

## **HYDROPONICS**

### **Q.1 Identification and Justification of problems (max 100 words):**

Nowadays there is a lack of knowledge about the development of various modern methods to grow good quality crops. In villages there is lot of land available, but due to lack of knowledge, the farmers tend to add extra amount of fertilizers in order to yield a better outcome. But excess fertilizers not only poison the crop but also make the land unusable for further cultivation. In traditional farming the land is not used optimally in order to get maximum yield. Additionally the crops on fields can be damaged by a number of external factors such as rain, insects, etc.

### **Q.2 Village/study area /location (max 50-100 words):**

### **Q.3 Description of problem (challenges/felt need/market opportunities)(maximum 50-100 words):**

The problems faced by the farmers in villages are mainly related lack of land optimization. There is a need to produce good quality and abundant crops in order to cope up with the increase in population [<http://indiamicrofinance.com/population-growth-agriculture-india.html>]. Another major problem faced is pests and insects destroying crops. About 15-25% crops are destroyed [<https://www.thehindu.com/news/national/Pests-destroying-almost-one-fourth-of-crops/article14497608.ece>]. With the help of automated Hydroponics, the farmers can have good quality yield in along optimum use of space. This will also increase the income of farmers considerably.

### **Q4.Brief description of innovative solution (max 250 words):**

Hydroponics is basically soilless farming. In hydroponics the plant roots are submerged into a container filled with water. All the necessary nutrients required by the plant are injected in the water with the help of a pump. There is also a separate reservoir to help maintain the pH value of the water. Additionally hydroponics is carried out in a closed environment where the temperature, light intensity, moisture, etc can be controlled with respect to each type of crop to boost the produce. In order to increase the yield, the pH value of the water has to be maintained between 5.5 to 6 for most crops in hydroponics [<https://www.maximumyield.com/perfecting-ph/2/1212>]. With the help of automation, all of the controlling of pH value of water, Light intensity, temperature, moisture, etc. will be done with the help of sensors and actuators. Automation and IoT in farming will enable the farmer to access the controller and monitor the crops from his/her mobile phone from anywhere in the world in real time. In addition to that, with the help of automatic control of all the components, less electricity will be consumed and this will in turn increase the profit margin of the farmer. In hydroponics there is less chance of the crops being damaged by pests as no soil is being used.

### **Q.5Description of technology/management practice involved in innovative solution to given objectives (max 200 words):**

Automation in Hydroponics can be achieved by implementing IoT based solutions in order to control and monitor all the different sensors and actuators in real time. A cloud based solution will be used to store the data received by the sensors and provide an overview of all the parameters of the system. An easy to use and user friendly app will help control and monitor the whole system remotely. Based on the previous data gathered by the sensors the system will also provide optimum control of the parameters for a particular crop. The system will provide built-in presets for individual crops based on research but also provide the farmer the option to change the values of the parameters. The system will be able to run without the intervention of the farmer but also provide the farmer full control of the system if need be.

**Q.6.a Target beneficiary group/anticipated size of market for proposed solution/innovation (max 100 words):**

The target beneficiary group for Hydroponics is mainly farmers with limited and less land available. One of the major advantages of hydroponics is that it needs 20% less space as compared to soil based farming. Hydroponics also requires 95% less water and the yield is doubled. Due to this and many more advantages Hydroponics can be implemented in villages. Around 66.46% Indians live in rural areas [<https://tradingeconomics.com/india/rural-population-percent-of-total-population-wb-data.html>]. With initiatives by the government like Digital India more number of rural population has access to the internet and can adopt this system.

**Q.6.b Expected outcomes/outputs (short term/medium term/long term).**

This system aims to provide farmers the advantages of modern technology while boosting their income and hence boosting the economy of the country. The objective of the system is to reduce the water wastage, improve the quality and quantity of the yield. Hydroponics helps grow profitable crops which will increase the income of the farmer. In the long run, Hydroponics will be much cheaper to operate as it does not need much human intervention.

**Q.7 Brief description of implementation of delivery and business model (max 100 words):**

The automated Hydroponics system will be in the form of a product that comes with all the different sensors, actuators and miscellaneous things required to set up the system. It will also include an app that provides a user-friendly interface and a database to store the data. Initially the target customer will be farmers with some capital to invest as the initial cost for this system is high. As the system becomes mainstream and there is more development in the system, the product can trickle down to farmers with less capital.

**Q.8 Description of support/ecosystem provided by /available at institute to facilitate the start-up (need to felt by mentor) (max 150 words):**