

# INNOVATIVE BIODIGESTORS FOR OIL SPILL CONTAMINATED SEAWATER & ORGANIC WASTEWATER



Three stage biodigester system

## SINGLE TO THREE- STAGE BIODIGESTER SYSTEM

In each cylindrical digester tank, with diameter  $O$ , 10.5 in; pebbles layer is made with a corresponding height of 4 in; sand layer with a corresponding height of 3 in and finally coconut husks layer with a corresponding height of 4 in. The media used are both organic and in-organic media. In between media, perforated PVC is placed. The coco husks are finally capped with flat stones, to prevent them from floating.

Water is circulated via an electric water pump, and connected to a Reservoir Tank. The system may be used as one tank to multiple tank digesters.

### Performance

The average digestion of diesel oil from a single digester is 49.25%, within the 3 day period of 27 hrs digestion in a 72 hrs incubation period.

Diesel oil was reduced by 85% for a 3-stage digester, suggesting that increasing the number of digester tanks seemed to increase the efficacy of oil digestion.

Preliminary work on the oil wastewater effluents after digestion, suggest that it could be used as liquid fertilizer. Somehow the effects is comparatively similar to the costly liquid fertilizer being used by the Biodiesel from Algae Program.

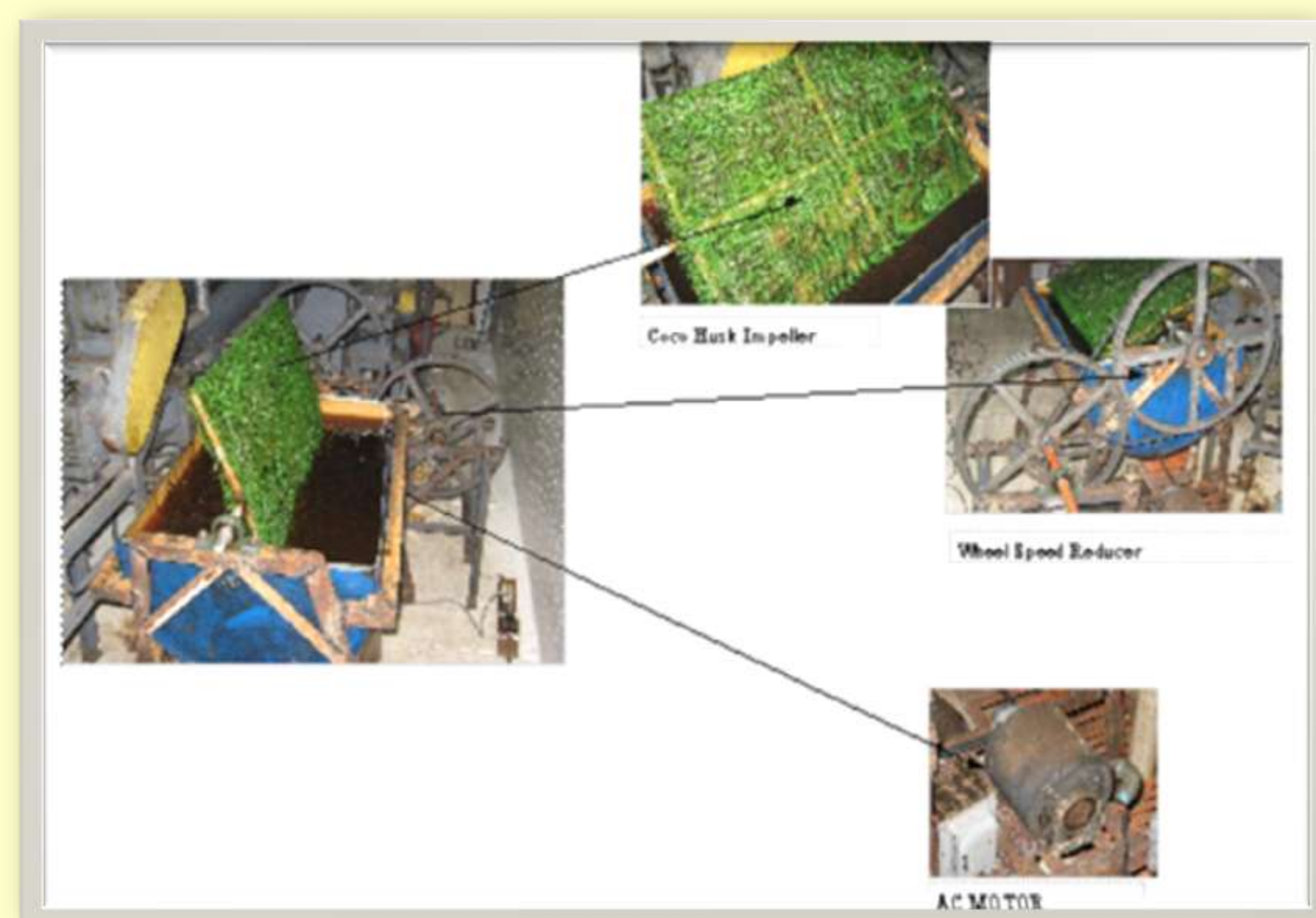
## ROTARY PADDLE WHEEL with Packed Organic Media

The Paddle Wheel Biodigester has two paddle wheel's rotational speeds; 18 revs/min; and 10 revs/min. A laterally cut spent oil drum container, with dimensions 34" x 22" was made as base. The cut drum container could hold 120 l of water, roughly with a depth of 12 in. There are 4 in. contact overlap between the paddle, and the water level in the container. The paddle wings spans 19 in x 30 in, and rotates at the middle. The organic media used are made of coconut husks previously dried. In the paddle wings, coco husks are sandwiched in between, creating 4 compartments in the wing, with paddle thickness of 1.5 ".

### Performance

This prototype is capable of digesting diesel oil up to 73.2% of the original level, within the 3 day period of 27 hrs digestion in a 72 hrs incubation period, which is also the optimum performance level of the machine.

It is also capable of digesting light crude oil up to 47.17% of the original level, within the 3 day period of 27 hrs digestion in a 72 hrs incubation period.



Paddle wheel biodigester

**These biodigestors were developed by the project "Investigations on the Enhanced Bio-Digestion of Light Industrial Oil Contaminated Water and Organic Materials" under the Oil Spill Program, funded by NDCC.**

### General workplan and milestones

- ✓ A marketing plan is to be developed on **how to advertise and promote** the developed biodigestors to intended customers & Institutions.
- ✓ Work also is to be made **to identify potential customers**, and **identify potential applications & utilities of the biodigestors**;
- ✓ DENR regulations mandates that wastewater need to be treated prior to dumping the effluents, according to the Clean Water Act.
- ✓ **Potential customers** includes **all commercial establishments with heavy organic loads** that needs wastewater treatments prior to dumping their wastewater; piggery, chicken farms, village domestic wastewater; etc.
- ✓ Fish aquaculture farms wastewater effluents need to be treated prior to dumping, and pond replenished with water.

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