2021 Hemp Cannabidiol Drying Trial

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Table 1. Agronomic information for the hemp used in this CBD hemp drying trial, Alburgh, VT, 2021.

Location	**Borderview Research Farm, Alburgh, VT**
Soil type	Benson rocky silt loam, 3-5% slope
Previous crop	Corn
Plant spacing (feet)	5 x 5
Field planting date	6-Jun
Fertilization	180 lbs N ac^{-1}, 20 lbs P ac^{-1}, 72 lbs K ac^{-1}
Harvest date	5-Oct through 8-Oct

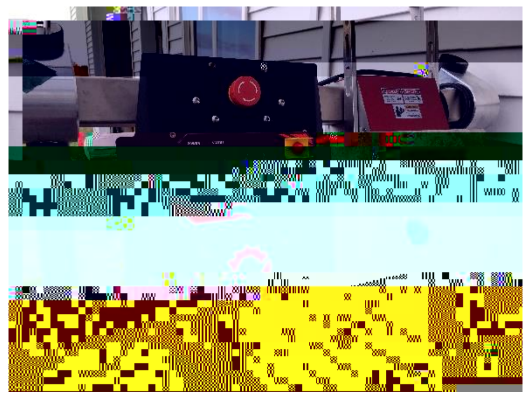

Image 1. Triminator BuckMaster Pro (Maple Ridge, BC, Canada).

Plants were harvested by hand using bypass loppers or chainsaw depending on trunk diameter. Each harvested plant was broken down into smaller branched sections and larger ñfanò or ñsunò leaves were removed by hand, while smaller leaves were left attached since they subtend from the flower bract. Remaining stems were then bucked using the BuckmasterPro Bucker (Maple Ridge, BC, Canada) (Image 1) and remaining leaf material and buds were collected. Wet bud and leaf material was then run through the Centurion Pro Gladiator Trimmer (Maple Ridge, BC, Canada) (Image 2). Wet bud weight and unmarketable bud weight were recorded. The flower buds were then dried at 80 F or ambient temperature with airflow until dry enough for storage without molding.

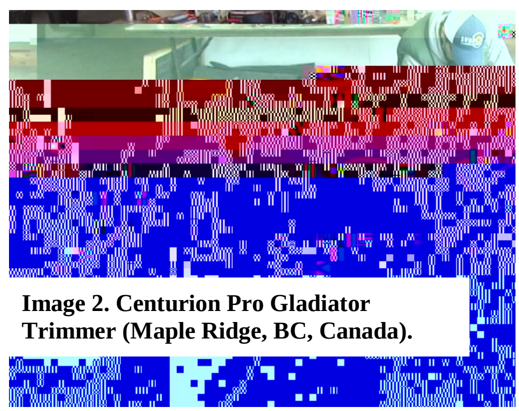

Image 2. Centurion Pro Gladiator Trimmer (Maple Ridge, BC, Canada).

The drying trial began at harvest, when Lifter hemp plants were debudded, weighed, and placed in two dryers, one with an 80 F temperature treatment and one with a 105 F treatment. Samples dried at ambient temperatures were placed on similar hardware cloth trays and placed in two separate rooms. Locations for each drying temperature were further differentiated by the use of a dehumidifier and lack of dehumidifier, with all treatments receiving airflow through use of a fan. Within dryers, two middle shelves were filled with equal amounts of hemp flower where each tray section was a replicate. Fans, driers and dehumidifiers remained on throughout the duration of the drying period. Samples dried at 105° F were started on 5-Oct and were removed from dryers on the morning of 6-Oct for both the dehumidifier and no-dehumidifier treatments. Samples dried at 80° F began drying on 6-Oct and were pulled on the afternoon of 7-Oct (dehumidifier) and morning of 8-Oct (no dehumidifier). Ambient samples began drying on 8-Oct and were pulled on afternoon of 12-Oct (dehumidifier) and afternoon of 14-Oct (no dehumidifier). Samples were monitored for temperature and relative humidity throughout the drying period however data were lost through technical errors.

Subsamples of flower material from each treatment and replications were sent to Bia Diagnostic Laboratories (Colchester, VT) for analysis of cannabinoids profiles. Analyzed cannabinoids included tetrahydrocannabinolic acid (THCA), delta-9-tetrahydrocannabinol (D9-THC), cannabidiolic acid (CBDA), and CBD with a total potential THC and CBD included. Total potential THC and CBD indicate the maximum amounts of each compounds that can be contained in a sample, accounting for losses through decarboxylation. CBDA

Impacts of temperature

Based on the temperature of the drying environment alone (Table 3), significant differences in treatments were observed for D9-THC, CBDA, CBD, and total cannabinoids. The CBD concentrations for the 80° F treatment was significantly higher than all other treatments at 1.45% with a trial average of 0.914%. The D9-THC showed similar trends with highest observed values seen under the 80° F treatment at 0.135%. CBDA concentrations were highest under the 105° F treatment at 22.0%, significantly higher than the other two temperature treatments. At the time of testing, the 105° F environment produced the greatest concentrations of cannabinoids at a level that was statistically similar to the 80° F environment, and significantly higher than the ambient environment. The cannabinoid THC did not show a significant difference in any of the three drying temperatures.

Table 4. The influence of a dehumidifier on cannabinoid content, 2021.

Environment	THCA	D9-THC	CBDA	CBD	Total THCÿ	Total CBDÀ	Total Cannabinoids
	%	%	%	%	%	%	%
Dehumidifier	0.662	0.055	**21.6**	0.668	0.635	**19.6**	**20.7**

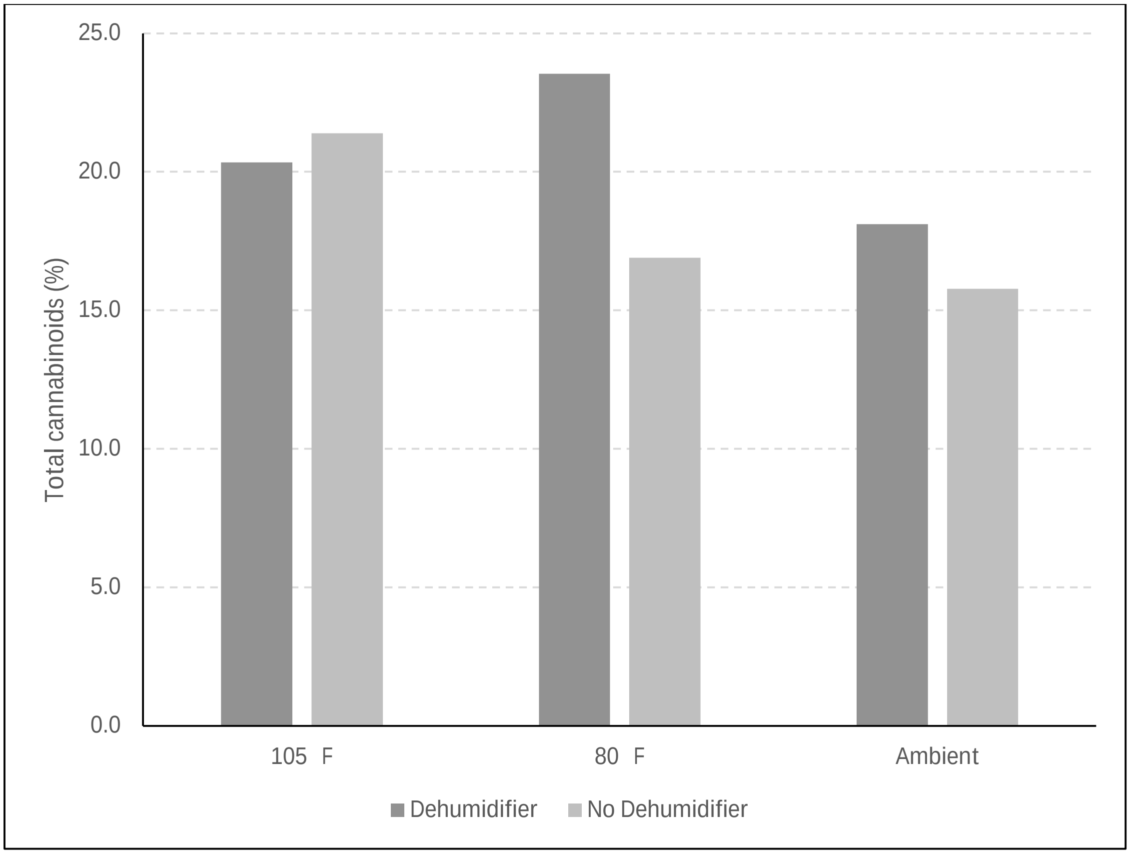

Figure 1. Total cannabinoids as a function of the treatments, Alburgh, VT, 2021.

DISCUSSION

While the use of higher temperatures results in faster drying rates, producers should consider the potential impact of drying temperature on the quality of their product. Highest total potential cannabinoid concentrations within this trial were observed in those treatments dried with additional heat and under the presence of a dehumidifier. While our study indicated higher drying temperatures resulted in higher overall cannabinoid levels, when compared to ambient temperatures, additional quality considerations should be made depending on market and post drying handling practices. There is greater potential for leaf and trichome shattering for over-dried samples, especially if repeatedly handling flower material. This could have a greater impact on the quality of product. Additionally, those samples dried at ambient temperatures in our study showed some slight molding during the first few days of the study and furthermore, required turning to encourage airflow across flowers. These factors could have also detrimentally impacted flower quality resulting in the lower observed cannabinoid concentrations.

This trial also did not track terpene concentration over the various drying conditions, which could be an additional quality consideration as many terpenes are highly volatile and experience greatest loss in drying temperatures starting at 70° F. Drying methods could also be tailored to the desired cannabinoid or terpene profiles of the grower to produce the highest concentrations of one or more compounds at the expense of another. Data for relative humidity and temperature over the drying period were lost, humidity gauges could be used to monitor, and control drying time to determine ideal drying times and maximize efficiency, especially for those growers with limited drying capacity.

ACKNOWLEDGEMENTS

Special thanks to Roger Rainville and the staff at Borderview Research Farm for their generous help with the trials. This project was supported by and was funded through our partnership with Hatch Act Multistate Research Fund and Vermont IPM Extension Implementation Program. This work was funded by the Northeastern IPM Center through Grant #2018-70006-2882 from the National Institute of Food and Agriculture, Crop Protection and Pest Management, Regional Coordination Program. We would also like to thank Henry Blair, Catherine Davidson, Hillary Emick, Ivy Krezinski, Scott Lewins, Lindsey Ruhl, Sophia Wilcox Warren, and Sara Ziegler for their assistance with data collection and entry. The information is presented with the understanding that no product discrimination is intended, and no endorsement of any product mentioned or criticism of unnamed products is implied.

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