Journal Homepage: - www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/16139
DOI URL: http://dx.doi.org/10.21474/IJAR01/16139

RESEARCH ARTICLE

"CONTRIBUTION OF GOVERNMENT, RESEARCH AND FINANCIAL INSTITUTIONS TOWARDS DEVELOPMENT OF HYDROPONIC FARMING IN INDIA"

Thanushree B.V[1] and Dr. Pradeep Kumar S.V[2]

1. Research Scholar, School of Commerce, Presidency University, Bangalore, Karnataka, India.
2. Assistant Professor, School of Commerce, Presidency University, Bangalore, Karnataka, India.

Manuscript Info

Manuscript History
Received: 30 November 2022
Final Accepted: 31 December 2022
Published: January 2023

Key words:-
Hydroponic Farming, Hardware and Software, Training and Subsidy

Abstract

In the world around 9 million people die because of hunger and its related diseases. Of the world population 24% live in an area where they can't get sufficient food to survive. ButIndia is a country which exports Rs.9,47,930.77lakh worth of fresh fruits and vegetables and floriculture worth Rs.69,603.49 lakh for the financial year 2021-22 and import exotic fruit and vegetables from other countries. This is because of enrichment in the agricultural methods and techniques that helps in increasing the productivity of the farmers and hydroponic method of farming is one among them. Hydroponic farming is the system of farming where crops are grown without soil but by using water, media and nutrient solution. In hydroponic faming water required is 80-90% less than the traditional farming or soil based farming. Land required is also only 20% of the land which is required for traditional farming to produce same quantity of output. Though the Initial investment and operating expenses are high to install and maintain hydroponic farming, yield and returns are also high.Since India started exporting more food produce and started growing exotic fruits, vegetable and flowers, this would boost the growth of economy of a country. To support, empower and encourage the farmers government of various states are providing subsidy facility up to 25%, 40%, 50% and 75%(percent vary from state to state), since the initial invest and operating expenses are high.Banks and financial institutions are providing loans and financial support with less interest rates and easy repayment modes. In few states, government is proving free training programs for women and physically disabled persons to empower them and to make them independent.

Introduction:-

Hydroponic farming is system of growing plants without soil but using nutrient rich water and growing media like coco peat, perlite, vermiculite, leca balls and sometimes without media. We can grow any crop in any season because of artificial climate. Here sunlight is replaced by artificial lights, natural air is replaced by climate controllers or air conditioner, soil is replaced by growing media and nutrient rich solutions. It is one of the methods of growing crops organically because they even use manure of chicken, cow, fish, turkey and other animals. Crops grown hydroponically are healthy because they do not use pesticides since it is free from soil based diseases and also it is environmental friendly method of farming. It requires very less water for growing crop and saves 80-90% of

Corresponding Author:- Thanushree B.V
Address:- Research Scholar, School of Commerce, Presidency University, Bangalore, Karnataka, India.

water consumption compared to traditional farming. Initial investment required is high says every 5 years once they need to invest Rs.30.5 lakh(cost of installation vary from structure to structure) and also operating expenses will also be high because power consumption for controlling climate, purifying water and also required skilled and trained labour to whom we need to pay high consideration. But still it is the most profitable mode of farming because it consumes less water, $4/5^{th}$ of the space can be saved, yield will be very high (Range varies based in variety of crop grown and the hydroponic structure used). There is also financial assistance from government and financial institutionsin the form of loan, subsidies and training program to improve the skilled labour. These efforts are to improve the economy, life style of the people and also to minimize import of exotic vegetables, fruits and flowers by growing sufficient food required and since $1/3^{rd}$ of world population is not getting adequate food for consumption, so we can even able to export to other countriesand the country's economy will grow.

Hardware and software components:

There are various hardware and software components required for the installation of hydroponic farming system. Where hardware components includes protected cultivation structures like indoor structure, climate control green house, glass house, retractable green house, poly carbonate green house, naturally ventilated greenhouse using roofs, mechanical ventilated greenhouse using fans, high and low tunnel, net house, movable containers. Growing system includes growing bag, rhyzobags, trough and trench. Growing media includes cocopeat, lecaballs, rockwool, perlite, vermiculite. Nutrient film technique includes flatbed system, a frame and tower. Irrigation system includes irrigation system layout, tank, main line, sub line, laterals drippers, automation, Pump, filters, supply pipe, agricultural tools, support equipment like reverse osmosis treatment unit, water softener unit, chiller unit UV light treatment unit.Software includes selection of crop, selection of varieties, and strategy of variety selection that is mix of common and exotic varieties, high genetic potential, disease and insect resistance, seeds brand, and testing before adoption commercially.

Essential plant nutrients:

Plants grown hydroponically require nutrients for its growth in water. Maintaining EC(Electrical conductivity) and PH is most important part of growing crops in hydroponic farming and better micro climate. Elements required for hydroponic farming are broadly classified in to two categories based on the source from which it is extracted they are as follows:

1.Frame work elements- The element taken from air and water are called frame work elements they are hydrogen, carbon and oxygen

2.Mineral elements- The elements taken mainly in the form of ions form soil are called mineral elements. They are further classified into Macro nutrients and micro nutrients.

a. Macro nutrients- Macro nutrients which are required in large quantity. They are Primary nutrients (Nitrogen, Phosphorus, and Potassium) and Secondary nutrients (Calcium, Magnesium and Sulphur).
b. Micro nutrients- Micro nutrients which are required in less quantity. They are zinc, copper, manganese, iron, boron, molybdenum, nickel.

Review Of Literature:-

Amaresh Sarkar, Mrinomy Majumder (2019)-"Economic of six-story stacked protected farm structure":

In this study,Six-story protected farm on a land in Delhi City, India. The study revealed that there is a need of high initial investment to install hydroponic farming system initially but the requirement of operating cost is very less and the yield from hydroponic farming is very high so that returns will be high. There are many benefits of installing hydroponic method of farming because its ecofriendly and growing crops locally lead to less transportation and can reduce carbon footprint.

Wallace G Heath- "New potential for modern Indian economic development":

In this article the author discussed about Indian economic development, which should be directed towards community needs, Utilizing Indian Leadership for training and development programs. Providing educating plays an important role in economic development.And the Fort Yuma Reservation's hydroponic farming system is the best example of it. Utilizing resources and cooperative marketing programs, locals can compete with foreign food production and can contribute to US Food and Energy conservation.

Brahma Singh-"Protected Cultivation of Vegetables in India: An overview":

In this article the author say that in India more than 100000 hectors covers horticultural crops and among this 50% of the area is under nursery and vegetables. In India there were only 9 states and union territories adopting protected

cultivation in 2007-08 and it gradually increased to 30 states and union territories in the year 2014-15. Now a day's almost all sates are implementing protected cultivation structures to grow crops. Efforts of national boards and schemes like NHB, MIDH, RKVY and several bank schemes have created awareness about protected cultivation. Fe financial agencies are providing assistance for protected cultivation. The subsidy schemes and international collaboration with countries such as Israel, Netherland are expected to act as major boost for protected cultivation in India.

CP Du Plooy, MM Maboko, Evan den Heever, S Chiloane (2012)- "Research and technology transfer by the agricultural research council to sustain the south African hydroponic industry":

The Agricultural Research Council, Vegetable and plant Institute , developed an integrated program to assist hydroponic farmers in South Africa. The Gauteng Department of Agriculture and Rural Development (GDARD)provide infrastructure facility. ARC-VOPI is responsible for applied research and infrastructure dissemination which include tailor made training programs to enhance the skills of hydroponic growers. The research program is developed to new methodology that can produce more yields.

Other articles reviewed are-

"How hydroponic farming is redefining the approach of adopting a healthy life style?" –

In this article it states that Indian fresh produce market is expected to reach 10 billion dollar by 2025. There are few challenges for traditional farming that has scarcity of fertile land, water supply and quality soil. But, in hydroponics implementation of artificial intelligence, machine learning and data is processing can result in high quality crops with clean and healthy environment.

"Hydroponic farming: Government is providing special training to women."-

Delhi government is providing training for women to deprived section and physically challenged individuals. This training activity is undertaken by Delhi transport department at Delhi Agriculture Training facility. Trainees get certified from ASCI (Agriculture Skill Council of India). This has given livelihood for many who lost their jobs during Pandemic.

"IIT Alumni startup half acre hydroponic, soilless farm grows 7000kg produce."-

Amil Kumar and Abhay Singh, started hydroponic firm Eeki Foods, produced residue free Indian staple vegetables using hydroponics. They produce food products like Tomatoes, bitter gourd, bottle gourd, chili andeggplant using hydroponics without using media with chamber technology and IoT(Internet of Things) system. They had conducted research and developed their own system where they have complete control over taste and nutritional levels in crops. They grow 7000kg Tomatoes in half acre of land in one month and made monthly income of Rs. 3.5 lakh. And 800 species can be grown.

"Government is offering75% subsidy for urban farming"-

Kerala State Horticulture Mission, Vertical Garden structure cost Rs. 20,000 state horticultural mission plans to facilitate 75% subsidy for the initial period which includes 16 pots. This scheme is to encourage small growers.

"**Government is providing subsidy for hydroponics and aeroponics farming"-**

National Horticulture Board (NHB)subsidy for hydroponic and aeroponic farming under initiative Development of Commercial Horticulture through Production and post-harvest management in India.

"How to get subsidy for hydroponics?" -

In this article, they have given information regarding getting subsidy for hydroponic farming. India is exporting exotic vegetables more than 85% creating growth rate of 15-20% per year. Every 5 years once capital required is Rs.30.5 lakh. Subsidy varies from state to state depending on state government.

Statement Of The Problem:

The study is intended to describe various financial assistance for hydroponic farming like providing loan, subsidies from government, banks and financial institutions, various research activities conducted to cut the price for commercial hydroponic farming, training and development programs by government for adoption of hydroponic farming in India - the states like Karnataka, Kerala, Delhi, Rajasthan and Maharashtra.

Objectives:-

1. To explore the financial assistance by various banks for hydroponic farmers
2. To explore the subsidy available for hydroponic farmers.
3. To ascertain various training programs providing for hydroponic farmers.

Data collection:

The research is based on secondary data collected through literature review, online journals, articles written by hydroponic farmers and experts, NHB (National Horticulture Board) website and National Horticulture Mission.

Findings-

1. It is found that State Bank of India provides loan to the extent of 85% of the project cost at the rate of 7% p.a up to loan amount of Rs. 3,00,000 as per guidelines of Government of India where subsidy is available else 2% above base level for the construction of house and purchase of machinery and equipment. Insurance of assets created by bank finance for full market value.
2. It is found that Central Bank provides loan up to 80% of the project cost and the loan limit is maximum Rs. 5 crore. And other banks like Oriental Bank of commerce, ICICI bank, Bank of Baroda, Reliance money, IDBI, HDFC, Axis and Union Bank provides loan for green house, poly house and other kind farming machineries, equipment and to meet operational expenses.
3. It is found that Kerala State Horticulture Mission provides 75% subsidy for urban farming. State Horticulture Mission plans to provide 75% subsidy on the cost worth Rs.20,000 for initial period which includes 16 pots.
4. It is found that Maharashtra government is providing loan up to 50% subsidy for installing hydroponic farming to grow animal fodder
5. In few states government is providing 25%- 40% subsidy for initial investment in hydroponic farming.
6. It is found that Kochi Students created solution at low cost that triples hydroponic yield as a part of a central government project called e-yantra farm setup initiative(EFSI).
7. It is found that training activity is undertaken by Delhi transport department at Delhi Agriculture Training facility. Trainees get certified from ASCI (Agriculture Skill Council of India). This has given livelihood for many who lost their jobs during Pandemic.
8. It is found that training programs are provide by state government like Rajasthan, Delhi, Maharashtra, Karnataka and others to install hydroponic farming system specially for women, and physically handicapped individuals to make them financially independent.

Conclusion:-

In the world the nearly 24% percent (9 million people) of the population is suffering from insufficient food and mal nutrition. This is because of urbanization, industrialization, climatic uncertainties and unavailability of water for agricultural purpose. India has exported Rs.9,47,930.77lakh worth of fresh fruits and vegetables and floriculture worth Rs.69,603.49 lakh for the financial year 2021-22.The percentage is being increasing from year to year at growth rate of 15%-20% per annum. This help in the growth of economy. Hydroponic farming helps to produce quality and organic crops. Because of all these reasons even government, banks and financial institutions are providing subsidies, training programs, and loans at very less interest rates. Various research activities are being conducted for development of technology the helps to reduce the installation cost as well as operating expenses and IIT students from Kochi is the best example of it where they started experimenting in the year 2019 as a part of central government project called e-yantra farm setup initiative (EFSI). Subsidies are provided by state government which varies from one state to another (25%, 40%, 50% and 75%). Banks are providing loans to farmers at the interest rate 7% p.a up to loan amount of Rs. 3,00,000 as per guidelines of Government of India where subsidy is available else 2% above base level for the construction of house and purchase of machinery and equipment. Insurance on assets created by bank, finance for full market value.

Reference:-

1. Amaresh Sarkar, MrinmoyMajumder(2019). Economic of a six-story stacked protected farm structure. Environment, Development and Sustainability 21(3), 1075–1089, 2019https://doi.org/10.1007/s10668-018-0088-0
2. Wallace G Health(1974). ERIC/CRESS, Box 3AP, NM88003(on loan), 1974
3. Singh, B. and Sirohi, N.P.S. (2006). Protected cultivation of vegetables in India: Problems and future prospects. ActaHorticulturae. 710, 339-342https://doi.org/10.17660/ActaHortic.2006.710.38

4. CP Du Plooy, MM Maboko, Evan den Heever, S Chiloane (2012). Research and technology transfer by the agricultural research council to sustain the south African hydroponicindustry,ActaHorticulturae 947(947) https://www.researchgate.net/publication/259080384_Research_and_Technology_Transfer_by_Agricultural_Research_Council_to_Sustain_South_African_Hydroponic_Industry
5. https://krishijagran.com/agriculture-world/hydroponic-farming-government-is-providing-special-training-to-women/
6. https://krishijagran.com/agriculture-world/govt-is-providing-subsidy-for-hydroponics-aeroponics-farming/
7. https://timesofindia.indiatimes.com/life-style/home-garden/how-hydroponic-farming-is-redefining-the-approach-of-adopting-a-healthy-lifestyle/articleshow/83951253.cms
8. https://www.thebetterindia.com/255453/kota-startup-hydroponics-eeki-foods-iit-bombay-organic-high-quality-tomatoes-cucumbers-eggplant-bitter-gourd-soli-free-india-nor41/
9. https://krishijagran.com/agriculture-world/government-is-offering-75-subsidy-for-urban-farming/
10. https://krishijagran.com/agripedia/how-to-get-subsidy-for-hydroponics/