DRIP-IRRIGATED HYDROPONIC SYSTEM FOR LETTUCE (*Lactuca sativa*) PRODUCTION USING DIFFERENT GROWING MEDIA WITH AND WITHOUT COOLING SYSTEM

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An Undergraduate Thesis Submitted to the Faculty of the Department of Agricultural and Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Munoz, Nueva Ecija, Philippines
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(Land and Water Resources Engineering)

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BIOGRAPHICAL SKETCH

Anthony Dolor Diga, the youngest son of Benjamin C. Diga Sr. and Feliza D. Diga, was born on the 31st day of October 1997 at Cuyapo, Nueva Ecija. He lives in 73 Brgy. Curva, Cuyapo, Nueva Ecija and completed his elementary education at Curva Elementary School on 2009 as salutatorian, second place in Math District Contest and also, Boys Scout of the Year. He continued his secondary education in Special Science Curriculum at Dr. Ramon de Santos National High School on year 2013.

He was raised in a simple, happy, good-hearted and God-centered family. He think that he was raised by two of the best people ever. His mother and father are just the definition of hard work, faith and happiness. They've taught him, also his brothers and sisters to set their goals high and to give everything to reach them. They help him in every step of his life. They trained him very hard style for the future challenges. So they are the most precious gift of God to him.

He enrolled at Central Luzon State University on 2014 and at 21 years of age, he became a member of College of Engineering Football Club (CEnFC) and proud SAGES-PSAE. He is currently pursuing a degree of Bachelor of Science in Agricultural and Biosystems Engineering majoring in Land and Water Resources Engineering.

The experimental research and experience gained at the university through the instructions of competent instructors has prepared him to the demands of profession. Likewise, the experience of experimental study received in the thesis has helped him become ready for the challenges of the real professional world.

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TABLE OF CONTENTS

	PA
TITLE PAGE	i
ACCEPTANCE SHEET	ii
BIOGRAPHICAL SKETCH	iii
ACKNOWLEDGEMENT	iv
TABLE OF CONTENTS	vi
LIST OF TABLES	x
LIST OF FIGURES	xi
LIST OF APPENDICES	xii
LIST OF APPENDIX TABLE	xiii
LIST OF APPENDIX FIGURES	xiv
ABSTRACT	xv
INTRODUCTION	1
Background of the Study	1
Statement of the Problem	2
Objectives of the Study	3
Significance of the Study	4
Scope and Limitation of the Study	5
Time and Place of the Study	5
REVIEW OF RELATED LITERATURE	6
History of Hydroponics	6
Hydroponics Technology	7
Concept of Hydroponics	8
Types of System	9
Hydroponics Drip System	10
Types of Culture	10
Soilless Culture	11

Water Culture/Solution Culture 12
Media Culture 13

Components of Hydroponics System 13

Nutrient Container/Reservoir 13
Delivery System 14
Growing System 14
Automation 15

Types and Function of the Growing Media 15

Carbonized Rice Hull 17
Rice Hull 17
Coco peat 18
Sand 18

Nutrient Solution 19

Monitoring Nutrient Solution 19
Potential Hydrogen 20
Electrical Conductivity' 21
Temperature 22
Nutrient Solution Management 23

Advantages and Disadvantages of Hydroponics 23
Tropical Greenhouse 24
Peltier Thermoelectric Cooler 24

Principles of Operation 25
Performance of Peltier TEC 26
Uses of TEC 27

Hydroponically Grown Lettuce 27
Lettuce Production 28
Crop requirements 29

Seedling Propagation 29
Harvesting 29

Water Consumption 30
Water Productivity 30
Production Cost 31

METHODOLOGY 32

Conceptualization of the Study 32
Inspection and Testing of the system 33
Collection and Preparation of Substrate 34
Materials and Instruments 34
Materials for Drip System 35

Reservoir Container 36
Growing Media 36
Submersible Pump 36
Delivery pipeline and Drip lines 37
Mechanical Timer Swicth 37

Design Consideration for Drip Hydroponic Systems 37
Operating Principle of Hydroponic System 39
Cultural Practices 40

Seeding Preparation and Planting 40
Nutrient Solution 40
Pest Management 40
Harvesting 41

Data Gathering 41
Experimental Layout 42
Water Quality Parameter 43

Potential Hydrogen (pH) 43
Electrical Conductivity and Total Dissolved Solids 44
Temperature 44

Environmental Parameter 45

Temperature 45
Relative Humidity 45

Statistical Analysis 46
Production Cost 46

RESULTS AND DISCUSSION 49

Operation of the Systems 49
Operating Principle of Peltier Thermoelectric Cooler 51
Environmental Parameters 52

Ambient Temperature 52
Relative Humidity 53

Water Quality Parameters 54

Nutrient Solution Temperature 54
Potential Hydrogen (pH) Level 55
Total Dissolved Solids 57

Agronomic Characteristic 58

Plant Height 58
Number of Leaves 59
Yield of the Produce 61

Water Consumption 62
Water Productivity 63
Production Cost 63

SUMMARY, CONCLUSION AND RECOMMENDATION 66

Summary 66
Conclusion 67
Recommendation 68

LITERATURE CITED 69

APPENDIX 75

LIST OF TABLES

TABLE		PAGE
1	Materials and equipment used in the study	35
2	Average plant height of lettuce at harvest period in different growing media	59
3	Average number of leaves of lettuce per plant period in different growing media	60
4	Average yield (gram/plant) of fresh harvested lettuce per sub-plot in different growing media	62
5	Annual fixed and variable cost	64
6	Potential income and production cost	65

LIST OF FIGURES

FIGURE		PAGE
1	Plant nutrient availability as affected by pH	21
2	Peltier element schematic diagram	26
3	Conceptual framework of the study	33
4	Perspective of drip-irrigated hydroponics system	38
5	Right-side view of Drip-Irrigated Hydroponics System and flow operation	39
6	Diagram of drip hydroponic system and flow of operation	39
7	Statistical layout of the study	43
8	Hydroponics system	49
9	Flow of operation	50
10	Peltier assembly	51
11	Daily temperature inside the greenhouse	52
12	Daily change of relative humidity	53
13	Average daily temperature (°C) of the nutrient solution	55
14	pH of nutrient solution at 7:00 am during growing season	56
15	pH of nutrient solution at 2:00 pm during growing season	56
16	TDS level in both systems during growing season	58
17	Average number of leaves in both systems during growing season	61
18	Weekly average of water consumption of lettuce	62

LIST OF APPENDICES

APPENDIX		PAGE
1	Terminologies	76
2	Operational Instruction for pH Meter	79
3	Instructional Manual for TDS/EC Meter	81
4	Appendix Table	82
5	Appendix Figure	90

LIST OF APPENDIX TABLES

TABLE		PAGE
1	Relative humidity of inside and outside the greenhouse in %	82
2	Ambient temperature of inside and outside the greenhouse in °C	83
3	pH level for both tank in drip hydroponic systems	84
4	Total dissolved solids (TDS) level of the solution in ppm	85
5	Electrical conductivity (EC) level of the solution in mS/cm	86
6	Water temperature for both systems in °C	87
7	ANOVA for average height of lettuce in both systems with different growing media	88
8	ANOVA for average number of leaves of lettuce in both systems with different growing media	88
9	ANOVA for average yield of lettuce in both systems with different growing media	88
10	ANOVA for average weight of lettuce in different growing media	89

LIST OF APPENDIX FIGURES

FIGURE		PAGE
1	Conctruction of drip hydroponic growing beds	90
2	Installation of tank/reservoir, return, delivery and drip pipes	90
3	Installation of delivery and return pipe media	90
4	Repairing of drainage pipe and application of growing media	91
5	Pre-testing of the system	91
6	Drip-irrigated hydroponics system	91
7	One week old lettuce	92
8	Two weeks old lettuce	92
9	Three weeks old lettuce	92
10	Four weeks old lettuce	92
11	Harvesting of lettuce at early in the morning	93
12	Determining the weight, length and number of leaves	93
15	Average plant height in both growing media (Without TEC)	94
16	Average plant height in both growing media (With TEC)	94

ABSTRACT

DIGA, ANTHONY D., Department of Agricultural and Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Munoz, Nueva Ecija, Philippines, May 2019, DRIP-IRRIGATED HYDROPONIC SYSTEM FOR LETTUCE (*Lactuca sativa*) PRODUCTION USING DIFFERENT GROWING MEDIA WITH AND WITHOUT COOLING SYSTEM.

Adviser: CHITO F. SACE, Ph.D.

The study was conducted to evaluate the performance of the systems in the production of lettuce using different growing media with and without thermoelectric cooler. A total of 360 plants were grown in growing mix medium of rice hull and coco peat. Temperature and relative humidity inside and outside the greenhouse were monitored daily. Water quality parameters are also maintained at ideal levels adjusted using nutrient solution A and B which was recorded daily from planting to harvesting. The Peltier Thermoelectric Cooler (PTEC) was used to reduce the temperature of water in the system and uses labyrinth type drip pipe to irrigate the test crop. Height, weight and number of leaves of the lettuce were gathered and treatments were analyzed statistically. However, production cost of drip hydroponic system with and without cooling system under greenhouse was also carried out.

Results show that the production of lettuce in drip hydroponic systems using PTEC has reduced the temperature of nutrient solution up to 1 °C although temperature and relative humidity are beyond the ideal levels which also affected the quality of the nutrient solution. The availability of nutrients in the solution has impeded the growth and yield of the crop. Lettuce planted in system with thermoelectric cooler was better than those planted in system without cooling method in terms of average yield with higher

mean value of 17.17 g compared to without cooling with 17.00 g. Moreover, system with thermoelectric cooler consumed less water. In terms of water productivity, those lettuce planted in system with thermoelectric cooler receives a higher value of 6.27g/L while without cooling was 5.98 g/L which means that higher water percentage in plants has increased the crop productivity of hydroponic in tropical climate.

However plant height and yield produced in the two systems are comparable in using the two growing media. It reveals that the system has produced an average yield of 6.12 kg per cycle and the production cost of the systems were amounted to Php. 450.56/kg.

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