

## Coronavirus Pandemic's Impact On Aquaponics Farmers: With Reference To Palakkad District

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**ABSTRACT:** The COVID-19 pandemic is exerting a perilous effect on human life. The stringent restrictions imposed by the Government of India as part of this crisis resulted in an adverse effect on the economic bar graph of the country. The Aquaponics sector is one of the adversely affected sectors. Various factors such as lockdown, social distancing policies, forbidding restaurants to dine, interstate movement restrictions, cancellation of domestic and international flights have resulted in an unpropitious effect on Aquaponics farmers in Kerala. This research paper deals with the Coronavirus pandemic's Impact on Aquaponics farmers in Kerala with special reference to the Palakkad district. The study is carried with the help of data collected from authorized Aquaponics farm units in Palakkad in Kerala. The survey is carried out through Google form. The collected samples were analyzed to understand the change in different constraints before and during the Coronavirus Pandemic.

**Keywords:** Coronavirus, Covid19, Pandemic, Aquaponics & aquaponic farmers

### INTRODUCTION

By 2050, the world's population is expected to grow by 9 billion people. In the not-too-distant future, man will be forced to depend on the agricultural sector, which includes forestry, fisheries, woodcrafts, and livestock. Looking into the recent happenings of 21st C, we can say that various natural calamities and crises are distorting the human population and the pathetic thing is that it is exerting direct devastation upon land and agriculture. Agriculture is the most effective way of reducing poverty and maintaining food security. Despite the fact that small-scale farmers are the largest contributors to global food production, they are the poorest citizens in developing countries. Even though 70% of people in rural areas depend on the primary sector, one-fourth of the population in India finds it difficult to fulfill their everyday nutritional requirements. Low agricultural growth, sustainability concerns, Land degradation are the different challenges faced by Indian farmers. Excessive pesticide use has resulted in a decrease in soil quality, and has increased nitrogen levels in local water sources. The conventional agricultural system is being impacted by a rise in nitrogen levels and a reduction in rainfall. These challenges faced by farmers can be overcome by implementing innovative farming techniques. Technology and scientific methods development have led to a new era of sustainable development. Aquaponic farming could be considered as a solution to overcome the challenges mentioned. About the fact that aquaponics is gaining popularity in other nations, Indian farmers are still relatively new to the method. In India, there has been a steady rise in understanding of this method over the last few years.

Aquaculture and hydroponics are the two major elements that make up aquaponics. Plants and fish can be raised together in this scheme, with each meeting the needs of the other. Water from the fish tank containing fish excrement circulates into grow beds, where plants are rooted. Plants thrive in the water, which is rich in nutrients, and they clean the water that flows into the fish tank to keep the fish safe. Aquaponics consists of a fish tank and grow beds connected by a small pump that pipes water between them. The secret to this system's effectiveness is ensuring a well-balanced and interdependent relationship between the fish, plants, and nutrients. Aquaponic systems are useful in areas where water is scarce and landholdings are minimal.

In Kerala, agricultural land reserves are restricted to less than 0.2 hectares. As a result, farmers with scarce capital attempt to increase their production. Kerala is a net importer of food items such as cereals, peas, tomatoes, milk, and meat products, and its daily food needs are heavily reliant on other nations. The use of excessive fertilizers and pesticides has led to the trend of organic farming. Kerala households have started doing aquaculture in small tanks along with vegetables in separate grow beds. Importance has been given to integrating hydroponics and aquaculture in the current scenario. Organic farming has become common as a result of the overuse of fertilizers and pesticides. Households in Kerala have begun to practice aquaculture in small tanks, along with growing vegetables in separate grow beds. Integration of hydroponics and aquaculture has been prioritized in the current scenario.

The coronavirus (Covid 19) pandemic has altered the lives of people all over the world. As our Indian government attempted to protect the well-being of its people, negative consequences were felt throughout the country. Covid 19 had an effect on the aquaponics industry like any other sector in India. The aquaponic farmers in Kerala have been affected by the enforcement of lockout, social distancing laws, restaurant dine-in bans, interstate travel restrictions, and suspension of domestic and foreign flights. As a result of the covid19 pandemic, aquaponic businesses have faced changes in sales, development problems, demand challenges, labor challenges, and more. A research was conducted to compare different constraints of aquaponic farming in Palakkad before and after the Covid-19 pandemic in order to resolve the problems faced by farmers.

### **STATEMENT OF THE PROBLEM**

Due to various restrictions imposed by the Indian government, the aquaponic farmers faced various changes in revenue, market, labor, and more. To understand the impact of Coronavirus pandemic 19 pandemics in Palakkad various constraints of aquaponic farming pre and during corona, pandemics were compared.

### **REVIEW OF LITERATURE**

The literature review is an important role in the research study and it was conducted to search the recent studies done in the same field. It provides a general overview of the literature relevant to this study. Have made an extensive or in-depth study on aquaponics trend in India A large quantity of information was reviewed for this research in the form of books, journals, magazines, websites, and other sources, and some of the reviewed pieces of literature are discussed below:Gerking (1977) has made a study on a “global food potential of freshwater fish”. Freshwater fish will largely fill the world's supply of dietary protein, according to the report.Amritha Bhargavan Nair (2018) in this paper “STATUS AND PROSPECTS OF AQUAPONICS IN KERALA, INDIA” has made a study on fish and crop yield, marketing strategy, production methods, and profitability of commercial-scale aquaponics in Kerala. According to the findings, aquaponics is a viable option for a reliable source of income in Kerala.Simon Goddek (2015) has made a study on the "feasibility of aquaponics systemAccording to the report, Aquaponics is a key driver for the growth of integrated food production systems, especially in arid regions with limited water resources.G.S.ANANTH (2013) in his paper “A study on problems and constraints in production and marketing of fish in West Bengal” has identified fish production is marketed through 3 different channels “Channel I: Fish farmer Consumer Channel II: Fish farmer Petty trader/Retailer Consumer Channel III: Fish farmer Wholesaler Retailer Consumer and found that the price spread is highest in channel III among the three channels”. Farmers in freshwater aquaculture faced a major problem with theft and pilferage, while market intermediaries in the marketing of fish faced a major problem with high perishability of the commodity.Shitote Z (2013) in his research article “Challenges Facing Fish Farming Development in Western Kenya” examines the obstacles to the growth of fish farming in western Kenya. According to the report, the majority of fish farmers faced a variety of management issues, including high costs, unavailability, and low quality feeds, pond drying during droughts, a lack of fingerlings, floods, pond siltation, pond maintenance, and poor security.Jonathan van Senten(2020) has made a study “Impacts of COVID-19 on U.S. aquaculture, aquaponics, and allied businesses”. The findings suggest that the coronavirus disease (COVID-19) pandemic has had a significant negative effect on the aquaculture, aquaponics, and related industries in the United States.M. Kumaran(2021) in his paper Prospective “Impact of Coronavirus disease (COVID-19) related lockdown on shrimp aquaculture sector in India” has stated that the COVID-19 lockdown and resulting fluctuations in supply chain movements had a negative effect on the shrimp aquaculture sector's operations and resulted in a direct economic loss to its various stakeholders.Despite the fact that several experiments have been undertaken in the field of aquaponics, the research void discovered was that the condition or effect following the coronavirus pandemic has not been addressed in the papers mentioned above. Rather than discussing the general issue of aquaponic cultivation, this paper focuses on the changes that have arisen as a result of the coronavirus.

### **OBJECTIVES**

1. To Study the effect of the Corona Virus pandemic on aquaponic farming.

### **HYPOTHESIS**

1. H<sub>0</sub>: There is no significant difference in labor issues in Aquaponics farming prior to and during the Covid 19 pandemic  
H<sub>a</sub>: There is a significant difference in labor issues in Aquaponics farming prior to and during the Covid 19 pandemic
2. H<sub>0</sub>: There is no significant difference in cost of production in Aquaponics farming before and covid 19 pandemic

H<sub>a</sub>: There is a significant difference in cost of production in Aquaponics farming prior to and during the Covid 19 pandemic

3. H<sub>o</sub>: There is no significant difference in Repair, installation, consulting, or engineering services problems in Aquaponics farming prior to and during the Covid 19 pandemic  
H<sub>a</sub>: There is a significant difference in Repair, installation, consulting, or engineering services problems in Aquaponics farming prior to and during the Covid 19 pandemic
4. H<sub>o</sub>: There is no significant difference in sales and demand for Aquaponics products prior to and during the Covid 19 pandemic  
H<sub>a</sub>: There is a significant difference in sales and demand for Aquaponics products prior to and during the Covid 19 pandemic
5. H<sub>o</sub>: There is no significant difference in availability of commercial Market prior to and during the Covid 19 pandemic  
H<sub>a</sub>: There is a significant difference in the availability of commercial Market prior to and during the Covid 19 pandemic
6. H<sub>o</sub>: There is no significant difference in Challenges with financial services for Aquaponic farming prior to and during the Covid 19 pandemic  
H<sub>a</sub>: There is a significant difference in Challenges with financial services for Aquaponic farming prior to and during the Covid 19 pandemic
7. H<sub>o</sub>: There is no significant difference in Challenges with transportation of Aquaponic products before and during covid 19 pandemic  
H<sub>a</sub>: There is a significant difference in Challenges with transportation of Aquaponic products prior to and during the Covid 19 pandemic

#### **SCOPE OF THE STUDY**

The research will be limited to people doing aquaponic farming within the Palakkad district. The impact of the Covid19 pandemic on aquaponic farming with reference to the Palakkad district is analyzed. This research doesn't consider aquaponic farmers outside the Palakkad district due to Covid protocol constraints and the time limit of the study.

#### **RESEARCH METHODOLOGY**

A total of 30 respondents who are aquaponic farmers were randomly selected from the Palakkad district for the study. Primary data for this analysis was gathered from aquaponic farmers in Palakkad using a standardized interview schedule, survey, and questionnaire. A pilot survey was conducted with a small number of aquaponics farmers in Kerala before the survey. After the pilot survey, the questionnaires were restructured and given to Fishery's Expert and research supervisors for checking the reliability and validity. Secondary data was collected from the staff of the department of fisheries through an unstructured questionnaire and published research paper in the field of fisheries. The survey was conducted to access the impact of coronavirus on aquaponic farming in the Palakkad district. This research took into account a variety of aquaponics farming constraints, and data was collected using basic random sampling, which is a form of probability sampling. The results were exported and summarized using SPSS. A descriptive analysis is to test the hypothesis set forth. Means, Median, standard, Wilcoxon signed-rank test is used to testing check the difference in various constraints. All were tested at  $p=0.05$  level of significance.

#### **Testing of Instrument**

The Cronbach's Alpha value of the questionnaire is 0.772. Furthermore, the value is significantly higher than the required value of 0.60, indicating that the questionnaire is highly reliable. The data is not usually distributed, according to the results of the study's normality measure, since the significance value is less than the 0.05 limit. To get analysis output, the statistical tool used for the study is the Related Wilcoxon Sign Test.

## RESULTS AND DISCUSSIONS

Analysis on the impact of covid19 pandemic on Aquaponic Fish Farmers with reference to Palakkad.

Table No.1: Statistics on the Impact of the Covid19 Pandemic on Aquaponic Fish Farmers.

### Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75 <sup>th</sup>
Labour Issues existed in aquaponic farming during the spread of coronavirus (COVID-19) pandemic	30	3.30	.988	2	5	2.00	3.00	4.00
Cost of production inputs like Feed, chemicals, etc. was low during the coronavirus pandemic (Covid 19)	30	2.50	1.042	1	4	2.00	2.00	3.25
Repair, installation, consulting, or engineering services problems were low during coronavirus (Covid-19)	30	2.37	.928	1	4	2.00	2.00	3.00
Sales and demand for Aquaponic products(fish and plant) prior to the coronavirus (COVID-19) pandemic	30	2.97	.890	1	4	2.00	3.00	4.00
During the coronavirus (covid 19) pandemic, there are limited commercial markets.	30	3.43	.774	2	5	3.00	3.00	4.00
During the Coronavirus (Covid-19) epidemic, there were difficulties with financial services (operation loans, leases, and so on).	30	3.70	.915	2	5	3.00	4.00	4.00
There were fewer Challenges in the transportation of aquaponic products during the Coronavirus(Covid-19) pandemic	30	2.23	.774	1	4	2.00	2.00	3.00
Labour issues existed in aquaponic farming before the spread of the coronavirus(COVID-19) pandemic	30	2.80	.847	1	4	2.00	3.00	3.25
Cost of production inputs like Feed, chemicals, etc. was low before the coronavirus(Covid 19) pandemic	30	3.37	.890	2	5	3.00	3.50	4.00
Repair, installation, consulting, or engineering services problems were low before the coronavirus (Covid-19) pandemic	30	3.27	.785	2	5	3.00	3.00	4.00
Sales and demand for Aquaponic products(fish and plant)were elevated during the coronavirus (COVID-19)pandemic.	30	3.67	.959	2	5	3.00	4.00	4.00

There were few commercial Market before the coronavirus(Covid 19) pandemic.	30	2.63	.718	2	4	2.00	2.50	3.00
There were Challenges with financial services (operating loans, leases, etc.) before Coronavirus(Covid-19) pandemic	30	3.40	.894	2	5	3.00	3.00	4.00
There were fewer Challenges in the transportation of aquaponic products before Coronavirus(Covid-19) pandemic	30	3.50	.861	2	5	3.00	4.00	4.00

Source: Primary Data  
Table No.2

Frequencies		N
Labour issues existed in aquaponic farming before the spread of the coronavirus(COVID-19) pandemic	Negative Differences	12
	Positive Differences	3
	Ties	15
.Labour Issues existed in aquaponic farming during the spread of coronavirus (COVID-19) pandemic	Total	30
Cost of production inputs like Feed, chemicals, etc. was low before the coronavirus(Covid 19) pandemic	Negative Differences	7
	Positive Differences	18
	Ties	5
Cost of production inputs like Feed, chemicals, etc. was low during the coronavirus(Covid 19) pandemic	Total	30
Repair, installation, consulting, or engineering services problems were low before the coronavirus (Covid-19) pandemic	Negative Differences	4
	Positive Differences	17
	Ties	9
Repair, installation, consulting, or engineering services problems were low during coronavirus (Covid-19)	Total	30
Sales and demand for Aquaponic products(fish and plant)were elevated during the coronavirus (COVID-19)pandemic.	Negative Differences	5
	Positive Differences	15
	Ties	10
Before the coronavirus (COVID-19) pandemic, sales and demand for aquaponic products (fish and plants) were strong.	Total	30

10. There were few commercial Market before the coronavirus(covid 19) pandemics.	Negative Differences	17
	Positive Differences	3
	Ties	10
There are few commercial Market during the coronavirus(covid 19) pandemic.	Total	30
12. There were Challenges with financial services (operating loans, leases, etc.) before Coronavirus(Covid-19) pandemic	Negative Differences	8
	Positive Differences	1
	Ties	21
There were Challenges with financial services (operating loans, leases, etc.) during Coronavirus(Covid-19) pandemic	Total	30
14. There were fewer Challenges in the transportation of aquaponic products before Coronavirus(Covid-19) pandemic	Negative Differences	2
	Positive Differences	18
	Ties	10
There were fewer Challenges in the transportation of aquaponic products during the Coronavirus(Covid-19) pandemic	Total	30

Table No.3

Variables	Exact Sig. (2-tailed).
Labor issues existed in aquaponic farming before the spread of the coronavirus(COVID-19) pandemic	.035 <sup>b</sup>
Labor Issues existed in aquaponic farming during the spread of the coronavirus (COVID-19) pandemic	
Cost of production inputs like Feed, chemicals, etc. was low before the coronavirus(Covid 19) pandemic	.043 <sup>b</sup>
Cost of production inputs like Feed, chemicals, etc. was low during the coronavirus(Covid 19) pandemic	
Repair, installation, consulting, or engineering services problems were low before the coronavirus (Covid-19) pandemic –	.007 <sup>b</sup>
Repair, installation, consulting, or engineering services problems were low during coronavirus (Covid-19)	
Sales and demand for Aquaponic products(fish and plant)were high before the coronavirus(COVID-19) pandemic.	.041 <sup>b</sup>
Sales and demand for Aquaponic products(fish and plant)were elevated during the coronavirus (COVID-19) pandemic?	
There was few commercial Market before the coronavirus (Covid 19) pandemic.	.003 <sup>b</sup>
There is few commercial Market during the coronavirus (Covid 19) pandemic.	
There were Challenges with financial services (operating loans, leases, etc.) before Coronavirus(Covid-19) pandemic	.039 <sup>b</sup>
There were Challenges with financial services (operating loans, leases, etc.) during Coronavirus(Covid-19) pandemic	

There were fewer Challenges in the transportation of aquaponic products before Coronavirus(Covid-19) pandemic	.001 <sup>b</sup>
There were fewer Challenges in the transportation of aquaponic products during the Coronavirus(Covid-19) pandemic	

### **Labor**

Ho: There is no significant difference in labor issues in Aquaponics farming prior to and during the Covid 19 pandemic

Ha: There is a significant difference in labor issues in Aquaponics farming prior to and during the Covid 19 pandemic

Since  $p < 0.05$  (From table 3) we reject the Null hypothesis therefore there is a significant difference in labor issues in Aquaponics farming before and after Covid 19 pandemic. Owing to the widespread dissemination of the Covid 19 pandemic, the government enforced interstate and transportation controls, resulting in a labor crisis during the pandemic.

### **Cost of Production**

Ho: There is no significant difference in cost of production in Aquaponics farming both prior to and during the Covid 19 epidemic

Ha: There is a significant difference in the cost of production in Aquaponics farming both prior to and during the Covid 19 epidemic

Since  $p < 0.05$  (From table 3) we reject the Null hypothesis, therefore, there is a significant difference in cost of production in Aquaponics farming both prior to and during the Covid 19 epidemic. As a result of the manufacturing pause in many sectors and the limitations placed on vehicle transportation, the cost of input materials increased..

### **Maintenance**

Ho: There is no significant difference in Repair, installation, consulting, or engineering services problems in Aquaponics farming prior to and during the Covid 19 pandemic

Ha: There is a significant difference in Problems with repair, installation, Monitoring, or engineering servicesin Aquaponics farming prior to and during the Covid 19 pandemic

Since  $p < 0.05$  (From table 3) we reject the Null hypothesis is a significant difference in Problems with repair, installation, Monitoring, or engineering servicesin Aquaponics farming prior to and during the Covid 19 pandemic Since aquaponic device surveillance was relatively limited during the pandemic, and many utilities were not available according to requirements, the cost of maintenance for aquaponic farmers rose quickly. The system was also not well managed due to a shortage of labor.

### **Sales and demand**

Ho: There is no significant difference in sales and demand for Aquaponics products prior to and during the Covid 19 pandemic

Ha: There is a significant difference in sales and demand for Aquaponics products prior to and during the Covid 19 pandemic

Since  $p < 0.05$  (From table 3) we reject the Null hypothesis, therefore, there is a significant difference in sales and demand for Aquaponics products prior to and during the Covid 19 pandemic. Even though there was a drop in aquaponic product prices outside of India during the pandemic, sales in Palakkad skyrocketed since most aquaponic products are sold directly to customers in and around the processing area.

### **Commercial Market**

Ho: There is no significant difference in availability of commercial Market both prior to and during the Covid 19 epidemic

Ha: There is a significant difference in the availability of commercial Market both prior to and during the Covid 19 epidemic

Since  $p < 0.05$  (From table 3) we reject the Null hypothesis, therefore, there is a significant difference in the availability of commercial Market before and after the Covid 19 pandemic. Due to various constraints imposed by the Indian government, the commercial markets were closed.

### **Financial Services**

H<sub>0</sub>: There is no significant difference in Challenges with financial services for Aquaponic farming prior to and during the Covid 19 pandemic

H<sub>a</sub>: There is a significant difference in Challenges with financial services for Aquaponic farming prior to and during the Covid 19 pandemic

Since  $p < 0.05$  (From table 3) we reject the Null hypothesis therefore there is a significant difference in Challenges with financial services for Aquaponic farming prior to and during the Covid 19 pandemic. Due to the government's expenditures in Controlling spreading of the Covid19 virus, various incentives and funds were limited to the public, and various money lending institutions implemented stringent lending policies during this period.

### **Transportation**

H<sub>0</sub>: There is no significant difference in Challenges with transportation of Aquaponic products both prior to and during the Covid 19 epidemic

H<sub>a</sub>: There is a significant difference in Challenges with the transportation of Aquaponic products prior to and during the Covid 19 pandemic

Since  $p < 0.05$  (From table 3) we reject the Null hypothesis, therefore, there is a significant difference in Challenges with transportation of Aquaponic products both prior to and during the Covid 19 epidemic. The government placed numerous limits on vehicle traffic, allowing only vehicles with proper permits to travel. As a result, there were issues with the transportation of aquaponic necessities like feed, labor, and so on.

### **CONCLUSION**

According to the report, even though farmers faced a variety of issues as a result of direct and indirect factors influencing the Covid19 pandemic, there was a rapid increase in the sales and demand of aquaponic products in Palakkad because aquaponic farmers primarily sold directly to customers in Palakkad.. Owing to a spike in people's health issues, the costs of aquaponic items such as fish and organic vegetables have also risen. The aquaponic factories in other countries were severely harmed because most of them were large-scale operations, but in Kerala, where most of the processing of Aquaponics goods was done on a small scale and most of the consumers were locals, the product saw a rise in sales and demand. In the near future, the aquaponics industry has a lot of promise in developing countries like India.

### **REFERENCES**

1. Angral, C., Gupta, K., Gupta, S. K., Kant, K., Kumar, D., & Sharma, M. (n.d.). Constraints Faced By Fish Farmers & Implementing Agencies of Jammu Provinces of. In *J. Adv. Zool* (Vol. 2017, Issue 1).
2. Bhargavan Nair, A., & Thomas John, A. (2018). STATUS AND PROSPECTS OF AQUAPONICS IN KERALA, INDIA. *International Journal of Pure and Applied Mathematics*, 118(20), 4087–4103.
3. Goddek, S., Delaide, B., Mankasingh, U., Ragnarsdottir, K. V., Jijakli, H., & Thorarinsdottir, R. (2015). Challenges of sustainable and commercial aquaponics. *Sustainability (Switzerland)*, 7(4), 4199–4224. <https://doi.org/10.3390/su7044199>
4. Kumaran, M., Geetha, R., Antony, J., Vasagam, K. P. K., Anand, P. R., Ravisankar, T., Angel, J. R. J., De, D., Muralidhar, M., Patil, P. K., & Vijayan, K. K. (2021). Prospective impact of Coronavirus disease (COVID-19) related lockdown on shrimp aquaculture sector in India – a sectoral assessment. *Aquaculture*, 531(September 2020), 735922. <https://doi.org/10.1016/j.aquaculture.2020.735922>
5. Rahaman, S. M., Bera, B. K., & Ananth, G. S. (2013). A study on problems and constraints in production and marketing of fish in West Bengal. In *Journal of Crop and Weed* (Vol. 9, Issue 1).
6. Shitote, Z., Wakhungu, J., & China, S. (2013). Challenges Facing Fish Farming Development in Western Kenya. *Greener Journal of Agricultural Sciences*, 3(5), 305–311. <https://doi.org/10.15580/GJAS.2013.3.012213403>
7. van Senten, J., Smith, M. A., & Engle, C. R. (2020). Impacts of COVID-19 on U.S. aquaculture, aquaponics, and allied businesses. *Journal of the World Aquaculture Society*, 51(3), 574–577. <https://doi.org/10.1111/jwas.12715>