

Effects of powdery mildew infection and fungicide treatment on secondary metabolite profiles in hemp

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Secondary metabolites in hemp:

- Hemp produces a wide_range of secondary metabolites including cannabinoids and terpenoids/terpenes
- These secondary metabolites are produced on the glandular trichomes of the female flowers (left and right images below).
- **Cannabinoids** include CBG and CBD which are often the desired product from hemp.
- **Terpenes** are volatile compounds that are responsible for the fragrance and flavor of the hemp flowers.





Research Questions:

- 1. How do terpene profiles in hemp change throughout the season and what is the impact of flowering?
- 2. How can a biological fungicide treatment impact the terpene profile of hemp?
- 3. How can pathogen infection (powdery mildew and *Botrytis* grey mold) impact the terpene profile of hemp?









Preliminary Results from 2019 season:

- During the 2019 field season terpenes were collected from plants infected with powdery mildew and from healthy plants.
- Despite the small sample size, preliminary analysis shows that the samples collected from plants infected with powdery mildew had different terpene profiles than samples collected from healthy plants

2020 Season Terpene Collections:

- Terpenes are being collected from the same five uninoculated, untreated hemp plants weekly throughout the summer to determine how the terpene profiles will change throughout the season, and determine the impact of flowering
- 2. Terpenes were collected from 12 untreated hemp plants, and 12 plants that are being treated with a *Bacillus*based biological fungicide at the label rate pre-inoculation. The plants were recently inoculated, and terpenes will be collected a second time once infection is established.
- 3. At the end of this season, terpenes will be collected from 12 planted infected with *Botrytis* grey mold, 12 plants infected with powdery mildew, and 12 healthy, untreated plants. Flowers will also be collected from the same plants to extract and analyze cannabinoid profiles.



Hemp flowers can become infected and completely covered in powdery mildew.



Terpene Collection system shown for a mature hemp plant.