

**STUDY ON WATER QUALITY PARAMETERS OF SHRIMP FARMS IN
DIFFERENT LOCATIONS IN GANAPAVARAM MANDAL OF WEST
GODAVARI DISTRICT**

**SUBMITTED IN PARTIAL FULFILLMENT FOR AWARD OF DEGREE OF "BACHELOR OF
SCIENCE IN CHEMISTRY"**

**UNDER THE GUIDANCE OF
N.V.N.B SRINIVASA RAO
LECTURER IN CHEMISTRY**



By

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**DEPARTMENT OF CHEMISTRY
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Ganapavaram
Academic year 2021-2022**

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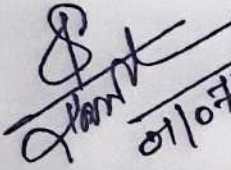
Date:01.07.2022

Certificate of Workshop

This is certified that Mr/Ms. **R. Satya Sri Devika** III BSc (MPC) S.Ch.V.P.M.R Government Degree College, Ganapavaram, West Godavari District, Andhra Pradesh. Has participated in the five days (25th June 2022 to 30th June 2022) workshop on "Basic Aquaculture laboratory techniques and tools "organized by Aqua tech laboratory The water base limited India.

All the best in all his future endeavors.

Thank you


01/07/2022

P. Karthik MSc, PhD (Life Sciences)
Dept of Aquatic Animal Health (Fisheries)- Tamil Nadu.
TWL -Aqua Tech Laboratory In-Charge (QC)- Andhra Pradesh.

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CERTIFICATE

This is certify that the work, incorporated in this project titled "STUDY ON WATER QUALITY PARAMETERS OF SHRIMP FARMS IN DIFFERENT LOCATIONS IN GANAPAVARAM MANDAL OF WEST GODAVARI DISTRICT" submitted by R.SATYA SRI DEVIKA, III B.Sc(MPC) H.T.No.193337101021 have been carried out under my supervision during the Academic Year 2021-2022.



Signature of project supervisor
Department of Chemistry
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Head of the Department
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Place: Ganapavaram

Date: 25/7/22

Examiners

1. V. Anami 14/08/2022,

2. N. Anami
14/8/22

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DECLARATION

I hereby declare that the Project titled "STUDY ON WATER QUALITY PARAMETERS OF SHRIMP FARMS IN DIFFERENT LOCATIONS IN GANAPAVARAM MANDAL OF WEST GODAVARI DISTRICT" work was done by me under the guidance of N. V.N.B Srinivasa Rao, Lecture in chemistry and submitted to S.Ch.V.P.M.R.Govt. Degree College, Ganapavaram for the award of B.Sc, degree of chemistry from Adikavinannaya university.

Place: Ganapavaram

Date: 25/7/22

R. Satya Sri Devika

Signature of the candidate

DEPARTMENT OF CHEMISTRY

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I am thankful to Smt. N.V.N.B Srinivasa Rao, Lecturer in chemistry for giving their valuable suggestion to do this project work.

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R. Satya Sri Devika
Signature of the student

STUDY ON WATER QUALITY PARAMETERS OF SHRIMP FARMS IN DIFFERENT LOCATIONS IN GANAPAVARAM MANDAL OF WEST GODAVARI DISTRICT

(Analysis of Ph, salinity, Total alkalinity Ca^{+2} , Mg^{+2} , Fe^{+2} , Unionized NH_3)

Shrimp aquaculture is one of the fastest-growing food sectors in coastal districts of Andhra Pradesh with promising growth rate for the past decade. Most of the produced shrimp are exporting to earn foreign exchange and economic development of the state. India is one of the leading producer of farmed shrimp in the world. Although shrimp cultivation has an important contribution for the earnings by export but still requires improvement in total production through better practices. In this regard, the state of Andhra Pradesh has the high productive shrimp producing brackish water aquaculture area in India, and it can be for its suitability for the wide expansion or development of the shrimp aquaculture.

Water quality plays an important role in increasing the productivity of the pond. It provides nutritionally a balanced and healthy environment to cultured animals. Sediment and water quality has a significant role in increasing the total production of the pond. However, in India, much fewer efforts have been made to assess the role of these parameters in the productivity of shrimp farms.

Water quality management is important in aquaculture quality of the pond water. Optimum Water quality parameters are to be maintained as shown in the table. The physical and chemical characteristics of pond water are very much influenced by the properties of bottom soil sediment as it provides food and shelter to the shrimp in culture pond environment and also act as the reservoir of nutrients for the growth of microalgae which constitute natural food for the aquatic organisms.

Physical and chemical factors like temperature, salinity, total suspended solids (TSS), dissolved gases and nutrients influence the water quality directly or indirectly, which ultimately govern the healthy survival of organisms in the aquatic ecosystem and also salinity plays an important role in the physiological functions of culture organisms. The hydrogen ion concentration in water (pH) and pond bottom soils can play a major role in the health, survival, and growth of aquatic animals, the balance of salt and water during a tissue is extremely essential for maintaining the coordination in its metabolic (Physiological) functions of the organisms.

Table : Optimum Water quality parameters for shrimp culture

Water Quality Parameter	Recommended Range
Temperature	28 - 32 °C
Dissolved Oxygen	5.0 - 9.0 ppm
Carbon Dioxide	≤ 20 ppm
pH	7.0 - 8.3
Salinity	0.5 - 35 ppt
Chloride	≥ 300 ppm
Sodium	≥ 200 ppm
Total Hardness (as CaCO ₃)	≥ 150 ppm
Calcium Hardness (as CaCO ₃)	≥ 100 ppm
(Magnesium Hardness (as CaCO ₃))	≥ 50 ppm
Total Alkalinity (as CaCO ₃)	≥ 100 ppm
Unionized Ammonia (NH ₃)	≤ 0.03 ppm
Nitrite (NO ₂)	≤ 1 ppm
Nitrate (NO ₃)	≤ 60 ppm
Total Iron	≤ 1.0 ppm
Hydrogen Sulfide (H ₂ S)	≤ 2 ppb
Chlorine	≤ 10 ppb
Cadmium	≤ 10 ppb
Chromium	≤ 100 ppb
Copper	≤ 25 ppb
Lead	≤ 100 ppb
Mercury	≤ 0.1 ppb
Zinc	≤ 100 ppb

Good water quality directly influences shrimp growth, survival and overall production. Poor water quality- causes disease, mortality, slow growth and low production of shrimp.

Objective of the study:

The Present study was carried out with the objective to study the water quality parameters of selected shrimp ponds in Ganapavaram mandal of erstwhile west Godavari district. Information gathered from the study would be useful to understand the productivity of the shrimp culture ponds with reference to water characteristics during the summer crop (May-June 2022).

Methods:

Method of water samples collection

The water sample was collected between 6-7 am in all selected culture ponds by dipping 500ml clean polythene bottles 1-2 feet depth in the ponds and samples were brought to the laboratory for analysis of various chemical parameters like Salinity, pH, total alkalinity, total hardness, calcium, magnesium, total ammonia, nitrate, dissolved oxygen by standard methods.

Method of Analysis

Temperature :

Water temperature was measured with a mercury-filled Celsius thermometer ranging 0 to 50 °C. To measure temperature the thermometer was dipped in to the water for one minute and the stable temperature final reading was recorded.

Salinity :

Salinity of the collected water samples was measured using a digital refractometer model Seawater Analysis HI96822 Hanna instruments. The salinity probe was immersed in the water samples to be tested without exceeding the maximum immersion level and waited for the salinity reading, and the final salinity value was recorded.

pH :

Water pH of the collected samples was measured using a digital pH meter (edge® blu Bluetooth® Smart pH Electrode and Meter - HI2202 HANNA instruments) nearest to 0.01. Before using the instrument it was calibrated with pH 7 and pH 10 buffer solutions. The pH probe was immersed in the water samples to be tested without exceeding the maximum immersion level. Then the sample was stirred gently and waited for the reading to stabilize and the final pH reading was recorded.

Alkalinity :

Alkalinity of the water was measured using titration method following (APHA, 1992). The burette was first rinsed with distilled water and then rinsed with 0.1N Sulphuric acid (H₂SO₄) was standardized by Na₂CO₃ solution. 10 ml sample was taken in a 250 ml conical flask and added 5 drops of the phenolphthalein indicator solution into it. 5 drops methyl orange indicator was added to the sample and titrated with 0.1N sulphuric acid (H₂SO₄) to a light pink color and the volume of titrate was recorded. Alkalinity of the sample was determined by calculating with following formula.

$$\text{Alkalinity, mg/L CaCO}_3 = \frac{A \times N \times 50,000}{\text{mL of Sample}}$$

Hardness :

Hardness of water was measured using Ethylenediaminetetraacetic acid (EDTA) titration method.

0.800M ethylene di-amine tetra acetic acid (EDTA) titration cartage was set into the selected place of the titrator. By moving the knob of the titrator the liquid was taken at the end of the delivery tube. Then the reading was taken of the titrator at 0.10 ml sample water was taken and 90 ml distilled water was taken into the 250 ml conical flask and 2 ml of buffer solution was taken (Hardness-1) into the sample water. Titration was done with 0.800M ethylene di-amine tetra acetic acid (EDTA) until the color change from red to

blue. Titration was carefully done at the end point and the temperature was kept under 200 0C. Total hardness was calculated with the following formula:

$$\text{Hardness of EDTA as CaCO}_3/\text{L} = \frac{A \times B \times 1000}{\text{mL of Sample}}$$

Calcium (Ca) :

Calcium of collected water samples was measured using test kit.

Magnesium (Mg) :

Magnesium of collected water samples was measured 5ml of hydroxylamine hydrochloride, 4 ml of polyvinyl alcohol, 5ml of 0.05% thiazole yellow, and 3.5 ml of 10N caustic soda are added to 30 ml of the neutral solution containing 30-200 mg of magnesium. The solution is allowed to stand for 15min at $25 \pm 0.5^\circ$ and calorimetrically is carried out at 540 nm.

Total Ammonia:

The ammonia of collected water samples was measured using 50 ml of sample add with 2 ml of phenol solution, 2 ml of sodium nitroprusside, 5 ml of oxidizing solution mix well. Allow to stand for one hour at the 200c-270c cover with Aluminum foil, read at 640 nm in a spectrophotometer.

Nitrite (NO₂):

Nitrate of collected water samples was measured 50 ml of sample add with 1ml of sulphonamide, allow to 2min add 1ml of NNED allow to Stand for 10 min read at 540 nm.

Dissolve oxygen (DO):

Dissolve oxygen (DO) of collected water samples was measured using a digital DO meter (Portable Dissolved Oxygen meter - HI8043 HANNA instruments). The probe plug was connected into the probe input socket and the power button was pushed. Then the O₂ screw was turned on and waited for the reading and final DO reading was recorded.

Result and Analysis:

Sample no.	pH	Salinity ppt	CO ₃ ²⁻ ppm	HCO ₃ ⁻ ppm	Total alkalinity ppm	Ca ⁺ ppm	Mg ⁺² ppm	NH ₃ ppm	Fe ⁺²
I	8.1	3.0	0	230	230	96	132	0.5	0.0
II	7.4	6.1	0	190	190	236	277	0.2	0.0
III	8.2	4.0	10	160	170	92	163	0.0	0.0
IV	8.1	4.5	0	230	230	120	206	1.5	0.0

Sample-I : Copper, ammonia, zeolite, nitrate has to be maintained by adding copper chloride, zeolite, yuka powder, rock salt.

Sample-II: PH, ammonia has to be maintained by adding Ag lime, zeolite, yuka powder

Sample-III : Copper, ammonia, zeolite, nitrate has to be maintained by adding copper chloride, zeolite, yuka powder, rock salt.

Sample-IV : Calcium, nitrite, nitrate, ammonia has to be maintained by adding Calcium chloride, zeolite, yuka powder, rock salt, nitro monas bacteria.



Ganapavaram, Andhra Pradesh, India
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