Dairy Wastewater Conversion into Liquid Biofertilizer

Applications

The present invention describes a microbial biofertilizer production plant with sustained performance and little maintenance that converts the entire milk processing plant wastewater into liquid biofertilizer which in turn replaces the use of fresh water and chemical fertilizers. The process can replace the existing labor intense wastewater treatment process for milk processing plant and has applications in

- Dairy Industry
- Waste Management
- Organic dairy farms
- Hydroponic farms
- Effluent Treatment Plants
- Milk Cooperative Societies

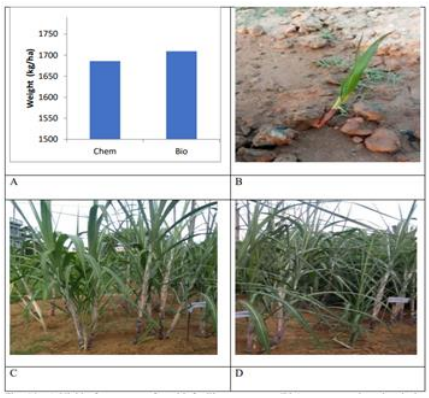

Fig. Field Trials of Biofertilizer Treatment – Sugarcane:
A) Yield of sugarcane from biofertilizer treatment as compared to Chemical Treatment,
B) Two leaves stage of Sugarcane plant after sprouting,
C) Image of field trial of sugarcane plant from chemical fertilizer application,
D) Image of field trial of sugarcane from biofertilizer application.
(P value – 0.653)

Intellectual Property

Bio-fertilizer production from bacterial consortium

Applicant - Dr. Shaon Ray Chaudhuri
Indian Patent - 201731003023 (Filed)
NBA Approval

Inventors

Dr. Shaon Ray Chaudhuri,
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Dr. Ashoke Ranjan Thakur

Waste to Wealth Innovative Technologies LLP, Tripura

Categories of this invention

- **Water Treatment**
- **Lifesciences**
  - Biotechnology
  - Environment
    - Bioremediation
      - Dairy Effluent

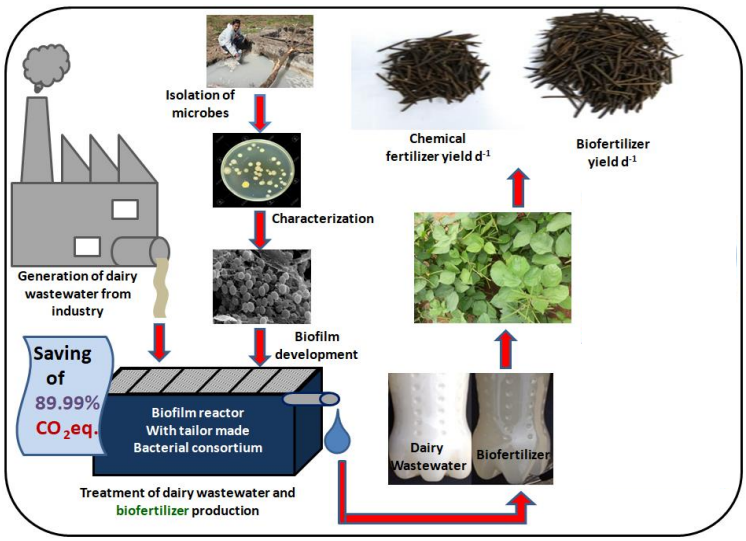
Technology

Dairy wastewater (DWW) is nutritionally rich and extremely hazardous to the environment if discharged untreated. The conventional treatment is time- labor-, and energy-intensive. The current technology provides a solution using a tailor-made microbial consortium which at particular combinations and weight ratios have the ability to convert DWW into a liquid bio-fertilizer. The consortium is developed using bacterial strains from different environmental origins that could **reduce 93% nitrate** with simultaneous production of ammonia (626 µg/100 ml) within **20 h in non-aerated**, immobilized conditions as compared **to 82% nitrate reduction** producing 2.4 µg/100 ml ammonia in **96 h with extensive aeration** in a conventional ETP setup.

This DWW treatment reduces space (by 75%) and energy (90%) requirement resulting in **89.9% reduction in CO2 equivalent gas emission**. Furthermore, it provides a synergistic, scalable, cost-effective solution for effluent management, while at the same time provides an effective biofertilizer which enhances plant biomass, yield, agronomic characteristics and plant protection against infestation, and has been tested for **16 types of crops.**

During the field trials, this biofertilizer enhanced yield in the crops of Mung bean, Maize, Black Gram, Sorghum Sudan grass, Aloe vera, Elephant Foot Yam, and Lemongrass as compared to the conventional practice while maintaining the nutritional quality.

Process Workflow



Advantages

Properties	Current Technology	Conventional Technology
Simple one/two step operation	√	X (7 steps)
Retention time only 4-16 hrs	√	X (120hrs)
Energy consumption 3-6kW for 500m3/day treatment	√	X (70kW)
Water Discharge	X	√
Scum to be processes	X	√
Value added product	√	X
Zero Discharge Technology	√	X
Agricultural Sustenance	√	X
Yield Increase	√ (1.04 - 4.38)	X

Fig. DWW Treatment A) In Bench Scale Reactors upto 108 litres /day, B) Pilot Scale in Dairy Farms upto 11m3 /day

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Dairy Wastewater Conversion into Liquid Biofertilizer | Field Trials

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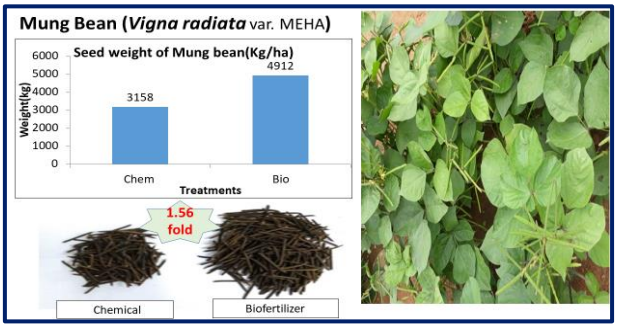

Fig.1 Field Trials of Biofertilizer Treatment – Mung Bean

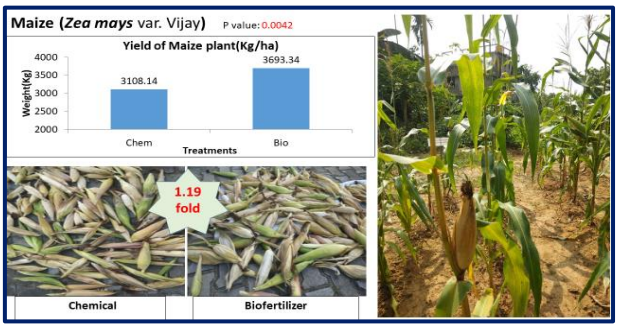

Fig.2 Field Trials of Biofertilizer Treatment – Maize

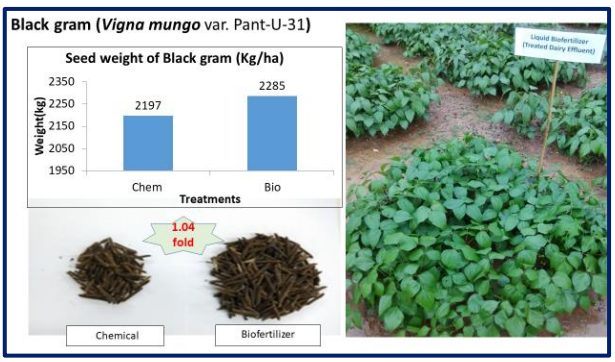

Fig.3 Field Trials of Biofertilizer Treatment – Black Gram

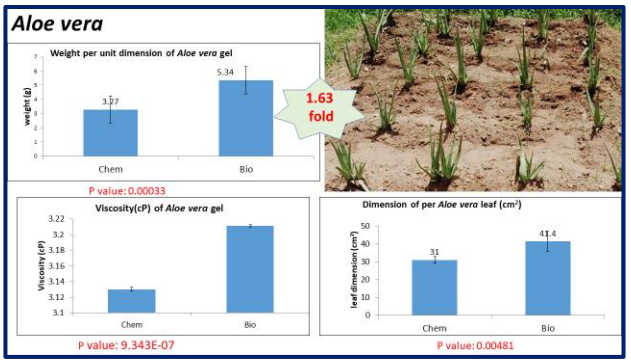

Fig.4 Field Trials of Biofertilizer Treatment – Aloe vera

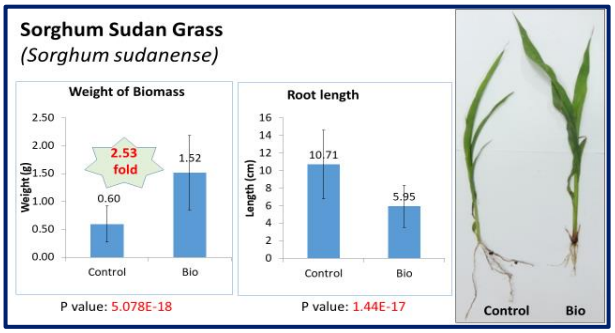

Fig.5 Field Trials of Biofertilizer Treatment – Sorghum

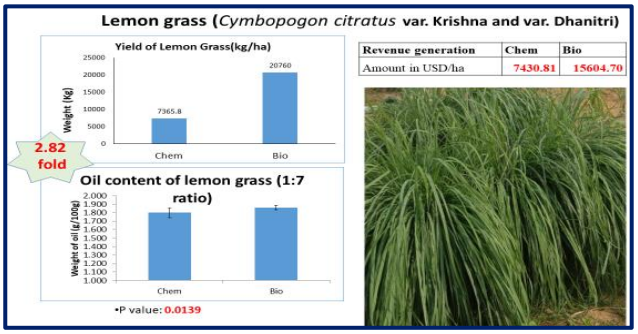

Fig.6 Field Trials of Biofertilizer Treatment – Lemon Grass

Table. Summary of Crop Yield – Chemical Fertilizer Vs Biofertilizer

Figure No.	Crop	Chemical Fertilizer	Biofertilizer
1	Mung Bean (Seed Weight)	3158 kg/ha	4912 kg/ha
2	Maize (Yield/ hectare)	3108.14 kg/ha	3693.34 kg/ha
3	Black Gram (Seed Weight)	2197 kg/ha	2284 kg/ha
4	Aloe vera (Gel)	3.27/ unit	5.34/ unit
5	Sorghum (Biomass)	0.60 (Control)	1.52
6	Lemon Grass (Biomass)	7365.8 kg/ha	20760 kg/ha
7	Elephant Foot Yam (Biomass)	11925 kg/ha	45327 kg/ha

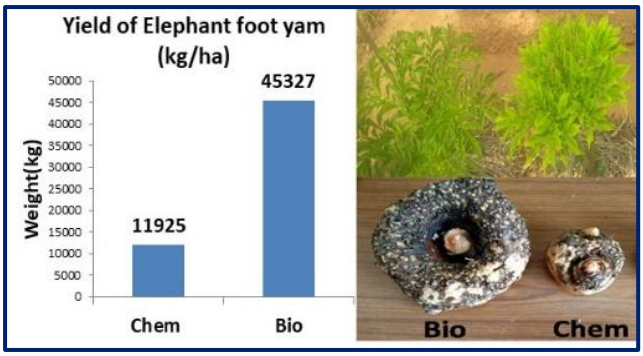

Fig.7 Field Trials of Biofertilizer Treatment – Elephant Foot Yam

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