Optimizing Dried Cannabis Flower Storage Conditions

PRESENTER: **Conner Jeffries**

INTRODUCTION

The storage conditions of dry cannabis flower are critical in maintaining the organoleptic characteristics of the product for the end consumer. Plant browning is dominated by the loss of chlorophyll, a process known to be controlled by oxygen and light, but also affected by water activity.[1,2] Volatile aroma compounds – primarily terpenes - can be lost due to vaporization or chemical decomposition.

Our work investigates the effect of oxygen, light, temperature and water activity on the chlorophyll content of dried cannabis, as well as the effect of temperature and water activity on terpene content in dried cannabis.

[1] S. Aronoff and G. Mackinney. *J. Am. Chem. Soc.* **1943**, 65, 5, 956–958; Moss, B. *New Phytologist.* **1968,** 67, 49-59.
[2] Östbring K, Sjöholm I, Rayner M, Erlanson-Albertsson C. *Foods.* **2020**, 22, 9(5), 669.; LaJollo, F., Tannenbaum, S.R. and Labuza, T.P. *Journal of Food Science.* **1971,** 36, 850-853.

METHOD

Crème Brulée plants were harvested and dried in a commercial drying room for two weeks until a plant water activity of 0.6 was reached. The dried flower was ground, homogenized, and lots were placed in water activity chambers held at 0.45, 0.55, 0.58, and 0.64. After 1 week of equilibration, samples were placed in 100 mL canning jars and moved to their experimental setups. All samples were kept in the dark unless otherwise noted. Initial measurements for chlorophyll and terpenes were taken and monitored over the course of 6 months. Chlorophyll was determined via UV/Vis absorbance at 655 nm in a methanol extraction. Terpenes were quantified from a hexane extraction via GCMS. Three experimental setups were maintained:

Effect of Oxygen & Light on Chlorophyll

Four jars of dried flower at 0.58 a_w were held in a lab maintained at 25 ºC and exposed to sunlight. Two samples were kept in quart containers to maximize oxygen headspace. Two sample jars were held in an airtight chamber purged with nitrogen gas. In each oxygen environment one sample was exposed to light, the other shrouded.

Effect of Temperature and Water Activity on Chlorophyll

Three sample jars at 0.58 a_w were held at 7 ºC, 18 ºC, and 25 ºC. Three other sample jars were held at 18 ºC with water activities of 0.46, 0.55, and 0.64.

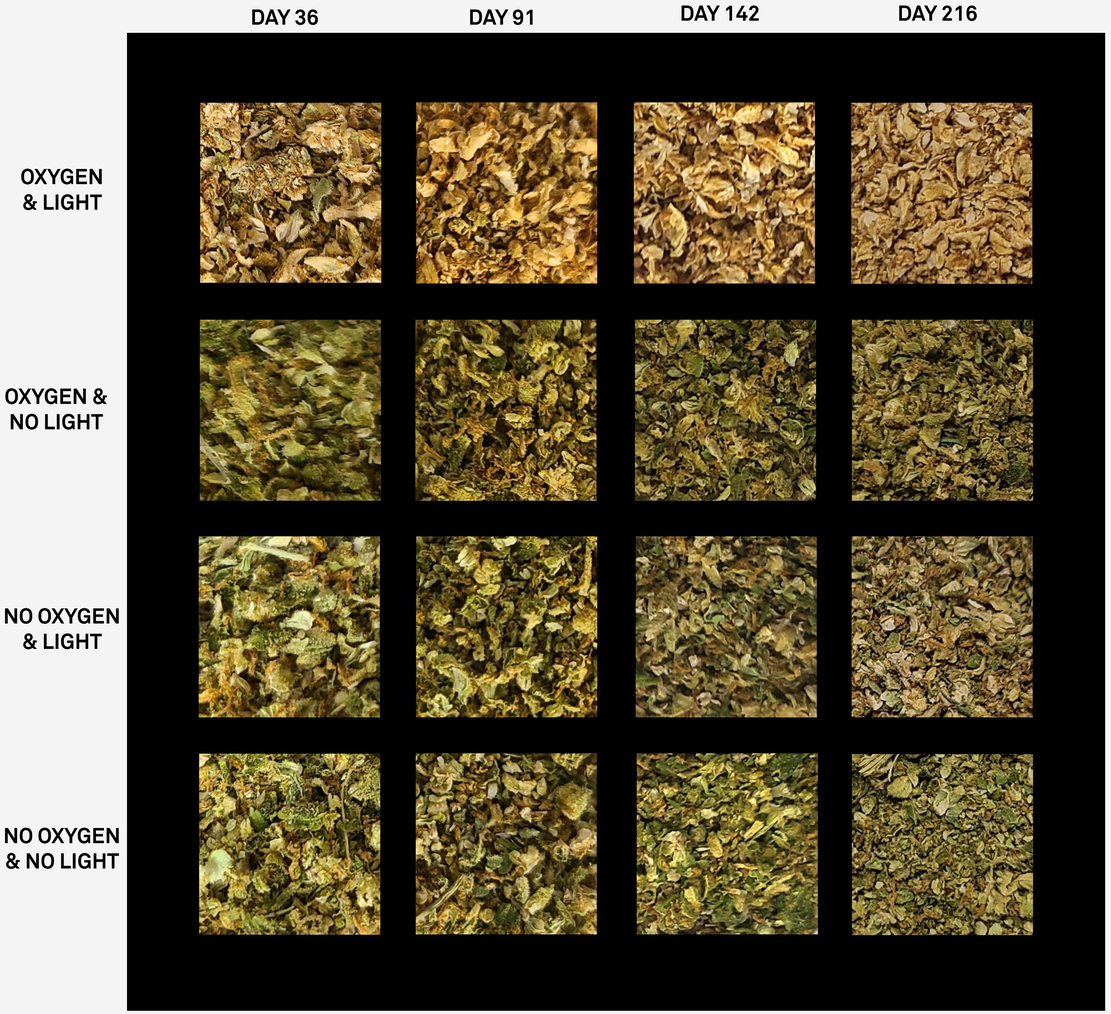
Effect of Temperature and Water Activity on Terpene Retention

Three sample jars at 0.58 a_w were held at 7 ºC, 18 ºC, and 25 ºC. Three other sample jars were held at 18 ºC with water activities of 0.46, 0.55, and 0.64.

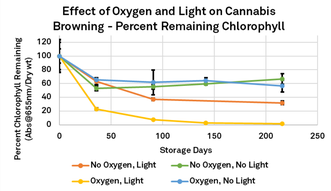
AROYA

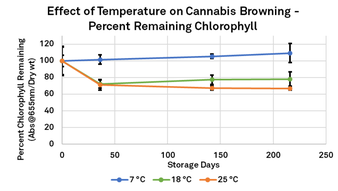
CANNABIS STORAGE MATTERS

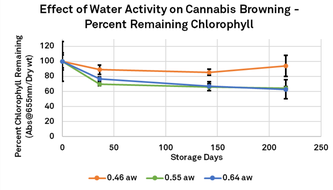
ARE YOU MAXIMIZING CANNABIS QUALITY?

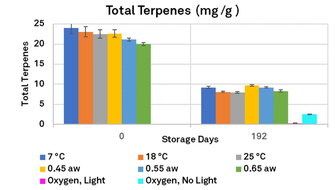


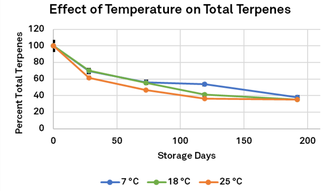
RESULTS

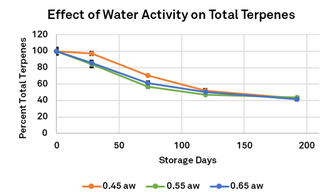


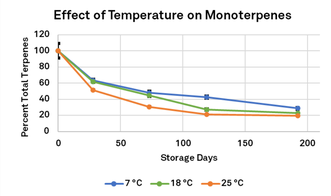


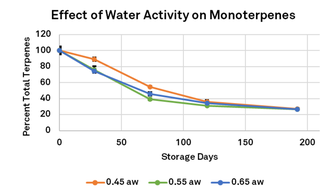


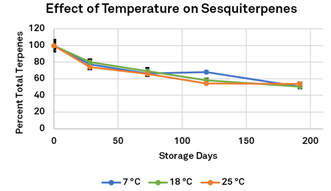


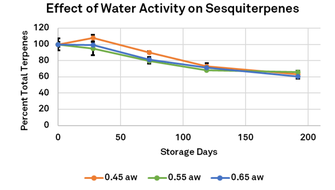












Monoterpenes: alpha & beta pinene, myrcene, limonene, linalool, fenchol, and alpha-terpineol.
Sesquiterpenes: caryophyllene, alpha-humulene, cis & trans nerolidol, and bisabolol.

DISCUSSION

The largest factor in cannabis browning is exposure to light. Modest gains in preserving chlorophyll can be had by storing dried plant at lower temperatures and water activities or lowering oxygen exposure. Our data suggests that there is an ideal middle ground water activity – too high and there is risk of microbial growth, too low and perceived quality is degraded.

While terpene quantity may be maximized over time by minimizing temperature, water activity, and exposure to light and oxygen, aroma quality is too complex to ascertain by quantifying a handful of compounds.

The organoleptic effects of single molecules can often be difficult to assess, and our future work will focus on qualifying human sensory experiences and how different storage conditions affect human perception of cannabis. AROYA has partnered with Dr. Caroline Ross at the Washington State University Sensory Evaluation Facility in order to better understand the complex sensory experiences and preferences of cannabis consumers.