FlaVUH by Ventana Plant Science: Efficacy on Controlled Environment Cannabis

Prepared For:

Ventana Plant Science

Services Performed By:

Sostanza Inc.
consultants@sostanzaglobal.com

Date

17-June-2022

Sostanza
+1 519 731 4548
+1 416 474 9855
+1 416 836 5701

Table of Contents

Summary of Findings

FlaVUH is a concentrated plant growth supplement intended to be used along with an existing fertilizer program to improve nutrient availability. In this trial, FlaVUH was applied at a rate of 12 ml/gal along with a raw soluble salt-based fertilizer program to container-grown, high-THC cannabis and compared to a control without FlaVUH.

FlaVUH supplementation increased yield by 14% without affecting vegetative growth or the electrical conductivity and pH of the growing media.

Materials and Methods

Experimental Design

Rooted cuttings of Cannabis sativa cv. 'Poco Loco' were transplanted into 3.5" square pots with one plant per pot containing Sunshine Six #4 (Sun Gro Horticulture Canada Ltd.) for the vegetative stage.

At the end of the 15-day vegetative stage, six plants with representative height and canopy size from each treatment were selected and transferred to the flowering stage. Plants were potted into 1.55-gal blow-molded black pots for the flowering stage containing Sunshine Six #4 and randomly oriented in a grow room at a density of 0.78 plants/ft^2.

Plants were hand-fertigated using Valenza Nutrients (valenzanutrients.com) following manufacturer-recommended rates and with a 10-20% leaching fraction. In the treatment group, FlaVUH was mixed in at a rate of 12 ml/gal at each fertigation event before the fertilizer.

The experiment was a completely randomized design with FlaVUH supplementation as the sole factor. There were six replicates per treatment, and each potted plant was an experimental unit. Plants were randomly re-oriented within the grow room weekly until the trellis netting was applied on day 12 of the flowering stage to reduce variability due to plant location. Non-experimental plants were placed along the borders of the grow tables and randomly among the treatment plants to maintain a consistent planting density and reduce border effects.

Growth & Environmental Conditions

Table 1. Grow room environmental parameters during the trial.

	Statistic	Day	Night
Vegetative Stage			
Air Temperature (°F)	Mean ± SD	71 ± 1.9	69 ± 1.9
Relative Humidity (%)	Mean ± SD	59 ± 2.7	59 ± 2.4
Flowering Stage			
Air Temperature (°F)	Mean ± SD	78 ± 4.1	69 ± 3.1
Relative Humidity (%)	Mean ± SD	60 ± 5.9	57 ± 6.9

Grow room environmental parameters are summarized in Table 1. Photosynthetically active radiation (PAR) at canopy level was maintained at 300-500 μmol·m^{-2} s^{-1} during the vegetative stage with an 18-hour photoperiod and for the flowering stage, was increased from 650 ± 50 μmol·m^{-2} s^{-1} to a maximum of 950 ± 50 μmol·m^{-2} s^{-1} with a 12-hour photoperiod under Gavita Pro 1650e LED grow lights (Hawthorne Gardening Company). PAR was measured using an MQ-500: Full-Spectrum Quantum Meter (Apogee Instruments, Inc.). Atmospheric CO_2 was maintained at ambient levels (400-600 ppm).

Plants were harvested after 63 days in the flowering stage; stems were cut at soil level, and plants were hang-dried until moisture content reached 11-13%. Floral material was cut from stems; leaves were trimmed the dry floral weight (yield) was measured for each plant.

Growth and Growing Media Measurements

At the end of the vegetative stage, canopy area and plant height were measured on six plants from each treatment. Growth index for each plant was calculated as height (cm) x length (cm) x width (cm) x 300^{-1} (Ruter, 1992).

Growing media pH and EC were determined every two weeks during the flowering stage using the pour-through method (Wright, 1986).

Data Analysis

Data were analyzed using JMP Statistical Discovery Version 13.0 (SAS Institute Inc., Cary, NC). Un-paired T-tests were used to determine the effects of FlaVUH treatment on yield, growth parameters, and growing media parameters.

Results

Growing Media Electrical Conductivity and pH

At each of the four measurement intervals, the pH and EC of the treatment and control were not significantly different (P>0.1 in each case).

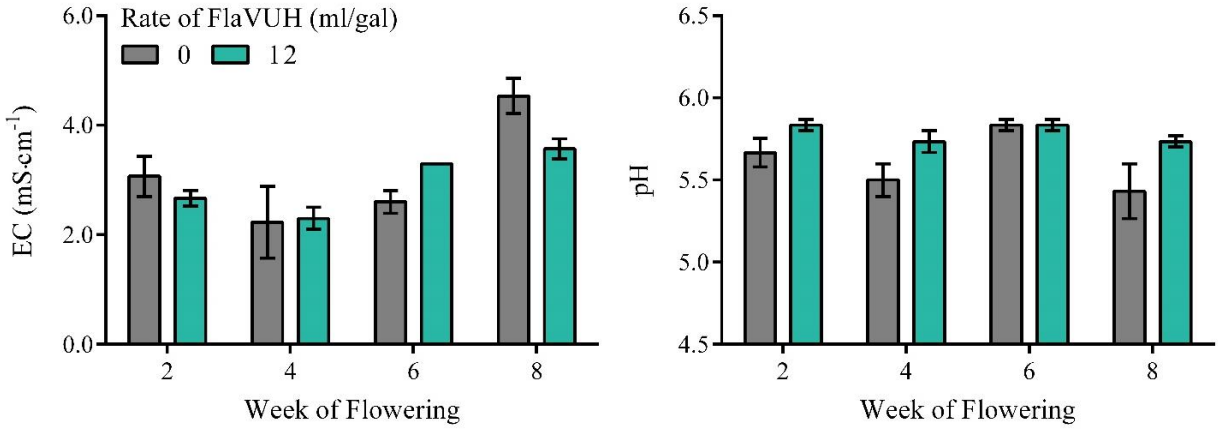

Figure 1. Response of growing media pH and electrical conductivity (EC) to FlaVUH supplementation. Data are means ± SEM (n =3)

Vegetative Growth

The control's mean (± SD) growth index was 55 ± 9.7 compared to 67 ± 16.3 for the FlaVUH treatment, though the difference was not significant.

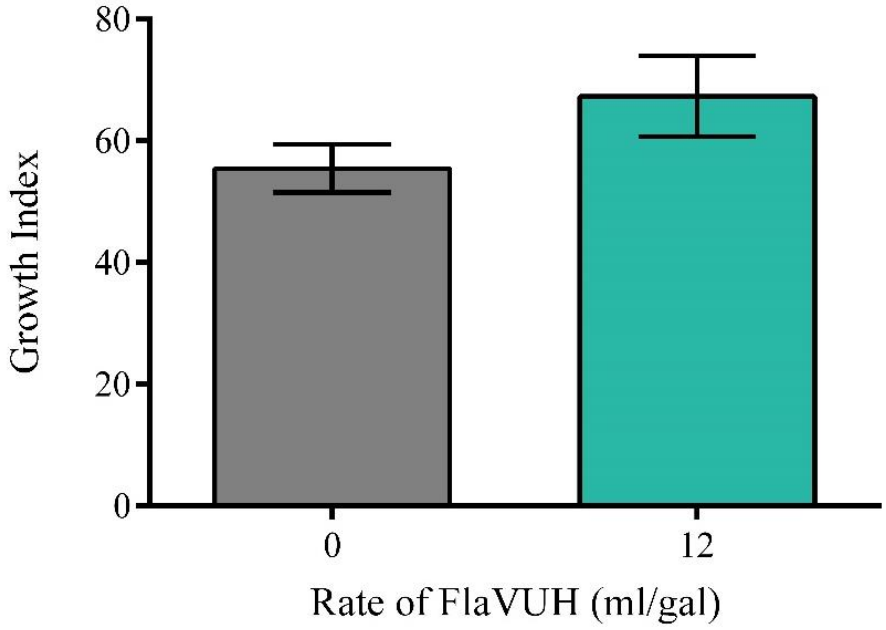

Figure 2. Response of cannabis growth index after a 15-day vegetative stage to FlaVUH supplementation. Growth index calculated as height (cm) x length (cm) x width (cm) x 300^{-1}. Data are means ± SEM (n =6)

Yield

FlaVUH supplementation increased yield by 14% compared to the untreated control (Figure 3; Table 2).

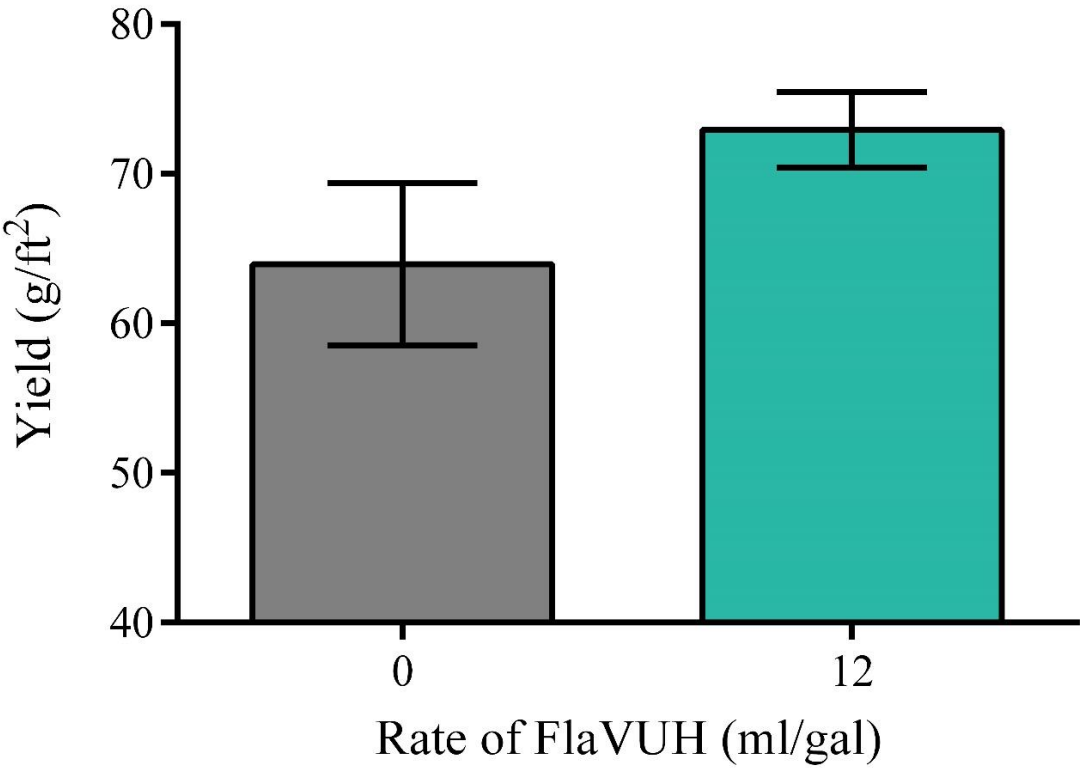

Figure 3. Response of cannabis yield per unit area to FlaVUH supplementation. Data are means ± SEM (n =6)

Table 2. Response of cannabis yield to FlaVUH supplementation. Data are means ± SEM (n =6)

Treatment	Moisture Content (%)	Yield (g/ft^2)
Control	12 ± 0.1	64 ± 13.3
FlaVUH	12 ± 0.4	73 ± 6.2
Significance[z]	NS	*

[z]NS,*, **, *** Nonsignificant, or significant at P < 0.1, 0.05, and 0.01, respectively

Conclusion

1. When applied at a rate of 12 ml/gal along with a raw soluble salt-based fertilizer program, FlaVUH increased yield by 14%.
2. There was no notable effect of FlaVUH on the electrical conductivity and pH of the growing media.

Quality Guarantee

The undersigned certifies that the execution of this trial, analysis and representation of the data was done in accordance with academic horticultural standards.

Deron Caplan

About Us

Sostanza is a group of horticultural researchers and advisors to some of the world's top cannabis producers. Our team has built and operated world-class facilities, established skilled teams, developed efficient processes, pioneered cannabis horticultural research, achieved some of the highest yields in the industry, and won several awards recognizing product quality.

Senior Team Members

Juan Gutierrez was the Director of Cultivation at MedReleaf for almost four years, where he led efforts to develop industry-leading and award-winning high-quality and high-yield cannabis cultivation practices. Once MedReleaf was acquired by Aurora Cannabis, Juan led assessment and improvement programs for all their cultivation facilities in Canada and supported similar projects in South America and Europe. Apart from cannabis experience, Juan

has a deep knowledge and expertise in commercial plant production. Juan holds a BSc in horticulture from the University of Guelph in Canada.

Philipp Matzneller, PhD was the Senior Scientist of cultivation at MedReleaf and Director of Applied Cultivation after Aurora Cannabis acquired the company. Under his guidance, a team of a dozen scientists and assistants across multiple facilities collected data and conducted experiments that resulted in a substantial increase in yield and quality of the production. Previously, Philipp worked in the ornamental greenhouse industry and as a research associate conducting climate impact studies. He holds a BSc and MSc in Agriculture from the University of Bologna (Italy) and a Ph.D. in Agroclimatology from the Humboldt University of Berlin.

Deron Caplan, PhD is a horticultural scientist specializing in controlled environment plant production. He earned North America's first Ph.D. with research focused on cannabis production, then led operations at The Kelowna Research Station - the world's first facility dedicated to advancing cannabis cultivation techniques and systems. Until recently, he was the Director of Research and Development at The Flowr Corporation, managing a team of ten scientists and operators and working closely with partners at The Hawthorne Gardening Company, a subsidiary of The Scotts Miracle-Gro Company. Deron has provided expert commentary on cannabis production to many media outlets and the Government of Canada

References

Ruter, J.M. 1992. Influence of source, rate, and method of applicating controlled release fertilizer on nutrient release and growth of "Savannah" holly. Fertil. Res. 32:101–106.

Wright, R.D. 1986. The pour-through nutrient extraction procedure. HortScience 21:227–229.