EFFECTS OF DIFFERENT HYDROPONICS GROWING SUBSTRATES ON GROWTH AND QUALITY OF LETTUCE (*Lactuca sativa* L.) MICROGREENS

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INTRODUCTION

Global food security has been significantly threatened by the Covid-19 Pandemic along with the food insecurity drivers such as increasing population, urbanization, climate change, and reduction in the global land area. As a result, indoor vertical cultivation techniques have evolved.

Importance of Microgreens

- richness in nutrients
- cheap growing mediums
- little growing spaces
- short production cycle
- environmental-friendly
- sustainable and economical

Research GAP

- Less research on optimization on the selection of growing substrate to maximize microgreens quality, nutrient profile, and yield.

Objectives of the Study

1. Assess the impact of different growing substrates on the growth and quality characteristics of lettuce microgreens, and
2. Identify the most suitable growing substrate that would generate the highest productivity and nutritional content of lettuce microgreens.

METHODOLOGY

Process flow

Experimental Site and Growing Conditions

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Preparation of substrates and Trays

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Seed Sowing and Germination

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Preparation of Hydroponics Solution

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Care and Management

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Harvesting

Experimental Design and Treatments

✓ Randomized Complete Block Design with 3 Replications

✓ Treatments:

- T_1 – Soil
- T_2 – Coco Coir
- T_3 – Jute Fiber
- T_4 – Rockwool
- T_5 – Vermiculite

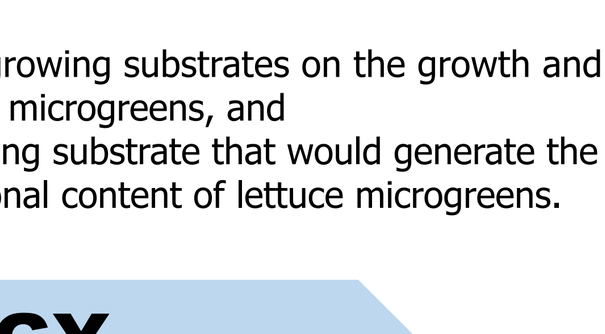

Figure 1. Experimental Set-up: 1 week (left) and 2 weeks (right) after germination

RESULTS

Table 1. Shoot characteristics of lettuce microgreens

Treatment	Shoot Height (cm)	Leaf Area (cm^2)	Shoot Fresh Weight (g/tray)	Total Yield (g/tray)	Dry matter (%)
T_1 - Soil	9.99a	0.86a	105.70a	167.70a	8.96a
T_2 - Coco coir	7.92c	0.77b	60.53b	122.53b	4.00c
T_3 - Jute fiber	7.64c	0.67c	58.84b	120.80b	5.16c
T_4 - Rockwool	8.68b	0.72bc	73.13ab	135.13ab	4.01c
T_5 - Vermiculite	7.95c	0.71bc	49.72b	111.73b	7.24b
CV (%)	4.72	6.26	27.72	14.66	1.69

Table 2. Chemical properties of lettuce microgreens

Treatment	Total Soluble Solids (°Brix)	Titratable Acid (%)	Vitamin C (mg)	Chlorophyll (µmol m^{-2})
T_1 - Soil	1.67	5.08	21.00	13.70ab
T_2 - Coco coir	1.77	4.82	20.53	12.10b
T_3 - Jute fiber	1.60	4.93	21.60	15.23a
T_4 - Rockwool	1.70	4.97	21.20	12.83b
T_5 - Vermiculite	1.57	4.83	20.93	14.77a
CV (%)	11.11	3.90	4.03	1.08

CONCLUSIONS

1. Different hydroponic growing substrates significantly improves the morpho-chemical properties of lettuce microgreens. The soil substrate statistically enhance shoot height, leaf area, shoot fresh weight, total yield, and dry matter content while jute fiber have the highest chlorophyll content but comparable with vermiculite and soil
2. The soil and rockwool growing substrates produce the highest yield of lettuce microgreens

RECOMMENDATIONS

1. The Soil or rockwool as hydroponic growing substrate is recommended to enhance yield of lettuce microgreens.
2. Carry out a study on microgreens that incorporates sensory, nutritional and contamination evaluation to assess their acceptability among individuals.
3. A similar study be conducted to further confirm the results of the study.

REFERENCES

1. Salas FM and Salas RA. 2014. Liquid Nutrient Formulations for Lettuce Production Under Aggregate Hydroponic System. In Proceedings: 44th CSSP Scientific Conference held at Parklane International Hotel, Cebu City, Philippines on May 12-16, 2014