

Effect of Three Aquaponics Cultivation Methods on Cannabis Growth and Inflorescence Yield & Quality.

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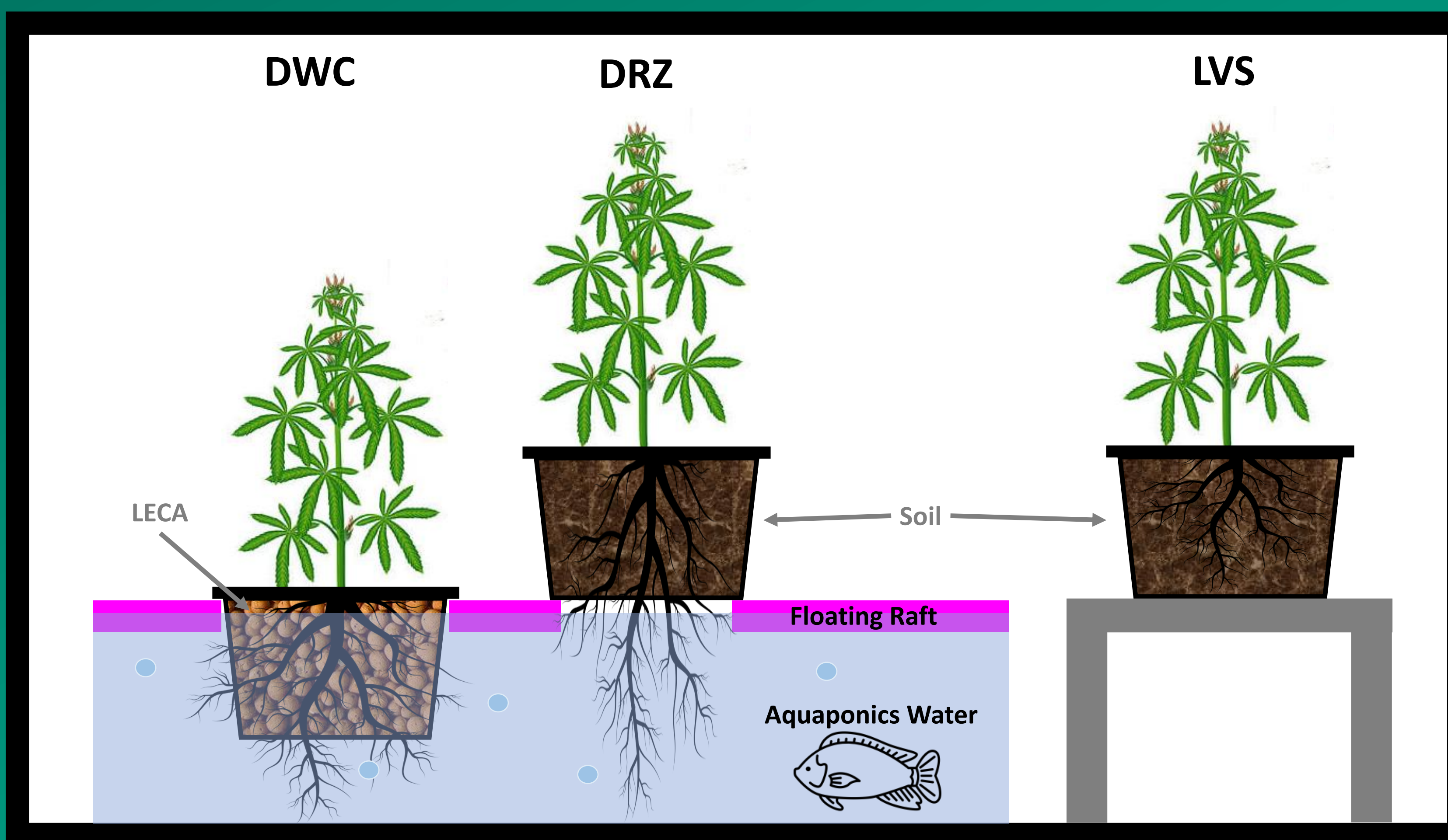
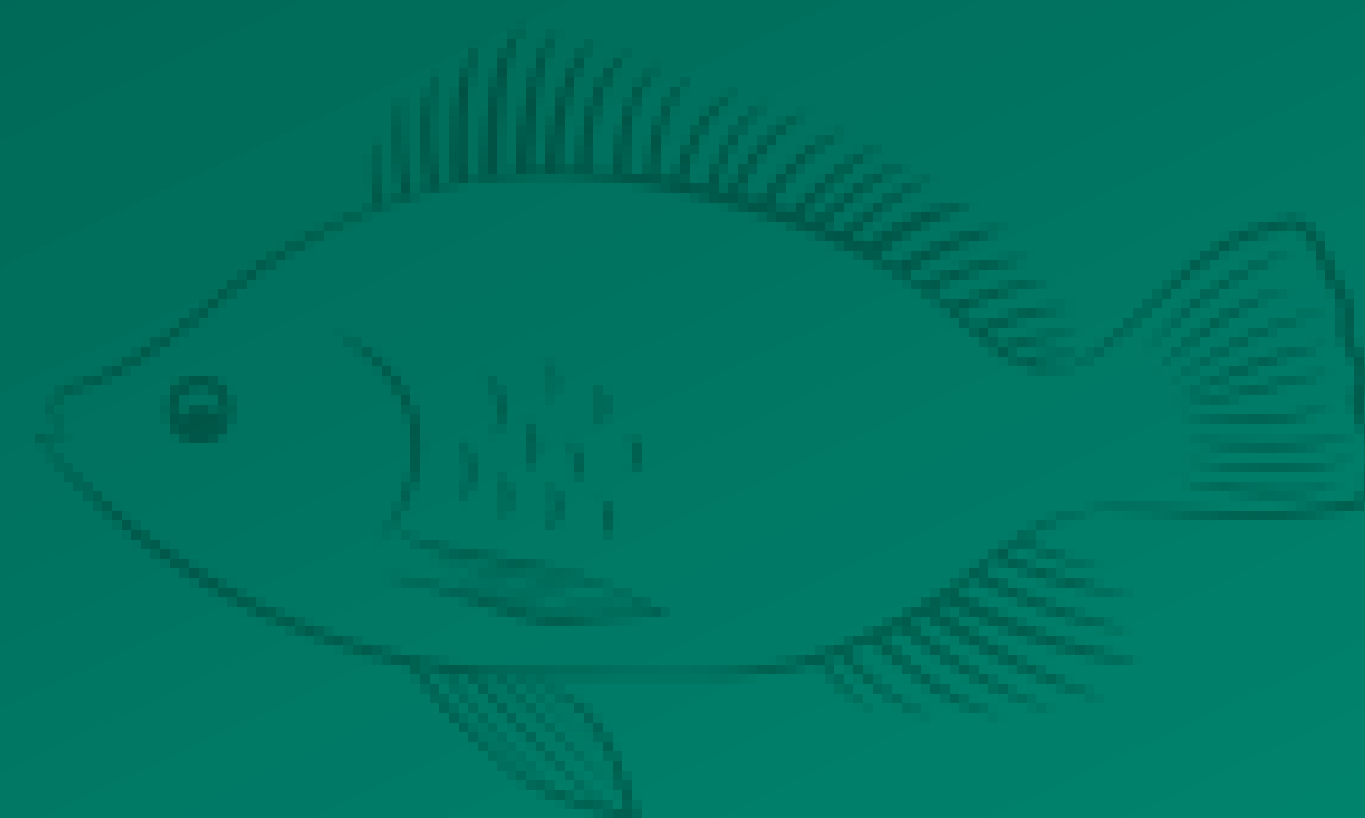
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Growing cannabis

in aquaponics:

deep-water-culture and dual-rootzone

performed equally well.



INTRODUCTION

- Aquaponics is a cultivation system that combines hydroponic and fish culture.
- Aquaponics offers multiple environmental benefits such as reducing water use, mineral fertilizer use, and effluents.

METHODS

- Three aquaponics treatments:
 - Deep-water-culture (**DWC**)
 - Living soil irrigated with aquaponics water (**LVS**)
 - Dual-rootzone (**DRZ**)
- DRZ is a combination of the other two treatments. The lower portion of the rootzone is submerged in aquaponics water and the top portion is in living soil.
- A balanced profile of mineral fertilizers were pre-mixed in the soil of LVS and DRZ treatments.
- Soil in LVS and DRZ treatments were watered with aquaponics water as needed, by hand.
- 100 plants per treatment.
- Cannabis sativa*, variety Sour Lifter CBD.
- Grown indoor in a controlled environment.
- Cultivation period:
 - Vegetative: 2 weeks
 - Flowering: 10 weeks

RESULTS

- DWC and DRZ treatments performed equally well in most growth and inflorescence metrics.
- LVS treatment significantly underperformed in most growth and inflorescence metrics when compared to the other two treatments.

Effect of three aquaponics cultivation methods: deep-water-culture (DWC), living soil irrigated with aquaponics water (LVS), and dual-rootzone (DRZ), on growth characteristics (mean \pm standard error) of *Cannabis sativa*. Different letters represent significant differences at $p < 0.01$ probability level.

	DWC	DRZ	LVS
Growth			
Survival (%)	37	78	100
Plant Height (cm)	24.3 \pm 1.1 ^b	29.4 \pm 0.9 ^a	23.4 \pm 0.3 ^b
Plant Wet Weight (g)	102.9 \pm 9.7 ^a	105.1 \pm 7.4 ^a	28.0 \pm 1.4 ^b
Plant Dry Weight (g)	23.4 \pm 2.4 ^a	25.0 \pm 1.7 ^a	10.1 \pm 0.2 ^b
Number of Branches	1.5 \pm 0.4 ^a	2.0 \pm 0.4 ^a	0.2 \pm 0.1 ^b
Inflorescence			
Flower Dry Weight (g)	15.6 \pm 0.6 ^a	16.3 \pm 1.1 ^a	8.1 \pm 0.2 ^b
Total CBD (%)	13 \pm 1 ^a	14 \pm 1 ^a	13 \pm 1 ^a

DISCUSSION

- We had initially hypothesized that the dual-rootzone treatment, popularized by Stephen Raisner (potentponics.com), would increase flower yield, potency, and terpene content. Results from this study did not support our hypothesis. Plants may not have expressed their full growth potential due to other limiting factors.
- Many DWC plants died early in the experiment due to anoxic rootzones. The 6.6 L basket of LECA was too large and reduced water flow through the rootzone. Baskets had to be raised and kept above the water line to stop mortality. This issue could be solved by using smaller net pots.
- Many DRZ plants died due to excessive soil moisture caused by water from the aquaponic trough continuously wicking up the soil. The gap between the bottom of the pot and the surface of the aquaponic water was too short in some instances, allowing water to come in contact with the soil. This issue could be solved by maintaining a larger gap of several centimeters between the pot and the water surface.
- The study will be replicated with adjustments made to address the issues highlighted above.

