



Cornell Hemp

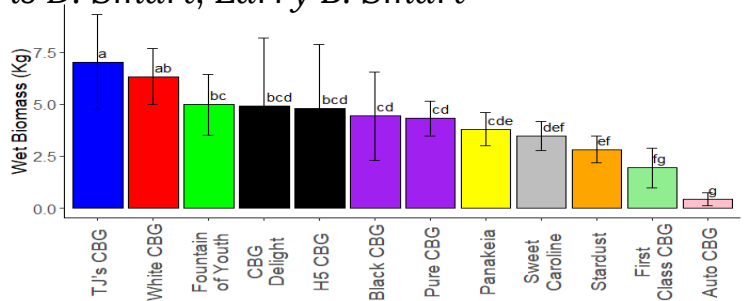
<http://hemp.cals.cornell.edu>

2020 CBG Hemp Cultivar Trial

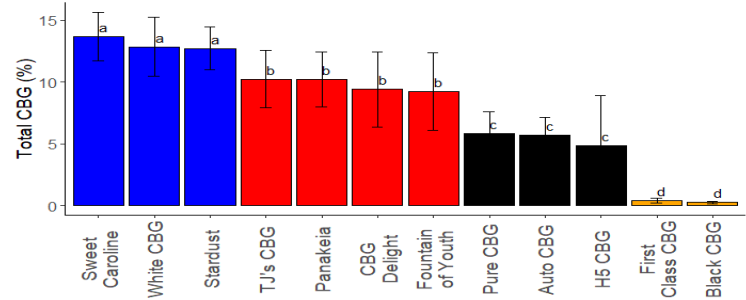
Jacob A. Toth, George M. Stack, Craig H. Carlson, Ali R. Cala, Glenn Philippe, Jocelyn K.C. Rose, Chris D. Smart, Larry B. Smart

Cannabigerol (CBG) is a non-intoxicating cannabinoid with growing interest.

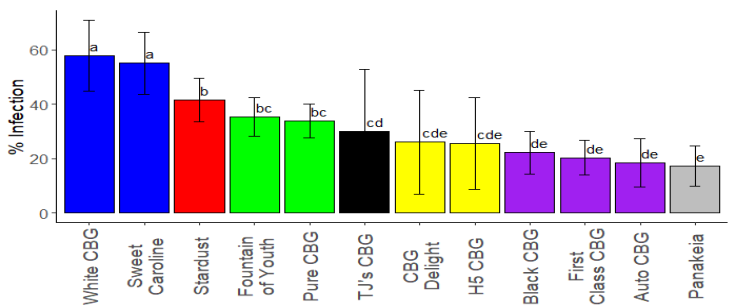
CBG is the precursor to other cannabinoids including cannabidiol (CBD) and tetrahydrocannabinol (THC), and has distinct pharmacological effects of its own. Most cultivars of hemp have a low (<1%) CBG concentration, but CBG-dominant cultivars have been developed. It should be easier remain under 0.3 % THC in CBG-dominant plants compared to CBD-dominant plants. We evaluated 12 CBG cultivars in the 2020 growing season, and found many were not stable for flowering time or cannabinoid profiles. Reliable cultivar sourcing will be essential for successful CBG production.



Wet biomass (kg) by cultivar. 'CBG Delight' and 'H5' segregated for photoperiod insensitivity (autoflowering), which led to high variance in biomass.



CBG content (%) in shoot tips by cultivar. Total CBG was calculated by $CBG + 0.878 * CBGA$. 'First Class CBG' and 'Black CBG' were CBD-dominant cultivars, while 'H5' and 'Fountain of Youth' were segregating for individuals with CBG- and CBD-dominant cannabinoid profiles.



Powdery mildew severity (%) by cultivar. Powdery mildew was extensive on some cultivars, exceeding 50% for 'White CBG' and 'Sweet Caroline'.

Production and Phenotyping:

Twelve CBG hemp cultivars were grown at McCarthy Farm in Geneva, NY, in a replicated trial of eight plants per plot. Wet biomass measurements were taken at the end of the season. Cannabinoid content was determined through HPLC analysis of shoot tip samples. Powdery mildew severity was rated three times throughout the season and an average rating was calculated.

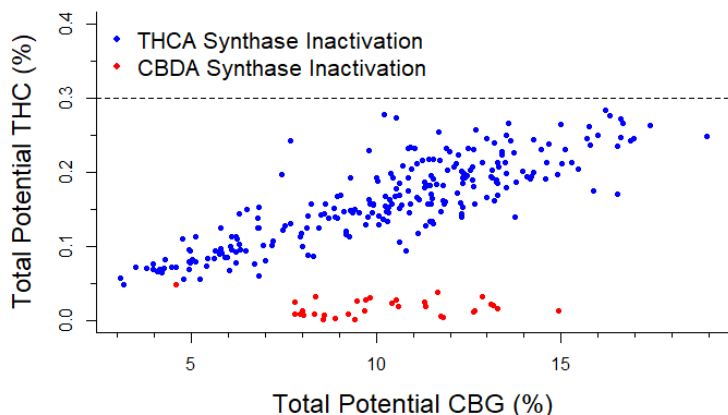


Many CBG cultivars are segregating for important traits such as major cannabinoid and photoperiod insensitivity (autoflowering). Further study and breeding will be necessary for development of high-yielding, stable, powdery mildew-resistant cultivars.

Cannabinoid profiles. CBGA is the first cannabinoid produced and usually converted to CBDA or THCA by a synthase enzyme. CBG- dominant plants had either an inactivated THCA synthase or an inactivated CBDA synthase as determined by molecular markers. Most cultivars had an inactivated THCA synthase and produced ~70:1 CBG:THC. ‘Panakeia’ had an inactivated CBDA synthase and almost no THC (<0.05%). ‘Black CBG’, ‘First Class CBG’, ‘Fountain of Youth’, and ‘H5’ had individuals that produced predominantly CBD and expressed active CBDA synthase.

Cultivars in the 2020 CBG Cultivar Trial

Cultivar	Type	Source	Major Cannabinoid	Segregating Traits	Inactivated Synthase
TJ’s CBG	Fem. Seeds	Stem Holdings Agri	CBG	Autoflower (1/4)	THCA
White CBG	Fem. Seeds	Oregon CBD	CBG		THCA
Fountain of Youth	Clone	Green Point Research	CBG	CBD (3/32)	THCA/None
CBG Delight	Fem. Seeds	Flura	CBG	Autoflower (1/4)	THCA
H5	Fem. Seeds	American Hemp Co.	CBG/CBD	Autoflower (1/4) CBD (1/2)	THCA/None
Black CBG	Clone	Ryes Creek	CBD		None
Pure CBG	Clone	Front Range Bioscience/ Puregene	CBG		THCA
Panakeia	Clone	Front Range Bioscience	CBG		CBDA
Sweet Caroline	Clone	Ryes Creek	CBG		THCA
Stardust	Clone	Ryes Creek	CBG		THCA
First Class CBG	Clone	Hydrogrow	CBD	Males	None
Auto CBG	Fem. Seeds	Oregon CBD	CBG		THCA



Acknowledgements: We would like to thank Stem Holdings Agri, Oregon CBD, Green Point Research, Flura, American Hemp Co., Ryes Creek, Front Range Bioscience, and Hydrogrow for contributing cultivars, as well as the lab members of Larry Smart, Chris Smart, and Jocelyn Rose for their assistance. This work was funded by Pyxus International and New York Ag and Markets through a grant with the Empire State Development Corporation.

