

Bio-Activator – As A Solution of Biological Treatment Problems in Dairy Industries

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Abstract

Dairy industries are one of the fastest developing industries of India, but at the same time it is one of the largest amounts of wastewater generating industry, both in case of quality and quantity. Dairy industry has many processes like Milk receiving/storage Pasteurization; Curd, butter milk, ghee production; Floor and lines washing and sanitizing, their cleaning operations and milk processing demands water and generates wastewater. The wastewater includes dissolved sugars, proteins, and fats. They are organic in nature and also bio-degradable. It is estimated that dairy industries creates approximately 2.5 to 3 liters of wastewater per liter of milk processed. Due to high organic loading, BOD (Bio-chemical oxygen demand) and COD (Chemical oxygen demand), biological treatments for wastewater are suitable for dairy waste water. Effluent characteristics of dairy get change due to production of different products on different days, which make the biological treatment process less effective. Also, with increase in production in dairy the generation of wastewater increases which leads to expansion of the ETP (Effluent treatment plant), that is costly solution and if ETP is not expanded the quality of treatment gradually decreases. When poorly treated water discharges to the water body causes water pollution. Hence there is need to improve effectiveness of biological treatment process of dairy effluent. Bio-Activator consists of naturally occurring micro-organisms attached to organic compost. It positively promotes and enhances the activated sludge process. Bio-Activator is completely organic and eco-friendly material that can solve the problems in Biological treatments in dairy Industries.

Keyword- Dairy Industry, Effluent Treatment Plant, Biological Treatments, Bio-Activator

I. INTRODUCTION

Quick expansion of industries has not only enhanced the productivity but also resulted in the production and discharge of toxic substances into the environment, creating health hazards and effected normal operations, flora and fauna. These wastes are capable pollutants when they produce damaging effects on the environment and commonly released in the form of solids, liquid effluent containing a spectrum of organic and inorganic chemicals. Thus pollution is an essential evil of all development. To fight the excess of environmental evils economically, efficient and environmentally secure organic waste treatment technologies are needed.

Like other industries that have major waste disposal problem, the milk industry is faced with the view of having a large number of comparatively small treatment plants. Dairy plants are considered as 'wet industry' because they consume large volumes of water, which is used for very diverse purposes. As a result, dairy plants discharge large volumes of wastewater. Liquid effluent from milk industry creates environmental issues like soil and water pollution. From dairy industry, environmental issues like generation of oil and grease play a major threat to the environment Other than lactose, another pollutant component considering the project demand by 2020 A.D., the dairy industry in India is expected to expand rapidly. Poor design, operation or treatment systems causes poorly treated wastewater with high levels of pollutants that creates major environmental problems when discharge to surface water or land.

The dairy industries generate approximately 2.5 to 3 liters of wastewater per liter of milk processed from different production processes like Milk receiving/storage, Pasteurization, Curd, butter milk, ghee production and Floor and lines washing and sanitizing. Due to high organic load, BOD and COD, dairy wastewater can be effectively treated by biological processes both aerobic and anaerobic. Biological treatments includes activated sludge process, aerated lagoons, trickling filters, sequencing batch reactor, up-flow anaerobic sludge blanket reactor, anaerobic filters, etc. Due to fluctuating nature of wastewater from dairy industries, these biological treatments don't work efficiently always. Hence, there is the need for highly specialized strains for efficient treatment of wastewater. This review is to study problems in dairy's ETP and to suggest enhancing material for efficient biological treatments in dairy's ETP.

II. AVAILABLE BIOLOGICAL TREATMENTS FOR DAIRY WASTEWATER

In the dairy industry wastewater treatment process is based on five steps: screening, sand trap/oil and grease separation in a tank, flow equalization in a tank, biological process, and tertiary treatment. Following are several biological treatment methods that are commonly used for Dairy wastewater.

A. Activated Sludge Process

Activated sludge process is most commonly used biological treatment process in dairy industries. Activated sludge systems treat wastewater containing high organic loading with high removal efficiency in a limited space compared to other methods. The effluent from the primary settling tank is mixed with a dose of activated sludge and is aerated in an aeration tank for a period of some hours. During the aeration, the micro-organisms in sewage multiply by assimilating part of the influent organic matter.

B. Aerated Lagoons

Aerated lagoons are artificial ponds for wastewater treatment. Mechanical aerators provide artificial aeration in this system to achieve high degradation rate of organic substances in wastewater. The mechanical aeration is done by motor driven submerged, floating or fixed aerators or air diffusers.

C. Trickling Filters

Trickling filters consists of a fixed bed of rocks, gravel, ceramic, or plastic. Over them wastewater flows downward and creates a layer of microbial film to grow that covers the bed of medias. Aerobic conditions are maintained by diffusion either by forced air flowing through the bed or natural convection of air if the filter medium is porous. The microbial film metabolise using nutrients of wastewater.

D. Sequencing Batch Reactor

Sequencing batch reactor (SBR) systems are a modification of the conventional activated sludge process. SBR system acts as semicontinuous systems where wastewater is fed batch-wise. An SBR serves as an equalization tank, aeration tank and clarifier in one vessel. Therefore, secondary clarifiers and return sludge pumps and piping are unnecessary.

E. Up-Flow Anaerobic Sludge Blanket Reactor

The up flow anaerobic sludge blanket is a high-rate system, with very high organic loading rates. A UASB system typically comprises two tanks, the conditioning or acidification tank and the sludge blanket reactor. UASB sludge is unique and a key component of a successful system, as are the influent distribution system, and particularly the solids/liquid/gas separator.

F. Anaerobic Filters

Anaerobic filters are high rate systems that use filter media and operate in either up flow or down flow modes. Anaerobic filters are suited for low solids wastewaters.

III. PROBLEMS IN DAIRY EFFLUENT AND TREATMENT

There are several common problems in dairy wastewater and that affects it treatment system.

- Dairy wastewater contains strong and irritating odour.
- Production of all milk products doesn't take place at the same time. Depending upon the product, characteristics of effluent get change.
- Variation in organic loading decreases efficiency of biological treatment.
- Shock loads occurs due to machinery failure, leakage or other reason can cause complete failure of biological treatments
- Due to increase in production or expansion of dairy, amount of wastewater generates per day increases. If the plant capacity is not enough, that can lead to poorly treated wastewater and expansion of the whole ETP may not be economical.

IV. SOLUTION & MATERIAL

Due to these huge problems in biological treatments in dairy ETP, there strong need of solution to enhance the biological treatment and make them more effective.

Bio-Activator is an excellent material that can be used. Bio-Activator consists of naturally occurring micro-organisms attached to organic compost. It quickly stimulates the bacteria in situ so that the waste quickly decomposes. In the process it prevents the generation of smells. Bio-Activator is entirely natural and it does not contain any hazardous or poisonous chemicals or enzymes, it is eco-friendly product. Bio-Activator prevents the generation of odors, increases metabolic rate of bacteria, improves the ability to handle shock loads in ETP, improves bacterial breakdown of organic material. It is most effective on organically overloaded treatment plants it increases treatment plant capacity dramatically. Bio-Activator enhance the

performance of different biological processes like activated sludge process, sludge lagoons, oxidation ponds etc. Bio-Activator has given great results in odor removal in case of dairy ETP.

V. CONCLUSION

- For effectiveness and enhancement of biological treatment in dairy ETP, Bio-Activator is very reliable solution.
- It is eco-friendly and economical material that increases plant capacity and reduces the chances of expansion of ETP.
- Common problems in dairy ETP like variable loading, shock loads, odor problem and also excessive sludge generation can be controlled by use of Bio-Activator.
- There is scope of further research regarding effects of Bio-Activator on different parameters of dairy wastewater and study of optimum quantities of Bio-Activator for different type of wastewaters.

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