

ENHANCING PROPERTY OF RIVER WATER WITH ECO-ENZYME SOLUTION

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Abstract: This study was conducted to evaluate the feasibility of using eco-enzyme in improving stream water quality. The enzyme solution which was prepared from vegetable waste fruit peels, jaggery and fresh water. In this study water sample was collected from river 'Mulla-Mutha', Pune. The water sample collected was analyzed with treatment of various concentration of eco-enzyme for its Dissolved Oxygen (DO) level, Biochemical Oxygen Demand (BOD) level, Chemical Oxygen Demand (COD) level. Based on the results obtained, the optimum concentration of eco-enzyme to act effectively in treating river water samples is 5ml : 1000ml to balance the properties of stream water.

Index Terms – eco-enzyme, garbage enzyme, bio enzyme, vegetable waste, fruit peels

I. INTRODUCTION

River water is a type of surface water found on the surface of the earth just like rivers, streams, and wetlands. This surface water quality of river is subject to frequent and dramatic changes as the result of a variety of activities. These activities could be due to human activities or natural occurrence. Typical reasons for poor water quality in river are such as discharge of municipal raw wastewater, treated manufacturing industrial sector, storm water runoff or other nonpoint source runoff. However state that deterioration in water quality of river is largely caused by green algae which lead to eutrophication where a body of water develops a high concentration of nutrients normally in the forms of nutrients and minerals. Therefore this kind of pollution of river leads to serve concern for unsuitable activities as it water quality does not achieve the requirement stated in interim national water quality standards for India.

Waste is a material that is wasted from all the results of human activities or natural processes that are not utilized. Based on the form the waste is classified into three parts one of which is solid waste which is often called the garbage. This process includes mixing of water, organic waste and orange fruit peels and jaggery in a certain ratio that is 10:3:1 in an Air tight container for 3 months and every 5 days gases from the container are to be released. After 3 months the solution and the remaining solid waste in container are drained and separated. The final eco-enzyme liquid is obtained after filtration and removal of the residue. It is the process of fermentation with the key ingredient of Jaggery that is metabolized by bacteria into alcohol which is subsequently reduced to acetic acid and orange fruit peels give it a pleasant flavored smell which can change the unpleasant odour of the river water into flavored scent.

The major aim of wastewater treatment is to achieve maximum efficiency with constant improvements in using the lowest cost, time and area. In wastewater treatment system, additives may be added into so that specific pollutants may be degraded to a higher degree within a shorter time. Additives in the wastewater treatment are those available as biological and chemical. Chemical additives may be harmful to the environment. To balance the main elements in water like BOD level, COD level and pH value of the river water coming for treatment and reduce the load on treatment unit.

This project is an attempt to give primary treatment to domestic waste water in a specially designed stabilization Tank with the help of addition of eco-enzyme and effective microorganisms which will help to reduce further treatment used. Thus by using the stabilization tank we can treat the waste water by process of settlement.

II. RESEARCH METHODS

This study included experimental research with quantitative descriptive methods due to the treatment of experimental group to perform preparation and identify the changes in the properties of water at specific interval of time. The waste was collected from the KJES Institute canteen, Pune which was further then mixed in the air tight plastic bottle with ratio of 1:3:10 in which 1 part is jaggery, 3 parts orange peels, and 10 parts water. Jaggery was taken 100 grams, 300grams of orange peels and 1 liter of water. This air tight plastic bottle was kept for 3 months for fermentation and after every 5 days gasses formed in the bottle were released.

After completion of the fermentation process the residual substances in the solution were drained out and again the bottle was kept air tight for 1 month fermentation to get concentrated properly.

Test was conducted on the water after adding eco-enzyme and before adding eco-enzyme. The rate of dilution was changed for every test, the rate of dilution used in the test were 10 ml : 1000 ml and 5 ml : 1000 ml. All tests were conducted

at room temperature at the time of test every time room temperature was measured. The enzyme was allowed for digestion for period of 5 days to affect the river water sample.

| Laboratory tests | Dilution of eco-enzyme in river water sample | Parameters monitored | Testing period |
|------------------|--|-----------------------------|--|
| Phase 1 | | BOD, COD, pH, Chlorides, DO | Before adding eco-enzyme tested daily |
| Phase 2 | 10ml :1000ml | BOD, COD, pH, Chlorides, DO | After adding eco-enzyme ,after 5day digestion period |
| Phase 3 | 5ml:1000ml | BOD, COD, pH, Chlorides, DO | After 5 days digestion period tested daily. |

Table 1: Laboratory tests for dilution of eco-enzyme

All water samples were placed in same location in the, subject to the same room temperature, Phase 1 tests are aimed at to obtained the results of the parameters of river water before adding eco-enzyme and check the actual values of the parameter to compare the results. Therefore, in Phase 2 it was found that DO, COD and chlorides were effectively stable after 10ml dilution but the BOD was slightly increased. Phase 3 tests we found that the BOD was effectively decreased from the water after 5ml dilution. Similarly 5 days digestion period was monitored and daily tests for (DO) Dissolved oxygen was carried out to monitor the change in DO and BOD, COD. These tests were conducted for determining best eco-enzyme dilution for balancing these 3 parameters of the water.

III. RESULTS

i. Phase I test:

Due to space constraint the water quality test results are presented in tabular form in table 2. The test was carried out for pre digestion of eco-enzyme in the river water sample. As shown the river water sample is alkaline with pH of 8.7.

The BOD, COD were considerably in the permissible limit at 135 mg/l BOD and COD 280mg/ l. This BOD, COD level was quiet high in the river water. Chloride contain in the river water sample 200mg/l which was also high as compared to fresh water or domestic water used in household.

| Tests | Sample water I | Sample water II |
|----------------|----------------|-----------------|
| pH level | 8.7 | 8.68 |
| DO | 4 | 3.8 |
| BOD mg/l | 135 | 130 |
| COD mg/l | 280 | 290 |
| Chlorides mg/l | 200 | 195 |

Table 2: Laboratory test for Phase 1

ii. Phase 2 test:

The phase 2 tests were conducted on dilution rate of 10ml : 1000ml as shown in the table 3. the results shown in table 3 indicates that the BOD level in the water slightly increased due to 10ml dilution of eco-enzyme solution and the COD, Chlorides and pH values were comparably reduced to COD to 70 mg/l and chlorides to 145 mg/l. in this phase 2 test we can see that the dosage of 10ml dilution is slightly concentric for BOD and pH values. The tests were conducted after digestion of 5 days with 2 samples considering the average of the both.

| Tests | Sample water I | Sample water II |
|----------------|----------------|-----------------|
| pH level | 6.42 | 6.4 |
| DO | 5.5 | 5.1 |
| BOD mg/l | 75 | 72 |
| COD mg/l | 70 | 77 |
| Chlorides mg/l | 145 | 140 |

Table 3: Laboratory test for Phase 2 for dilution of 10ml eco-enzyme

iii. Phase 3 test:

The phase 3 tests were conducted on dilution rate of 5ml : 1000ml as shown in the table 4. the results shown in table 4 indicates that the BOD level in the water has decreased due to 5ml dilution of eco-enzyme solution as compared to the 10 ml dilution tests as the bacteria level has reduced and the COD, Chlorides and pH values were comparably reduced to COD to 65 mg/l and chlorides to 120 mg/l. in this phase 3 test we can see that the dosage of 5 ml dilution is optimum for BOD and pH values. The tests were conducted after digestion of 5 days with 2 samples considering the average of the both same as the above process. The dilution was correct for balancing the primary parameter of the river water.

| Tests | Sample water I | Sample water II |
|----------------|----------------|-----------------|
| pH level | 6.82 | 6.87 |
| DO | 5.3 | 5 |
| BOD mg/l | 65 | 68 |
| COD mg/l | 65 | 65 |
| Chlorides mg/l | 142 | 140 |

Table 4: Laboratory test for Phase 3 for dilution of 5 ml eco-enzyme

IV. CONCLUSION

The water quantity is an important element to keep the ecosystem of water body in balance. Despite river does not receive much attention of pollution from the public, its actual status of pollution should not be ignored as it is part our environment. Therefore the study emphasizes on the perpetration of eco-enzyme from fruit peels to improve the water quality of river.

Based on the result and discussion of parameters such as DO, BOD, COD, nutrient availability, bacteria growth curve, and property of eco-enzyme this shows a significant evidence of the eco-enzyme effectiveness and efficiency. The findings of the study shows that eco-enzyme with 5 ml : 1000 ml concentration proved to be the idea dosage for the treatment as its percentage of COD and BOD removal was more significant. Results of this study demonstrate the potential of eco-enzyme in water treatment purposes as well as an alternative treatment method that require less cost and expertise to operate. Eco-enzyme property which directly determining the functionality and effectiveness of eco-enzyme in treatment water.

V. ACKNOWLEDGEMENT

The authors wish to thank and acknowledge the 'Trinity Academy College of Engineering, Pune' for its assistance provided during the course of this study.

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