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Biorefinery (lab scale) for low cost biodiesel production with zero waste production technology

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A noleaginous (fat accumulating) oxidative red yeast that can accumulate lipids and β -carotene to more than 50% of its biomass when grown under different carbon and nitrogen ratios was isolated in the lab. It showed the capability to grow in various cheap agricultural raw materials such as sugar cane juice, molasses and extracts of vegetable and fruit peels for lipid production. There was concomitant production of beta-carotenoids (antioxidant) and finally biocompost was produced as an additional useful product.

The technology aims at recycling of all the waste/effluents generated during lipid or carotenoid production. Since the organism uses glycerol as a carbon source, this by-product of biofuel production will also be utilized for further cultivation of the organism. The other waste effluents (cell mass and liquid discharge) would be utilized as nutrient (nitrogen) source for re-generation of the yeast biomass in the bioreactor.

The proposed technology is novel bioprocess for the production of an important biofuel along with other invaluable components as by-products. It is also a low-cost technique in terms of availability of raw materials and processing. The zero-discharge aspect of this method makes it further lucrative because it is environment friendly. Preliminary results reflect upon the efficiency of the process as 'good return on investment' (ROI).

It has an advantage over algae, mycelial fungi and bacteria due to its unicellular and relatively high growth rate with utilizing low cost fermentation media and is also a good source of proteins, lipids, and vitamins if used as animal feed.

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