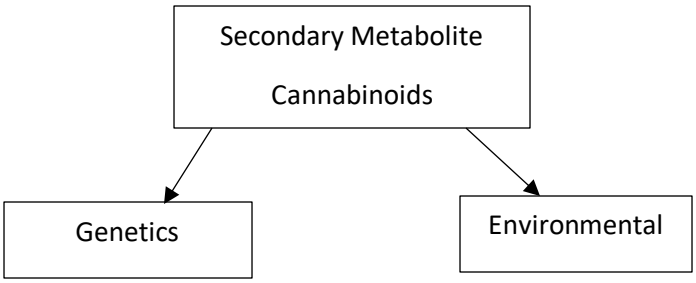
To: PooTee **Date:** March 11, 2024

From: Zill

Subject: Summary - "UV-B RADIATION EFFECTS ON PHOTOSYNTHESIS, GROWTH AND CANNABINOID PRODUCTION OF TWO *Cannabis sativa* CHEMOTYPES, JOHN LYDON, ALAN H. TERAMURA and C. BENJAMIN COFFMAN" (1987)

Why the study

At the time, conflicting information swirled around what influences the production of cannabinoids, secondary metabolites in Cannabis species. One camp claimed the metabolites are produced solely based on genetic instructions. Others suggested that while genes are important the environment plays a major impact in cannabinoid production and content.



Objective: *How does a plant become insensitive to UV-B radiation?*

Is it done by changes in plant morphology (genetics) or does insensitivity correlate with increased THC production (environmental)?

The study uses two *Cannabis sativa* Chemotypes: 1) Drug and 2) fiber strains. A sativa fiber strain does not produce THC but does produce CBD. The biosynthetic pathway is copied on the last page. CBD is above the yellow circle (Ignore the circles, I was illustrating decarboxylation that happens while concocting cannabutter, care to see that?).

Previously it was known that altitude influences cannabinoid production - The higher the altitude the more cannabinoids are produced. Hint: The author is laying the foundation that UV in sunlight is stronger at higher elevations and influences (environment) cannabinoid production. Both altitude and latitudinal location (latitudinal – think of living at the equator) dramatically influence the UV-B exposure. An earlier study (1970's) mentioned that plant functions in general at 3,500M altitude is 32% greater than at 1,500M altitude. Another earlier study showed a 23% increase in delta9 THC in irradiated drug-type *C. sativa* plants

Materials and Methods

This was a greenhouse study. All incoming UV is filtered by the greenhouse glass.

Why focus on UV-B? UV-A is very non energetic and from a plant standpoint does nothing. UV-C is energetic and is quite destructive to all tissue, you, and plants. UV-B on the other hand is powerful enough to cause a response but does not kill tissue out right. Plants and animals respond to UV-B irradiation.

Also mentioned in the article - Temperature and light strength influences CO2 assimilation. My article summary focuses only on THC.

UV-B dose

Article: Ultraviolet-B radiation was provided for 3 h on either side of solar noon, resulting in a daily UV-B dose of 0, 6.7, or 13.4 effective kJ per m-2 UV-B.

My Adaptation: A reptile 24" 75W bulb should provide enough UV-B for a 2x2 tent. With bulbs placed about 12-14" above the canopy. $25.00 amazon.

Results

Both sativa chemotypes respond to UV-B irradiation.

The fiber-type plants did not show an increase in any cannabinoids, CBD, or THC.

In drug-type plants the THC content increased in leaf tissue by 28% and 48% with effective dose of 6.7 and 13.4 kJ/m2. The same levels of UV-B irradiation resulted in 15% and 32% increase in THC production in floral tissues.

Discussion

The two sativa chemotypes are insensitive to UV-B irradiation. The Drug-type made loads more THC but the fiber-type did not. Perhaps background levels of CBD in fiber-types protect from UV.

It is thought that the increase in cannabinoids especially in floral parts help prevent UV induced mutations in the flower ovaries during seed development.

In Conclusion

The delta9-THC content in leaf and floral tissues of greenhouse grown drug-type *C. sativa* increased linearly with UV-B dose.

Cannabinoid synthesis