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HYDROPONIC PLANT

RESEARCH PAPER SUBMITTED BY

MOHAMED SULAIMAN

(GRADE V)

MADRASA-E-MUFID-E-AAM

AIDED MUSLIM (BOYS)

PRIMARY SCHOOL, (URDU MEDIUM)

NEELIKOLLAI, VANIYAMBADI-635751.

TIRUPATTUR DISTRICT.

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ABSTRACT

As we all know that day by day we are facing land and water scarcity, which are the main element of agriculture.

“Hydroponic, a soilless cultivation technique, offers a promising solution to modern agricultural challenges such as soil degradation and water scarcity. It is a method of growing plants using nutrients rich water with sunlight. This method of farming can be extremely helpful to countries that have poor land or facing water scarcity.

In my research I have grown plants using hydroponic system. For which I used R.O water with added nutrient solution and sun light.

Through this research project. I observed that plants can grow better in nutrient rich water and absolutely it does not need any pesticides.

HYPOTHESIS

Plants can grow better and faster in nutrient rich water.

DESIGN OF STUDY

INDEPENDENT VARIABLE:-

Nutrient Solution

DEPENDENT VARIABLE:-

Growth of plant

(Height of plant and size of leaves)

CONTROLLED VARIABLES :-

⇒pH level

⇒ light

⇒ Temperature

INTRODUCTION AND METHOD:-

There are 6 types of hydroponic system. In this study of thesis I have used Deep Water Culture (DWC). In this system plants roots are suspended in a deep tank of nutrient rich water.

PROCEDURE:-

I have used reverse osmosis (RO) water for this system , with nutrient solution. I have added 5 ml of concentrated nutrient A solution and 5 ml of nutrient B solution with 1 litre

of R.O water. Quantity of Nutrients solution may vary on every stage of plant growth. As my plant requires light for growth. I kept it in sunlight for nearly 6 hours a day. So that it gets natural light. I checked pH and ppm of water before and after adding nutrient solution. I changed water of this system after 7 days. I also used TDS machine to check ppm of solution.

For Reference :

Nutrient A contains :- Nitrogen, Calcium and other macro nutrients

Nutrient B contains :- Phosphorous, Potassium, Magnesium and other micro nutrients.

N.S → nutrient solution

R.O → reverse osmosis

pH → potential of hydrogen

ppm → parts per millions is a unit of measurement for concentration.

4.TABULATION

(Examine the growth of plants in different stage) 23-09-2025 to 25-09-2025

HYDROPONIC PLANT GROWTH EXPERIMENT	NUTRIENT RICH WATER lettuce seeds			NO NUTRIENT WATER lettuce seeds		
	Day	Day	Day	Day	Day	Day
Measurement	1	3	5	1	3	5
Sprout Appeared / Not	–	–	Colour changes	–	–	Colour changes

No sprout came out , No growth till 10 to 15 days.

HYDROPONIC PLANT GROWTH EXPERIMENT	NUTRIENT RICH WATER SPINACH			NO NUTRIENT RICH WATER SPINACH		
	Day	Day	Day	Day	Day	Day
Measurement	1	2	7	1	2	7
Sprout Appeared / Not	–	–	Sprout seen	–	–	Few Sprout seen

Seeds without nutrient rich water did not bring cotyledon.

HYDROPONIC PLANT GROWTH EXPERIMENT	NUTRIENT RICH WATER SPINACH			NUTRIENT RICH WATER TOMATO		
	Day	Day	Day	Day	Day	Day
Measurement	9	11	13	1	3	4
Number of leaves	Cotyledon appeared	2 leaves	4 leaves	_	_	_
Length of largest leaves (mm)	_	Very little leaves	5 mm	_	Seeds changes colour	Sprout appeared
Width of largest leaves (mm)	_	Very little leaves	3 mm	_	_	_
pH level	_	5.0	5.0	_	_	_
ppm level	_	_	_	_	_	_
Plant appearance	Fresh	Fresh	Fresh	_	_	_

HYDROPONIC PLANT GROWTH EXPERIMENT	NUTRIENT RICH WATER SPINACH			NUTRIENT RICH WATER TOMATO		
	Day	Day	Day	Day	Day	Day
Measurement	15	17	19	5	7	12
Number of leaves	Few leaves	Few leaves	Many leaves	_	_	_
Length of largest leaves (mm)	1.5 cm	2 cm	2 cm	_	_	1 cm
Width of largest leaves (mm)	0.5 cm	0.5 cm	0.8 cm	_	_	0.3 cm
Nutrient solution per liter of RO water	5 ml	5 ml	5 ml	_	5 ml	5 ml
pH level	_	5.0	5.0	_	_	_
ppm level	_	_	_	_	_	_
Plant appearance	Fresh	Fresh	Fresh	_	_	_

HYDROPONIC PLANT GROWTH EXPERIMENT	NUTRIENT RICH WATER TOMATO			NUTRIENT RICH WATER BITTER GOURD		
	Day	Day	Day	Day	Day	Day
Measurement taken	15	16	18	7	9	12
Height of plant	5 cm	5.5 cm	6.5 cm	Cotyledon appeared	12 cm	13 cm
Length of largest leaves (cm)	2 cm	2 cm	2.5 cm	_	3.5 cm	4 cm
Width of largest leaves (cm)	0.4 cm	0.5 cm	0.5 cm	_	2 cm	2 cm
Quantity of Diluted Nutrient solution	50 ml	60 ml	60 ml	Sprinkled	5 ml	5 ml
pH level	6.0	6.0	6.5	_	5.5	6.0
ppm level	118	137	250	_	_	_
Plant appearance	Fresh	Fresh	Fresh a green	_	Green	Green fresh

Due to rainy day there was no sunlight, due to this reason tomato plant became dull and dried on 20th day.

HYDROPONIC PLANT GROWTH EXPERIMENT	NUTRIENT RICH WATER BITTER GOURD					
	Day	Day	Day	Day	Day	Day
Measurement taken	13	15	17	20	22	24
Height of plant	14 cm	14.5 cm	17 cm	19 cm	25 cm	34 cm
Length of largest leaves (cm)	2.5 cm	3 cm	3.5 cm	4.5 cm	4.5 cm	4.5 cm
Width of largest leaves (cm)	4 cm	5 cm	5.5 cm	6.5 cm	6.5 cm	6.5 cm
Quantity of Diluted Nutrient solution	10 ml	65 ml	120 ml	180 ml	270 ml	180 ml
pH level	5.5	5.5	6.0	6.0	6.0	6.0
ppm level	_	280	440	407	337	583
Plant appearance	Green	Green	Green	Green	Growing gradually	Climbers are growing

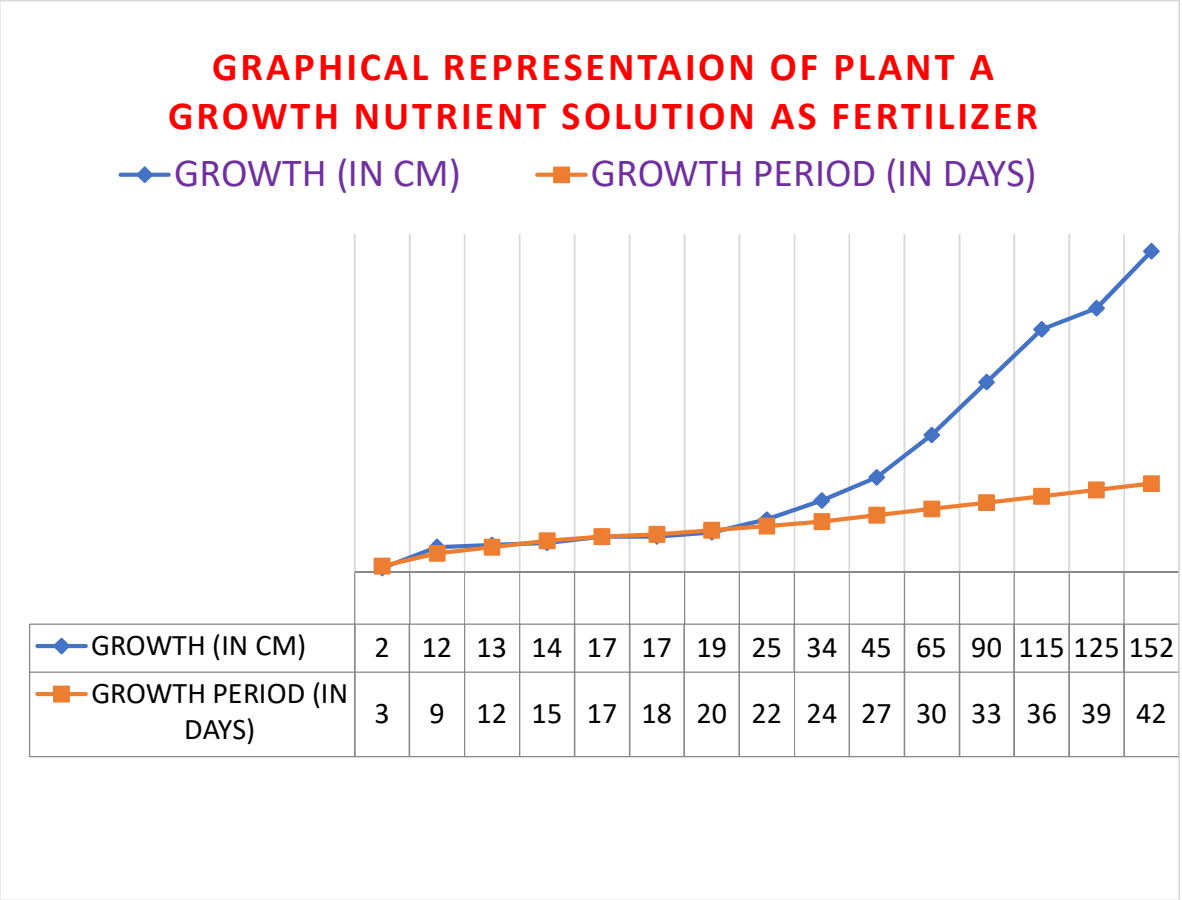
I understand that sun light is much needed factor in Hydroponic system of farming.

TABULATION

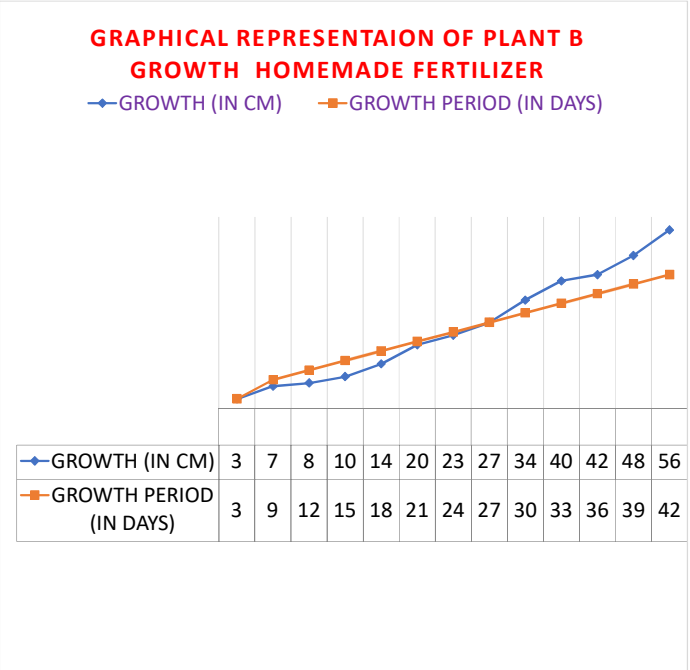
(COMPARISON OF PLANT 'A' AND PLANT 'B')

HYDROPONIC PLANT GROWTH EXPERIMENT	PLANT A NUTRIENT RICH WATER						PLANT B HOMEMADE LIQUID FERTILIZER					
	DAY	DAY	DAY	DAY	DAY	DAY	DAY	DAY	DAY	DAY	DAY	DAY
Measurement taken	27	30	33	36	39	42	27	30	33	36	39	42
Height of plant	45 cms	65 cms	90 cms	115 cms	125 cms	152 cms	27 cms	34 vms	40 cms	42 cms	45 cms	56 cms
Quantity of Diluted Nutrient solution / Homemade Fertilizer	180 ml	240 ml	240 ml	180 ml	Water change 180 ml	180 ml	90 ml	90 ml	90 ml	90 ml	Water change 180 ml	180 ml
pH level	6.0	6.0	5.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.5	6.0
ppm level	946	564	951	1263	441	1000	419	515	666	824	231	264
Plant appearance	Green & fresh	Green & fresh	Growing gradually	Growing rapidly	Growing rapidly	Growing rapidly	Green & fresh	Green & fresh	Green growing slowly	Growing slowly	Growing slowly	Growing slowly

- 39th day DWC system water changed. As water is new has less quantity of added nutrients ,ppm shows less.



GROWTH (IN CM)	2	12	13	14	17	17	19	25	34	45	65	90	115	125	152
GROWTH PERIOD (IN DAYS)	3	9	12	15	17	18	20	22	24	27	30	33	36	39	42



GROWTH (IN CM)	3	7	8	10	14	20	23	27	34	40	42	48	56
GROWTH PERIOD (IN DAYS)	3	9	12	15	18	21	24	27	30	33	36	39	42

DWC HYDROPONIC SYSTEM DIAGRAM


5th day of spinach


15th day of Spinach


15th day of tomato seed
plants growing


22nd day of tomato seeds
plants growing up


HYDROPONIC PLANT [TOMATO]
آبی زراعت [ٹماٹر]


7th day of bitter gourd
plant growing


9th day of
bitter gourd
BITTER GOURD
RO
HYDROPONIC PLANT


15th day of bitter
gourd plant growth


22 nd day of bitter gourd
plant growth


DS&EC
0459
300
HYDROPONIC PLANT
آبی زراعت


HYDROPONIC PLANT
آبی زراعت
کریلا


24 day of nutrients water
plant growth


NUTRIENT SOLUTION-A
NUTRIENT SOLUTION-B
#DRINKITUP


HYDROPONIC PLANT [BITTER GOURD]
آبی زراعت [کریلا]


HYDROPONIC PLANT
A BITTER GOURD
آبی زراعت
کریلا


HYDROPONIC PLANT
A BETTER GROWER
آبی زراعت
کریلا

RESULT AND DISCUSSION

The Seeds which I used for hydroponic system needed different climatic conditions and nutrient as well in different stages of its growth.

➡Lettuce needed low temperature atmosphere as the temperature did not suit it, it didn't grow.

➡Spanish needed different nutrient at some point of growth.

➡Tomato plants `growth was good, it was getting it's nutrient and sunlight it required in the apt condition. Due to rainy days, it did not get sunlight and became dull and didn't regrow after two days.

➡Bitter gourd responded very well in hydroponic system of growing, and it is getting nutrients which are suitable for its growth and also receiving good amount of sunlight.

➡ I have two plants of bitter gourd. For plant A, I am using nutrient readily available in the market. For plan B, I am using decompose fertilizer, which is homemade. And I have noted that plants 'A' is growing rapidly, where as plant 'B' which is getting decompose fertilizer is growing slowly.

CONCLUSION

Thus my hypothesis “plants grow faster and better in nutrient rich water has been proved. This is because of the good R.O water, which has the pH level between 5.0 to 6.0 with added nutrients like nitrogen, calcium, phosphorus, magnesium, potassium etc and sun light. As roots get its nutrients directly in the form of liquid.

Plants grow faster compare to land farming.

References

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BIO INFORMATION

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Stuart, Neil W. “About Hydroponics” In: science in farming.

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