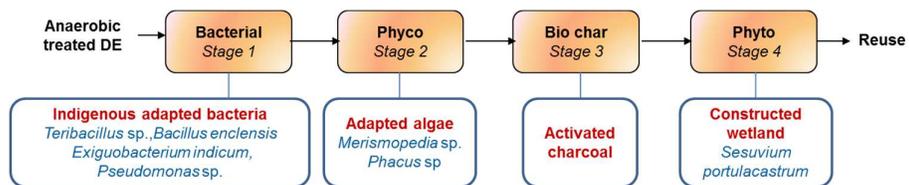


Technology **Sequentially integrated bio-treatment system to enhance distillery effluent (DE) quality and its reuse in agriculture**

Research organization The M. S. Swaminathan Research Foundation (MSSRF) is a leader in the field of food and agriculture among non-governmental research organizations in India. MSSRF's vision is to harness science and technology for sustainable and equitable development.



Description of the technology being developed Cost effective sequentially integrated treatments system combining bacterial, phyco and phyto remediation process for improving quality of Distillery Effluent (DE) to minimize the adverse effects on soil, water, air, human and animal health.



Distillery effluent quality enhanced significantly on reduction of COD, BOD, Colour, TSS, magnesium, Sulphate, Nitrate, Calcium and Phosphate.

Bacterial treatment enhanced pH and melanoidin degradation which enabled penetration of sunlight contributing for adaption and growth of algae. Increased removal capacity is due to indigenous adapted bacterial consortium, optimum retention time, aeration and continuous mixing of the effluent.

Growing algal cells *Phacus* sp. and *Merismopedia* sp. favoured degradation, adsorption and settlement of contaminants. High production of EPS indicates the involvement of EPS in protecting the algal cells against highly adverse conditions.

Activated charcoal removes the contaminants and biomass before phyto remediation i.e. it acts as filter media.

Further, the halophytes are used for phyto-remediation in constructed wetland to reduce salinity levels of treated water.

- Benefits**
- Removal of organic, inorganic contaminants by adsorption, uptake, sedimentation and supply of oxygen, reduced odour and colour by 60% as well as COD & BOD by 85%
 - Active uptake mechanism of algae helps in the removal of inorganic contaminants such as SO_4^{2-} (sulphate), NH_4^+ (ammonia), NO_2^- (nitrite), NO_3^- (nitrate), PO_4^{2-} (phosphate) and Na^+ (sodium) ions. Available of sunlight for algal growth is an indicator of the reduction of melanoidin.
 - Reusing nutrient rich treated distillery effluent in crop cultivation increased production without altering its micro and macro nutrients.
 - Luxuriant growth of halophytes in treatment and reuse reveals that it is potential for reducing salinity in effluent and reclaiming saline land.

Financial viability	<ul style="list-style-type: none">• Low cost green treatment technology that has a cumulative effect in improving the distillery effluent provided they are integrated sequentially.• It has high replication potential in all the distillery units in India.• Recycling the nutrients to the desirable level of crop cultivation produce good yield by saving fresh water.• Minimize the adverse effects on soil, water, air, human and animal health.
Potential users	Distilleries, Bio-treatment technology suppliers, farmers, industrial research community
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