

INDIAN INSTITUTE OF TECHNOLOGY
JODHPUR



Engineering Design II

Group 7

Team – A

**Project : Indoor Farming Hydroponic Plant Grow Tent 1
Layer**

Professors:

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Team:

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Introduction: -

When we were assigned our Engineering Design project.

Since our college is situated in Jodhpur, Rajasthan, it's our duty to solve the problem of the people of Rajasthan. So, we need to find a low-cost and easy method to solve the

problem of farming where people can easily grow fresh and natural vegetables at their home. For that we started our

Indoor Farming Hydroponic Plant Grow

Problem Definition: -

Indoor Farming Hydroponic Plant Grow

Conventional Machine for plant growth in less water area

Objectives: -

Our objective was to find an easy and conventional method of farming in the area where water are less and area which are not ideal for traditional for farming. So, we came up with Indoor Farming Hydroponic Plant Grow.

Literature Survey: -

A significant portion of the economy of Rajasthan is agrarian. The agriculture sector of the state accounts for 2.5 percent. The arid state which receives not more than an annual income of 25 cm thrives on agriculture that is

done with irrigation systems and painstaking efforts of the poor farmers of Rajasthan. As a major portion of the state is parched and fertile, agriculture becomes very difficult

The total cultivated area of the state encompasses about 20 million hectares and out of this only 20% of the land is irrigated. Ground-level is available only at a depth of 30 to 61 m.

Rajasthan farmers have to depend on different sources of irrigation that include tube wells, wells, and tanks. The Punjab Rivers in the north, the Narmada River in the south, and the Agra Canals from Haryana and Uttar Pradesh provide water to the dry land of Rajasthan.

North-western Rajasthan is irrigated by the Indira Gandhi Canal.

Methodology: -

For making this project we have use we have use different steps to complete the project

Step 1: - Gathering the information about the project

Step 2: - Designing the model

Step 3: - Other components research background

Step 4: - Assembling of the project

Step 5: - Testing of the project

Theoretical Findings: -

Importance of pH in Hydroponic Systems –

Hydroponically grown vegetable plants need different pH levels than plants grown in soil. Without soil, vegetable plants do not benefit from microorganisms, organic matter and interactions between water and minerals that regulate pH levels. The hydroponic system must constantly monitor and adjust pH levels. To obtain the best yield and healthiest plants, we want to give vegetables the optimal

growing environment. A pH level of 5.5-6.5 is suitable for most vegetable plants.

Water and Nutrients Requirements for Growing Vegetables Hydroponically

Plain old tap water is fine for your hydroponic vegetable garden. For plant food for vegetables, purchase a liquid 15-15-15 fertilizer or a 15-20-15 fertilizer. Clear, odorless, and tasteless water is good for hydroponic vegetables. Any good Hydroponic nutrient must contain all of these elements; Nitrogen (N), Potassium (K), Phosphorous (P), Calcium (Ca), Magnesium (Mg), Sulphur (S), Iron (Fe), Manganese (Mn), Copper (Cu), Zinc (Zn), Molybdenum (Mo), Boron (B), Chlorine (Cl). The nutrients are dissolved in water which uptake the water with minerals toward different parts of the plant in the hydroponics system.

Temperature Requirement for Growing Vegetables Hydroponically

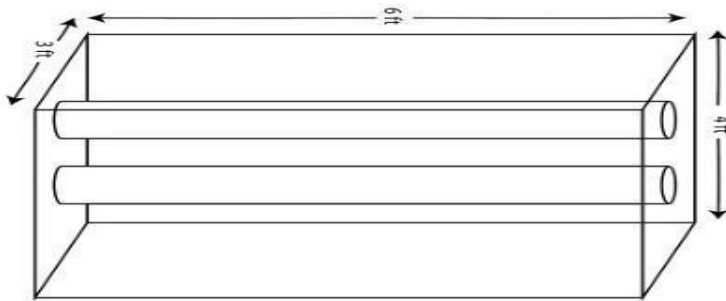
In hydroponics, most vegetable plants prefer a temperature between 20-21°C, it's important to keep an eye on how hot or cold it gets around a hydroponic garden. Sometimes we'll have to protect it from the heat generated by grow lamps. Other times you'll want to protect them from falling temperatures in the winter season, even though they're indoors. plant that we are growing in our project :-

Tomatoes

Favorable temperature – Hot and pH level 5.5 – 6.5 Many types of tomatoes like traditional and cherry ones have been grown widely by Hydroponic hobbyists and commercial growers. One thing we have to keep in mind is that tomato plants require much light. For that we are purchasing grow lights..

Tomatoes are a warm-weather plant and like the temperatures like cucumbers so we are in jodhpur and it gives an ideal temperature to grow tomatoes. The ideal pH level is between 5.5 and 6.5 and the temperature is between 14 and 26°C. The upper end of the range more preferable. They need a growing medium for plant support, a pH level of 5.5 to 6.5 and require more sunlight.

Measurement of the model –



Some models that we have taken reference: Reference
1: -



Reference 2: -



Reference 3: -



Summary: -

In this semester we have find out specific and detailed information for the working of our project and a plan for the assembling of our project. All the layout and design was completed during this semester

Future Plan of Our Project: -

Our project require only physical implementation and buying of the parts of our project . At last testing of the

project will be required then our project will be completed and can be use to serve its purpose

Individual Contribution of Team Members

1)Arpit Arya: - Group coordination and research on the project

2)Ashutosh: - Research of the project

3)Ankit Kumar: - Background research about project and costing of the project

4)Amisha Kumari: - Research for technical components of the project

5)Dawale Smruti Suhas: - Research for technical components of the project and designing a prototype of a model

6)Anupam Verma: To find better alternatives for the components to be used in the project

7)Aniket Devaliya: Research on a pre-existing model

8)Devang Dobiya: Research on a pre-existing model

Annexure: -

Individual Contribution -

a) For the project: -

- Learning part of the indoor hydroponic farming in detail
- Questioning Arpit and Amisha regarding the negative points of the project whenever they raise new ideas so as to prepare ourselves for all possible questions that can be asked.
- Web search to know about hydroponic farming and using advanced agricultural techniques.
- Smruti drew the prototype of the model.
- Creating the PowerPoint presentations and playing a role in assigning the parts which everyone has to explain and asking everyone a few questions so that there ○ wouldn't be any silence when any professor ask any question

- Learning new theories about the vegetation and the components of hydroponic farming ○
- Knowing the different component used.

b) For the course:

All of the group members were helpful when in need and we never had problems related to project discussion.

- Discussing more questions than answers in the beginning stages was helpful in the end.

- We made 4 presentations in the entire course which are as follows:-
 - Initial presentations with ideas.
 - The presentation with research work and about the components.
 - Presentation focusing on the cost or budget of the project.
 - Final presentation about making the final report and checking it again.

References that we have taken:-

For the literature part: -

<https://www.bartonbreeze.com/hydroponic-farm-setup>

For the references:-

<https://www.thebetterindia.com/60350/soil-less-hydroponic-gardening-india/>

https://www.sciencebuddies.org/science-fair-projects/project-ideas/PlantBio_p045/plant-biology/hydroponics-gardening-without-soil

<https://www.saveindianfarmers.org/project/hydroponics/>