



Cornell Hemp

<http://hemp.cals.cornell.edu>

Biological fungicide efficacy against hemp powdery mildew and *Botrytis* Gray Mold

Ali Cala, Colin Day, Garret Giles, Stephan I. Snyder, Jocelyn K. C. Rose, Chris Smart

Goal: Compare efficacy of commercially available products for use on hemp to control hemp powdery mildew and *Botrytis* gray mold.

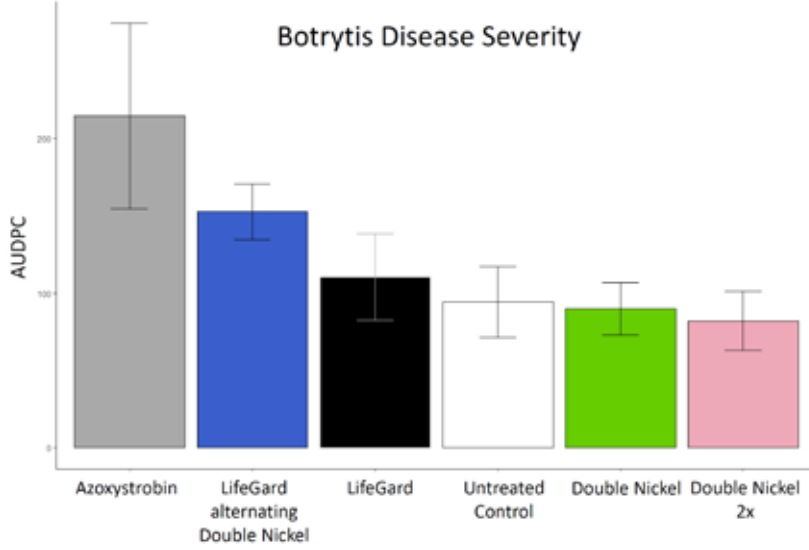
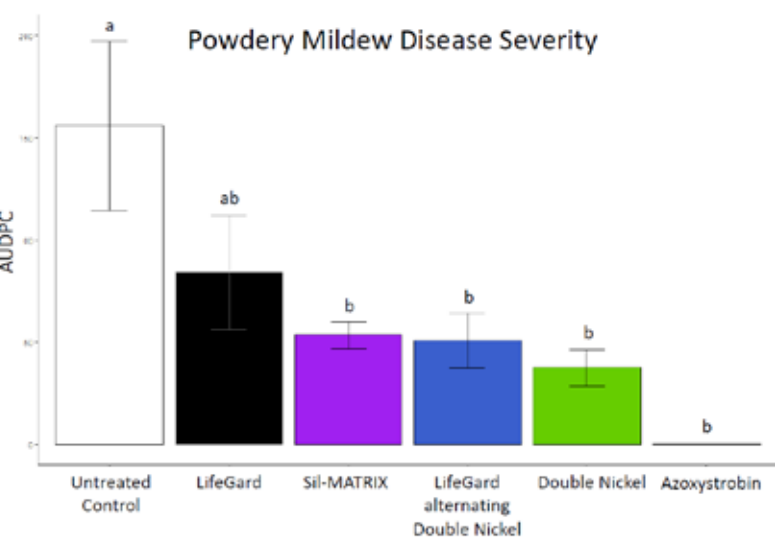
Powdery Mildew Treatments

LifeGard 4.5 oz./100 gal	<i>Bacillus mycoides</i> isolate J
Double Nickel LC 1 QT/acre	<i>Bacillus amyloliquefaciens</i> strain D747
Sil-MATRIX	Potassium silicate
LifeGard 4.5 oz./100 gal. alternated with Double Nickel LC 1 QT/acre	
Azoxystrobin	QoI Broad Spectrum fungicide
Untreated Control (UTC)	

Botrytis Treatments

LifeGard 4.5 oz./100 gal	<i>Bacillus mycoides</i> isolate J
Double Nickel LC 1 QT/acre	<i>Bacillus amyloliquefaciens</i> strain D747
Double Nickel LC 2 QT/acre	Double concentration
LifeGard 4.5 oz./100 gal. alternated with Double Nickel LC 1 QT/acre	
Azoxystrobin	QoI Broad Spectrum fungicide
Untreated Control (UTC)	

- Fungicide treatments were applied weekly throughout the season starting before the first inoculation.
- Both trials were spray inoculated with a liquid suspension of hemp powdery mildew or *Botrytis cinerea*, respectively, using a backpack sprayer.
- Disease severity was evaluated by multiple ratings of percent disease coverage (powdery mildew) or percent diseased flower heads (*Botrytis* gray mold). Area under the disease progress curves (AUDPC) were calculated and shown in the graphs below.
- **All treatments were effective for controlling powdery mildew disease severity, but not *Botrytis* gray mold.**



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Fungicide use and pathogen infection effect on secondary metabolites in hemp

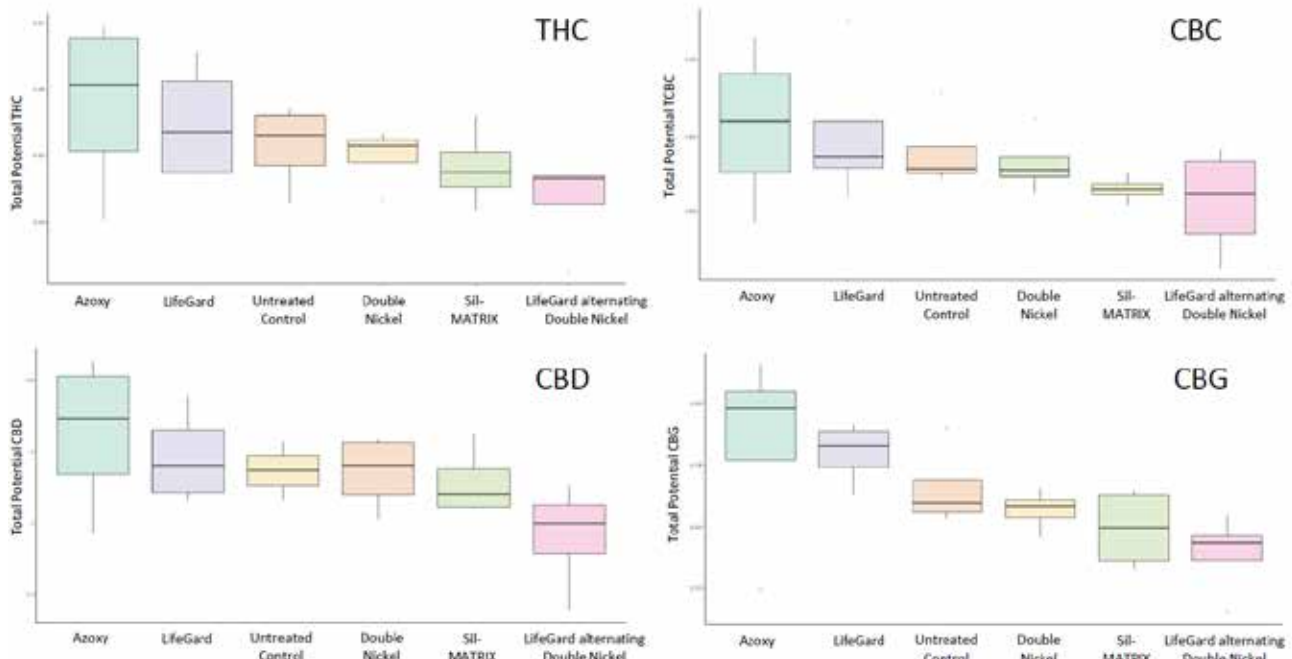
- Some of the major cannabinoids produced in hemp are cannabigerol (CBG), cannabichromene (CBC), cannabidiol (CBD), and tetrahydrocannabinol (THC).

Research Question: Do fungicide treatments affect the cannabinoid levels in hemp?

Experiment:

- Terminal flower buds were collected from plants treated with various fungicide treatments (see tables on previous page).
- Sample tissue was dried, ground, and cannabinoids were extracted using an ethanol extraction protocol. The extraction samples were analyzed using high throughput liquid chromatography (HPLC).

Effect of Biopesticide application (PM trial) on Total Potential:



Research Question: Does infection with Powdery mildew affect the cannabinoid levels in hemp?

Experiment:

- Terminal flower buds were collected from plants infected with powdery mildew and health plants.
- Extraction and analysis were the same as above.

Effect of Powdery Mildew infection on Total Potential:

