomycete (water mold) pathogens. No bacterial or viral infections were confirmed.

Under greenhouse conditions, breeding/propagation stock, as well as plants grown for cannabinoid production, are primarily affected by botrytis gray mold, powdery mildew, and *Pythium* root rot. Botrytis gray mold is caused by the fungus *Botrytis cinerea*. The ubiquitous pathogen is usually restricted to dead, dying, or wounded tissue; young plants are most susceptible to infections. Greenhouse conditions such as high humidity and moderate temperatures are ideal for infection and sporulation. Powdery mildew is a fungal disease caused by the pathogen *Podosphaera maculara*. Young, succulent tissue is most susceptible to disease. Specificity of *P. maculara* is limited to hemp and hops, and it thrives under humid conditions with limited air circulation. *Pythium* spp, in contrast, is a soilborne pathogen that can affect a wide range of hosts. The oomycete pathogen can enter greenhouse facilities through soil or water movement; poor sanitation and excess water allow the pathogen to replicate and infect at high rates. Losses from root rot disease can reach 100% in some cases, especially where growers have converted existing tobacco “float bed” systems.

Field-grown hemp has fewer and less severe disease problems, but there continues to be a few that can cause local epidemics. *Pythium* root rot and assorted leaf spot diseases are the primary challenges faced by growers of field hemp. *Pythium* spp., as previously mentioned, requires water to complete its life cycle. Heavy rains and poor drainage are the driving forces behind *Pythium*-induced crop losses. Leaf spot diseases vary by location, and under cool rainy conditions, can become severe. *Cercospora* leaf spot and a newly-identified* fungus in the Pleosporaceae family have been increasing in severity, especially in fields with two or three consecutive plantings. In some cases, leaf spot diseases can cause complete crop losses.

Disease management is a major challenge for Kentucky hemp growers. As long as the US Drug Enforcement Agency retains *Cannabis* spp. as a Schedule 1 narcotic, it will be impossible for pesticide manufacturers to register synthetic fungicides. Sanitation is currently the primary means for disease management. The UK Hemp Pathology team is working on disease management strategies for recommendations.

* Name and characteristics of the newly identified fungus will be released later in 2016.