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Naskoori Kaveri, Krishna Reddy Kakumanu,  
D. Srinivas Reddy and D. Srinivas Chary

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## Constraints and Challenges Faced by Hydroponic Farmers in Hyderabad Region of Telangana State

Naskoori Kaveri\*<sup>1</sup>, Krishna Reddy Kakumanu<sup>2</sup>, D. Srinivas Reddy<sup>3</sup> and D. Srinivas Chary<sup>4</sup>

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### ABSTRACT

Hydroponic farming is advanced and alternative farming method of agriculture in which crops are grown without using soil and wide space. This farming method mainly avoids the losses that are resulting from natural calamities and infestation of pests and diseases. The plants grown under hydroponic conditions are having better quality than the crops cultivated under traditional farming methods. In this perspective, the study is focused to analyze the constraints for production and marketing of hydroponic farming. To develop a deep understanding on the above, Hyderabad region was preferred as the study area with eight hydroponic farms. To perform the analysis, data was collected through personal interviews from the selected hydroponic farmers, with the help of structured questionnaire/schedule. Data on establishment of hydroponic farms, production and marketing constraints was collected from the farmers. The marketing and production constraints were analyzed by using garret ranking technique. The results revealed that the majority of the hydroponic farmers cultivated small scale area with adoption of NFT system and most of the farms grow different types of lettuce, herbs, kale and all kinds of leafy vegetables. The largest consumers belong to higher-income people because hydroponics products were sold at higher prices compared to traditional farming. The main constraints identified were high initial investment, lack of availability of credit and lack of marketing information and lack of awareness among consumers.

**Key words:** Hydroponic farming, Constraints, Marketing, Production, Market channel

The present World population is around 7.7 billion and estimated to reach 9.7 billion by 2050, of which 70% of people live in urban areas. The growing population increases the demand for additional food production with the available resources of land and water. About 50% of the arable land is unsuitable for farming activities in the World [1]. Nowadays many countries are facing food production and scarcity problems due to urban culture and increased city population. Population of India is estimated as 1.37 billion (18% of the world population) having only 2.4% of the World's

geographical area and 4% of the World's fresh water out of which 80% is used for agriculture operations (GFFA 2017).

In view of the about reasons, the world requires inventing new techniques to improve the production of farming system. Hydroponic system is one of the option available to produce as per the demand and provides employment opportunity. Hydroponic farming is a type of agriculture farming which is becoming popular throughout the World. It is also termed as (soil less culture) technique, where in, plants are grown in nutrient solution without soil in less space under greenhouse [2]. Hydroponics is a worthwhile reason to produce crops by supplying required nutrient solutions instead of soil. And also, to overcome the climate uncertainty and soil problems, hydroponics was developed by plant scientists recently [3].

The global demand for food grains and other vegetables are increasing every year. India is no exception to this. The Hydroponics technique can be an alternative to Indian agriculture system, which still depends upon age-old techniques. The global hydroponics market is valued at 293.12 million dollars in 2018 and is projected to grow at a healthy Compound Annual Growth Rate (CAGR) of 16.45 percent during period, 2019-2025 [4]. Leading countries in hydroponic technology are Netherlands, Australia, France,

\* **Naskoori Kaveri**

✉ kaveriin2015@gmail.com

<sup>1,3</sup> School of Agribusiness Management, College of Agriculture, Professor Jayashankar Telangana State Agricultural University, Hyderabad - 500 030, Telangana, India

<sup>2</sup> Center for Natural Resource Management, National Institute of Rural Development and Panchayat Raj, Rajendranagar, Hyderabad -500 030, Telangana, India

<sup>4</sup> Department of Statistics and Mathematics, Professor Jayashankar Telangana State Agricultural University, Hyderabad - 500 030, Telangana, India

England, Israel, Canada and USA. Tomato forms the largest market segment under hydroponics farming and it accounted for 30.4 per cent share of the tomato global market during 2018. China is the top world producer of lettuce; Spain is the world's largest exporter of lettuce, with the US ranking second. Western Europe and North America were the original major markets for wide scale lettuce production (FAOSTAT 2018). As the consumers are becoming increasingly aware of the superiority of quality greenhouse-grown vegetables, the demand for hydroponics culture is rising in Europe and Asia-Pacific. Europe is traditionally the largest market that is implementing advanced techniques in hydroponics. Asia-Pacific forms the second largest market for hydroponics [5].

In Asia, India is one of the countries that have higher need for increasing food production to meet the needs of population. More than 65 per cent of land is cultivated under rainfed of which 48 percent area is under food crops. India also has wastelands of 90 million hectares where 1.3 billion people depend on this for livelihood. The people living in metropolitan and big cities like Delhi, Hyderabad, Chandigarh, Noida and Bangalore are growing some leafy greens, small herbs and spices on their rooftops and balconies for fresh consumption through hydroponics. Hydroponic farming gives higher quality yield to the farmers compared to soil farming. The crops grown mostly in hydroponic systems in India are lettuce, cherry tomatoes, spinach, strawberries, bell peppers and these have more demand in urban and metropolitan cities [6].

Hydroponics farming is completely commercially viable. It increases the income to the investors as no tax is required to pay. It will help the farmers and unemployed youth to take as start-up opportunities. This type of new technology farming also helps the food processing centres to get fresh food without contamination of chemicals and fertilizers. The whole system can be controlled by the farmers at any period of time. Hydroponics method has also been planned for future space program [7].

As the hydroponic farming is new to the state the farmers may face problems in the production and marketing of it. In this study an attempt was made to know about the constraints in production and marketing of hydroponic farming. Therefore, the present research study critically examines and analyses the constraints/challenges in production and marketing of hydroponic farming in Hyderabad region. The study enables the growers in making decisions to overcome the problems at various stages of cultivation by efficient utilization of Government policies and initiatives.

## MATERIALS AND METHODS

The Hyderabad district from Telangana State was taken as the study area, because more than 15 hydroponics farms are located in this region. Among the 15 hydroponic farmers are operating from Hyderabad region were eight hydroponic farms selected based on convenience sampling to obtain first-hand knowledge about the constraints on production and marketing the hydroponic farming. The present study was conducted by interviewing eight hydroponic units farmers who were supplying the hydroponic products to the consumers. The data was collected from various places like medchal, Boduppal, Kondapur, Jeedimetla, Jublihill, Annaram (Gachibowli),

Secendrabad zones of Hyderabad Region through a structured schedule.

All the essential information required for the research study was collected through survey method by personally interviewing the respondents using the pre-tested schedule. The data relating to general information about the respondents with regard to age, education, occupation and size of the farms/land holding were obtained from them by personal interview. The information regarding various challenges of hydroponics farming were obtained from the farmers and it was ensured that the data made available by the respondents were relevant, comprehensive and reasonably correct and precise. For the purpose of evaluating the objectives of the study, based on the nature and extent of data, the analytical tools like and Garret ranking technique were employed for analyzing the data to draw meaningful results and conclusions.

### Garrett's ranking technique

Garrett's ranking technique will be used to indicate to identify the growers of hydroponic units. The individual rank will be converted into percent position by using the formula given below:

$$\text{Percent position} = \frac{100 \times (R_{ij} - 0.5)}{N_j}$$

Where;

$R_{ij}$  = Ranking given to the  $i^{\text{th}}$  attribute by the  $j^{\text{th}}$  individual

$N_j$  = Number of attributes ranked by the  $j^{\text{th}}$  individual

The respondents/individuals were requested to rank the opinions/reasons relevant to them according to the degree of importance. The ranks given by each of the respondents was converted into scores. Then for each reason, the scores of individual respondents were added together and divided by the total number of respondents. These mean scores for all the reasons were arranged in the descending order and ranks were given. These ranks help to identify the predominant options.

## RESULTS AND DISCUSSION

### Socio-economic characteristics of respondents

The information regarding socio-economic characteristics of the respondents is collected to know the about the decision making and risk-taking ability of respondents. The results showed half of the respondents in the study sample completed graduation (50 per cent) and most of the farmers are aged between 26 to 35 years (75 per cent). Majority (65 per cent). About 50 per cent of the farmers belong to 1000 to 5000 sq. ft size and one fourth of the farmers were having 5000 to 10000 sq. ft size in the study area and 50 per cent of the farmers have chosen hydroponic farming as primary occupation [7].

### Constraints faced by farmers in production and marketing of hydroponic farming

An attempt has been made to analyze the problems faced by farmers in the production and marketing of hydroponic farming in the study area. The farmers were asked to rank the problems faced by them and the results are presented below. The constraints faced by the hydroponic

farmers are classified into two categories i.e., production and marketing constraints.

According to the available literature identified in hydroponics farming are requirement requires high energy, difficulty in finding suitable space in the urban area, maintain water pH value and electrical conductivity in hydroponics is another challenge and it was found that the less adaptation of hydroponic cultivation was due to low literacy rate among farmers [8]. On the other hand, the usage of water and nutrition solutions has not been mentioned as a challenge in the literature [9]. In the present study, the data

collected with respect to constraints of hydroponic farmers has been analyzed through ranking techniques, separately for production and marketing related constraints, and the results are presented in (Table 1-2) respectively.

#### *Constraints faced by the farmers in the production of hydroponic farming*

Data depicted in (Table 1) gives the details of production constraints faced by the farmers. The constraints are analyzed based on the opinions of the hydroponic farmers.

Table 1 Production constraints faced by farmers

Constraints	Total score	Average score	Rank
High initial investment	532	66.5	I
Lack of availability of skilled labor	487	60.875	II
High cost of planting material	478	59.75	III
Lack of availability of credit	467	58.375	IV
Non-Availability of water	329	41.125	V
Pest and disease attack	314	39.25	VI
High labor charges	309	38.625	VII
High transportation cost	300	37.5	VIII

Of all the production constraints faced by the farmers, the major constraint faced by them was the high initial investment cost with the maximum garret score of about 66.5 and it was given first in the order of ranking, this situation has significantly negative impacts on the attractiveness for potential investors. Lack of availability of skilled labor was the second major constraint with a garret score of 60.875, followed by the high cost of planting material (III rank) with the garret score of 59.75, Lack of availability of credit (IV rank) with the garret score of 58.375, non-availability of suitable water (V rank) with garret score 41.125 and pest and disease attack (VI rank) with a score of 39.25, High labor charges (VII rank) with garret score 38.625 and high transportation cost (VIII rank) with garret score 37.5. Hence, it was noticed that the major problems for the farmers are high initial investment cost as well as lack of availability of skilled labor. High labor charges and high transportation costs were considered minor problems of hydroponic farming [10-12].

#### *Marketing constraints faced by hydroponic farmers*

Data represented in (Table 2) gives the details of marketing constraints faced by the hydroponic farmers. The constraints are analyzed based on the opinions of the hydroponic farmers. The marketing constraints faced by farmers are shown in the following (Table 2). The farmers in marketing were lack of marketing information and new markets with a maximum garret score of 74, followed by lack of storage facilities with a garret score of 68, lack of awareness among consumers about hydroponic products with a garret score 63.62 was ranked as the third most important constraint. High perishability of produce with a garret score of 63.25 was ranked four, Fluctuation in prices/seasonal demand was given the fifth rank with a garret score of 56.5 and lack of proper transportation facility with garret score of 54.75 secured the sixth rank. The main constraints identified were high initial investment, lack of availability of credit and lack of marketing information and lack of awareness among consumers [13-14].

Table 2 Marketing constraints faced by farmers

Constraints	Total score	Average score	Rank
Lack of market information and new markets	592	74.00	I
Lack of storage facilities	544	68.00	II
Lack of awareness among consumers	509	63.62	III
High Perishability of produce	506	63.25	IV
Fluctuation in prices/ seasonal demand	452	56.50	V
Lack of proper transportation facility	438	54.75	VI

## CONCLUSION

Hydroponic systems are highly effective techniques used in several agricultural domains and also against natural calamities. Hydroponic farmers were identified main constraints high initial investment, lack of availability of credit and lack of marketing information and lack of awareness among consumers in study area. Crop selection based on the market demand. Awareness and skill development programs to be organized, developing storage facilities for Hydroponic products, facilitating low interested loans to the hydroponic farmers through government

programs and rebate on the plant material and equipment's for hydroponic farms. The constraints perceived by the farmers about hydroponic farming should be taken into account while formulating and implementing the developmental programmes or schemes. The state and central governments can support farmers initially by providing a rebate on establishment costs and exotic planting material costs at lower prices for increasing the area on hydroponic cultivation and to protect the interest of the farmers. Overall, it can be concluded that, hydroponic farming acted as turning point for many farmers to get high income.

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