



PHYCOREMEDIATION BASED OIL SLUDGE DEGRADATION

An Interim Report

TRINITY ENVIRONMENT AND PHYCO RESEARCH CENTRE

TRINITY INTERNATIONAL

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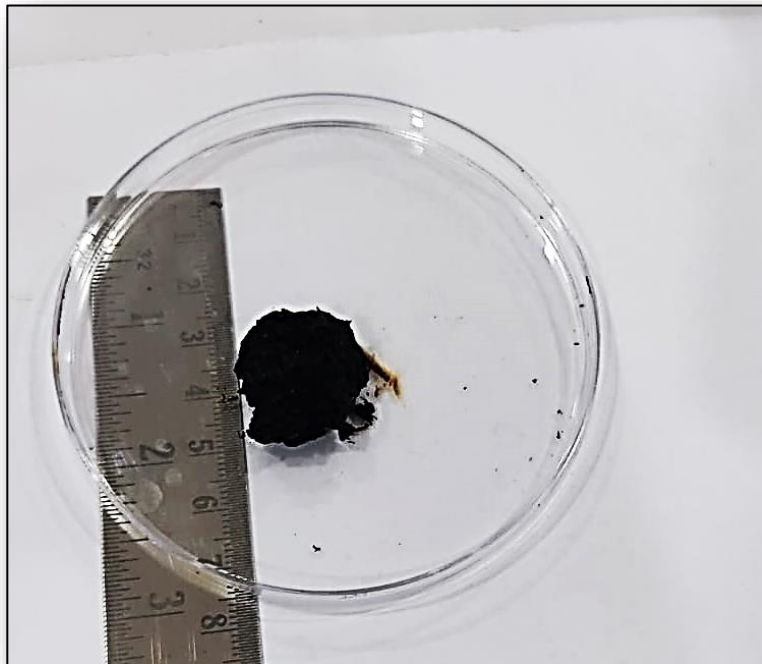
A-53/A, Malviya Nagar, New Delhi - 17



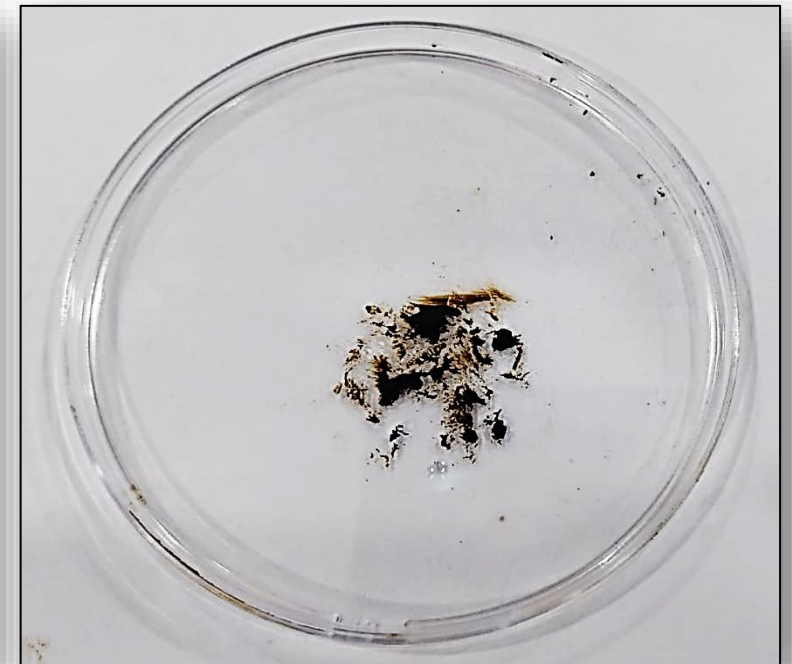
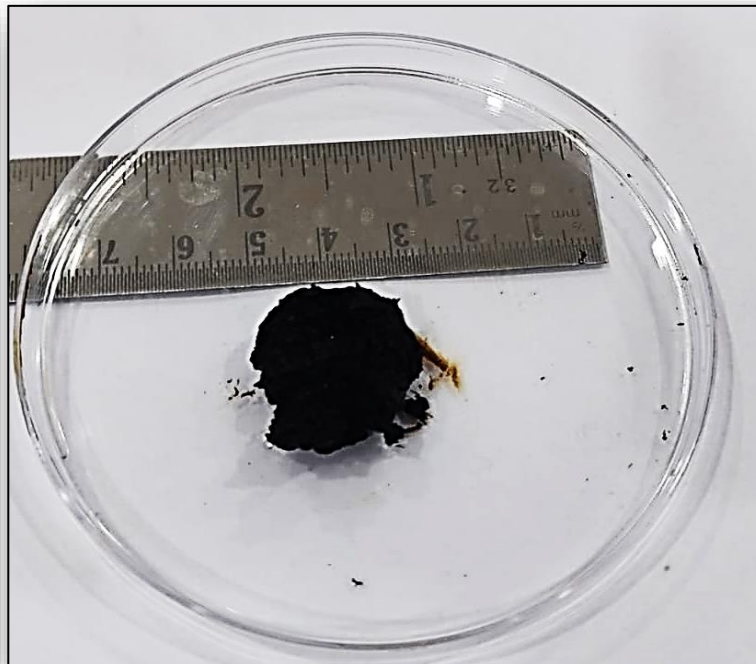
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Experimental Methodology - 1

- 1.23 gm oil sludge was suspended in 50 ml of dense biomass of algae (OD @ 680 nm- ~ 2.5).
- No other carbon source was added to support algal growth.
- The sludge before inoculation appeared as black, sticky mass as shown in pictures.



Dark thick sludge mass before algal inoculation



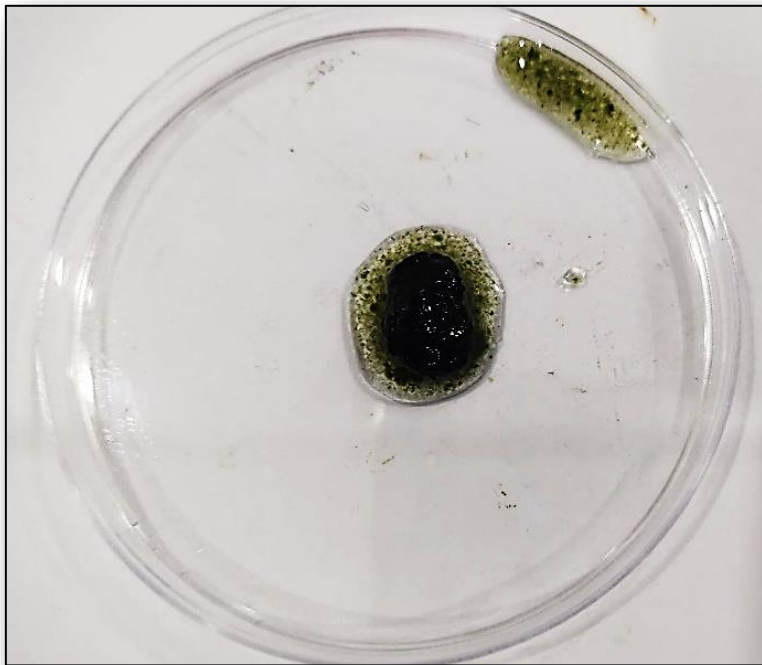
Sticky sludge mass



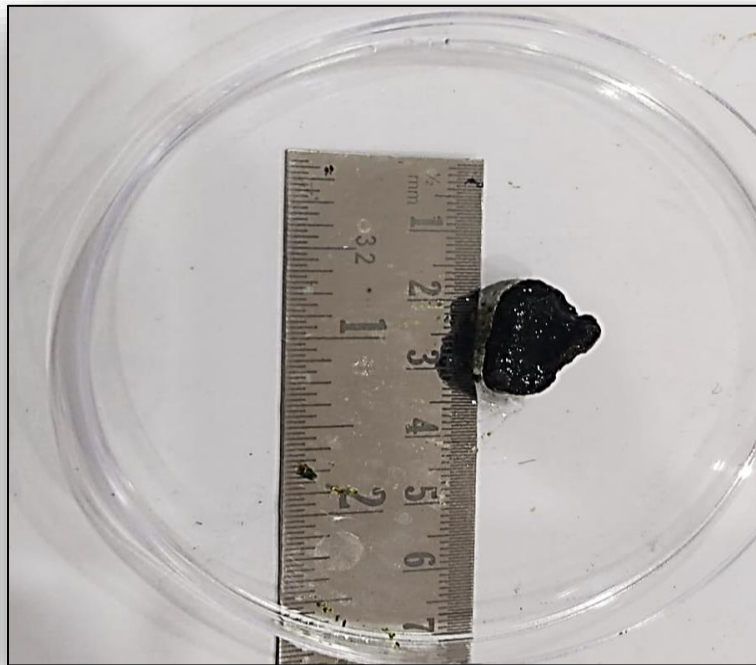
Results

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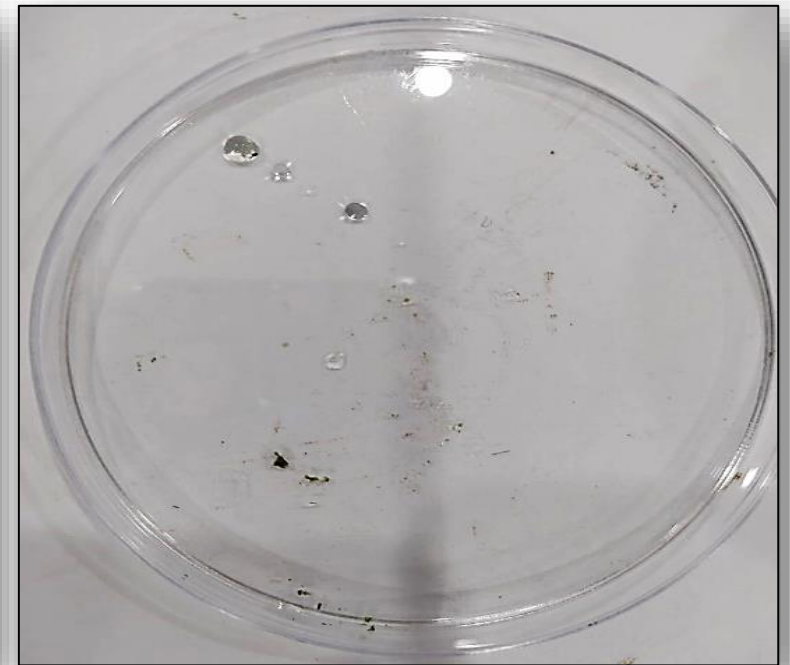
- After 15 Days, clear visual signs of algae growing over the sludge particles can be observed.
- There is significant reduction in the size of sludge mass added initially.



Algal growth of the surface of oil sludge



Reduction in the size of sludge mass in 15 days



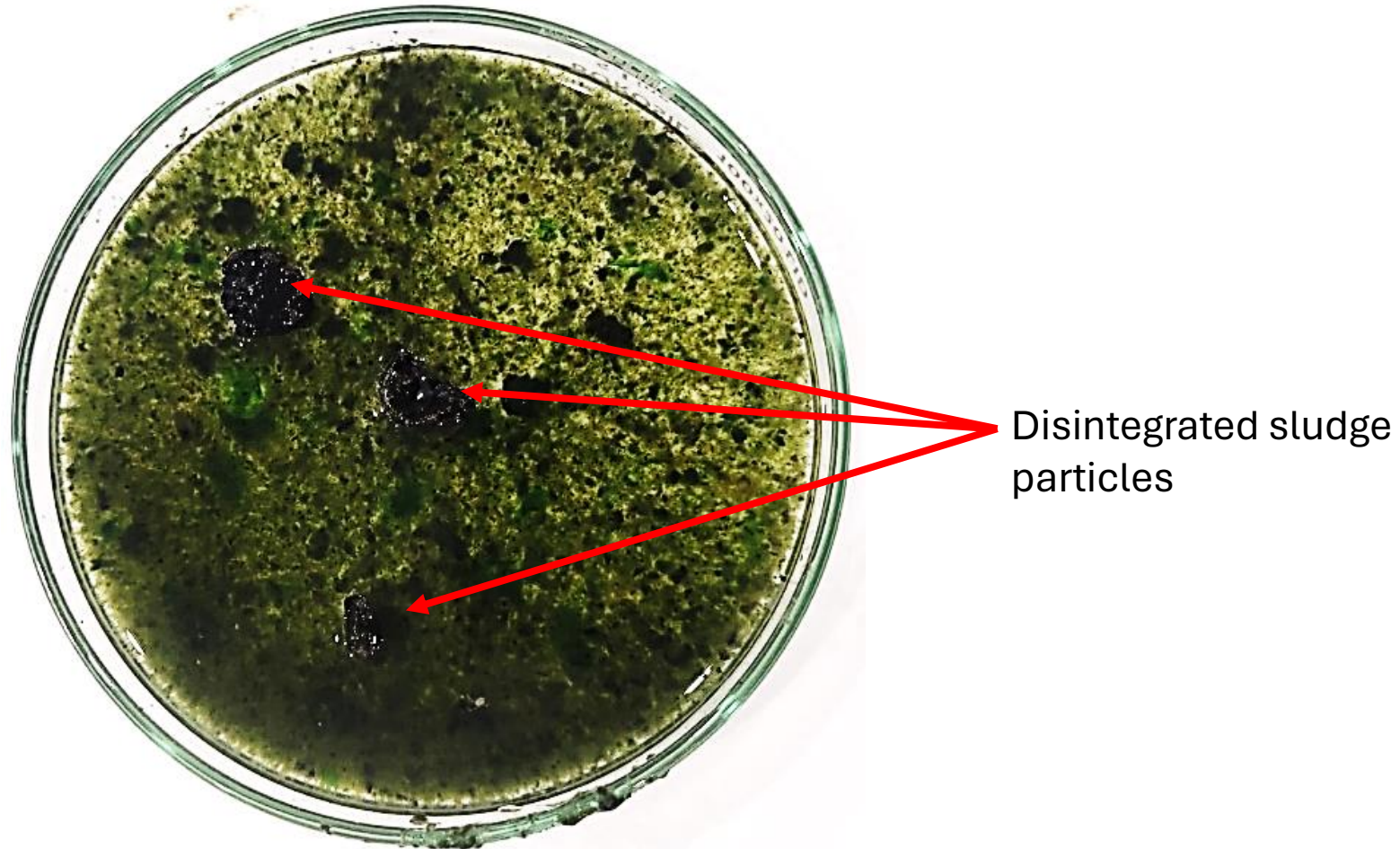
Sludge mass does not stick to the surface



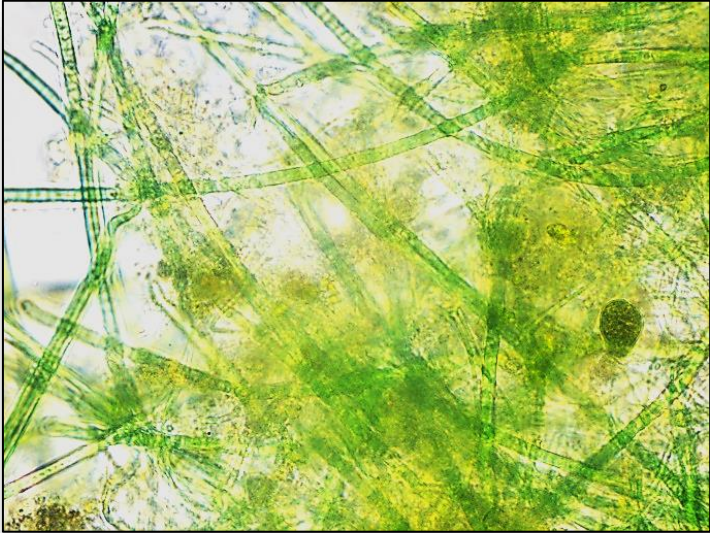
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Results

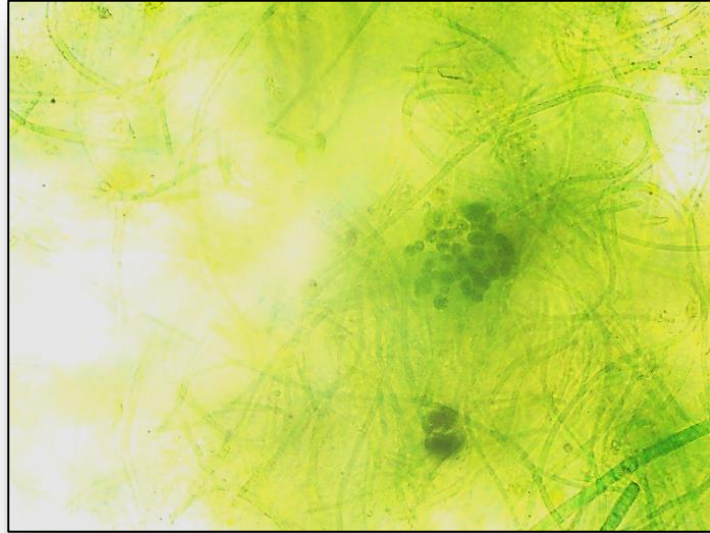
- After 19 Days, disruption of sludge mass can be seen in the solution with dense algae growth.



Microscopy



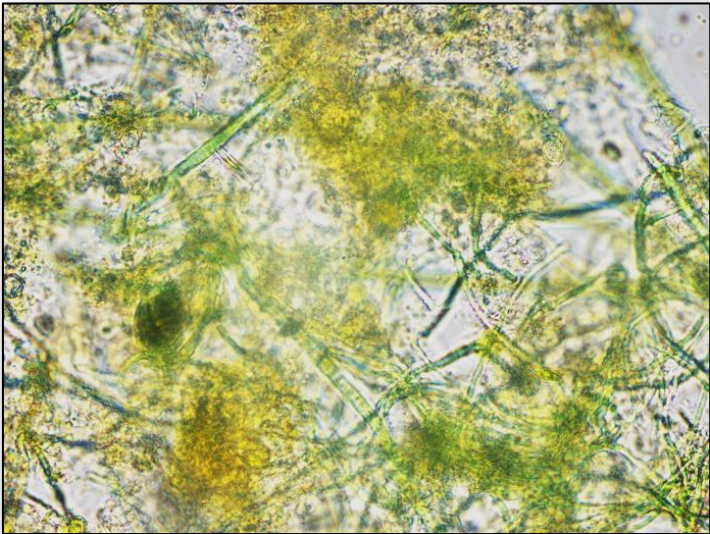
Algae used as Inoculum (Day 0)



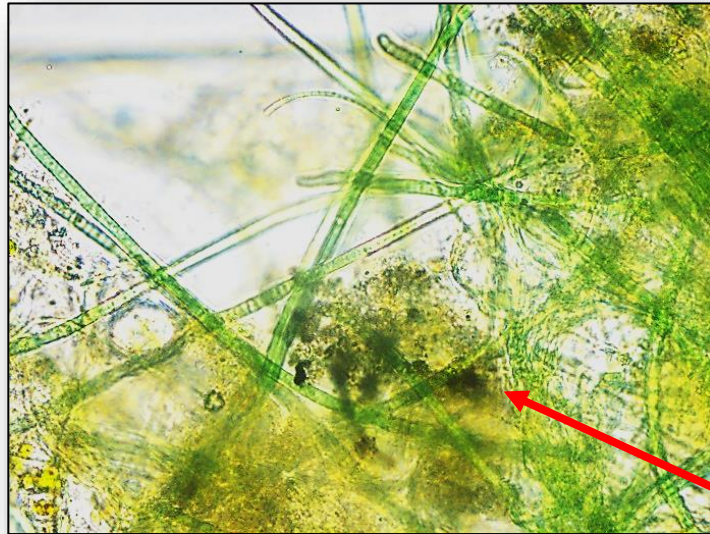
Algae into sludge mass (Day 5)



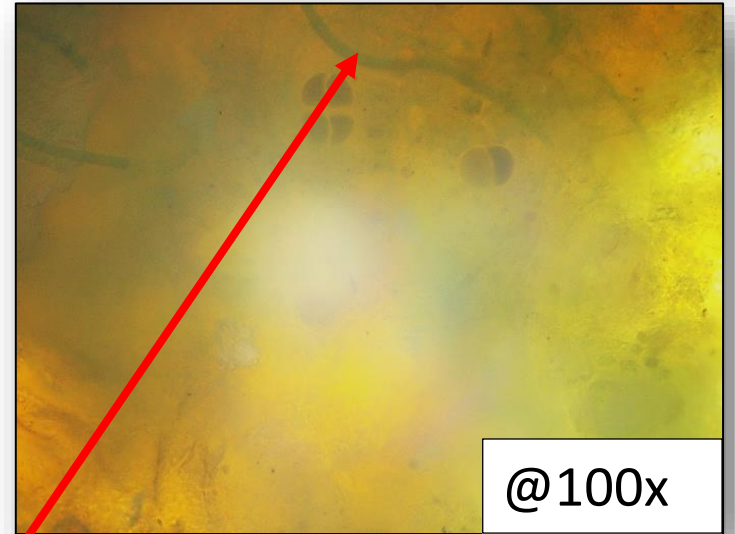
Algae into sludge mass (Day 10)



Algae into sludge mass (Day 15)



Algae growth (Day 19) with arrows showing algae growing on sludge particles

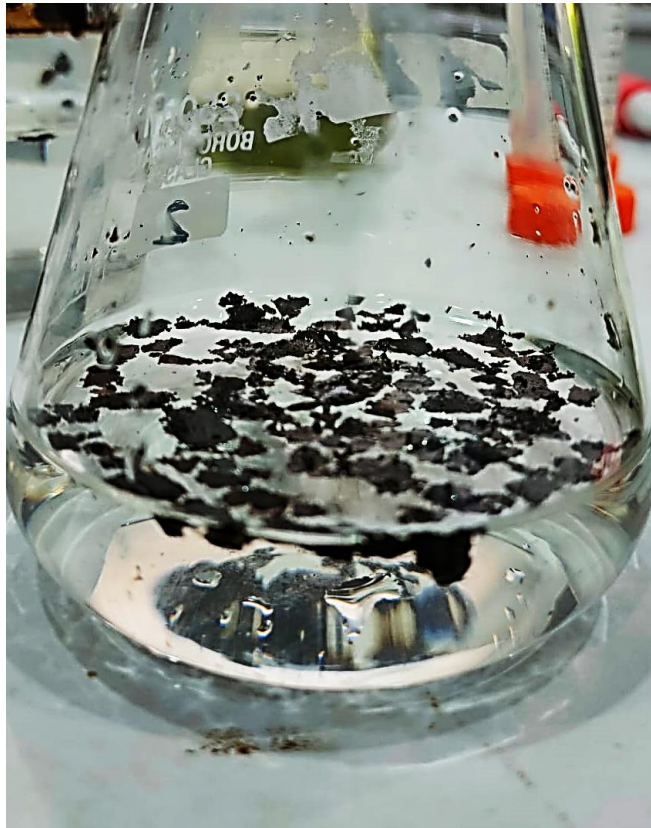


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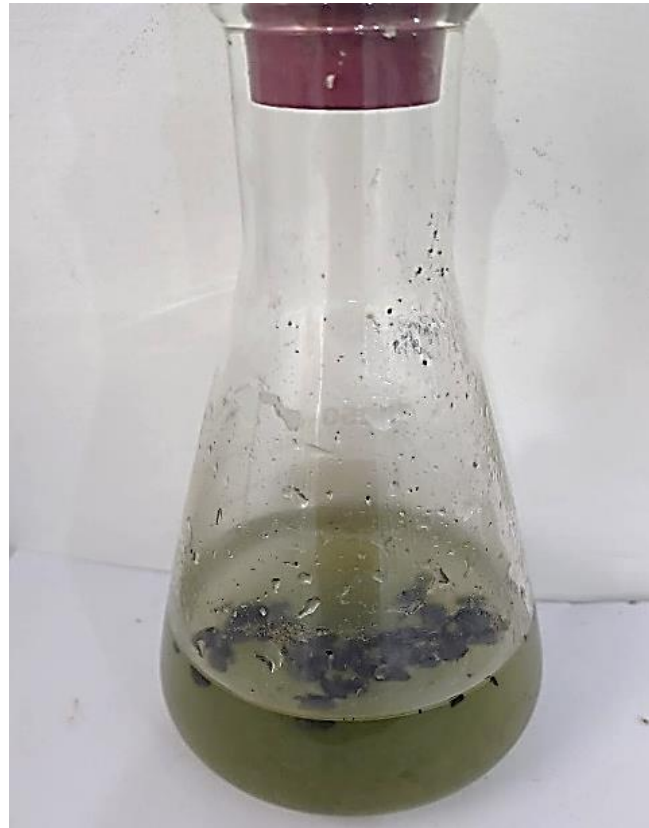


Experimental - 2

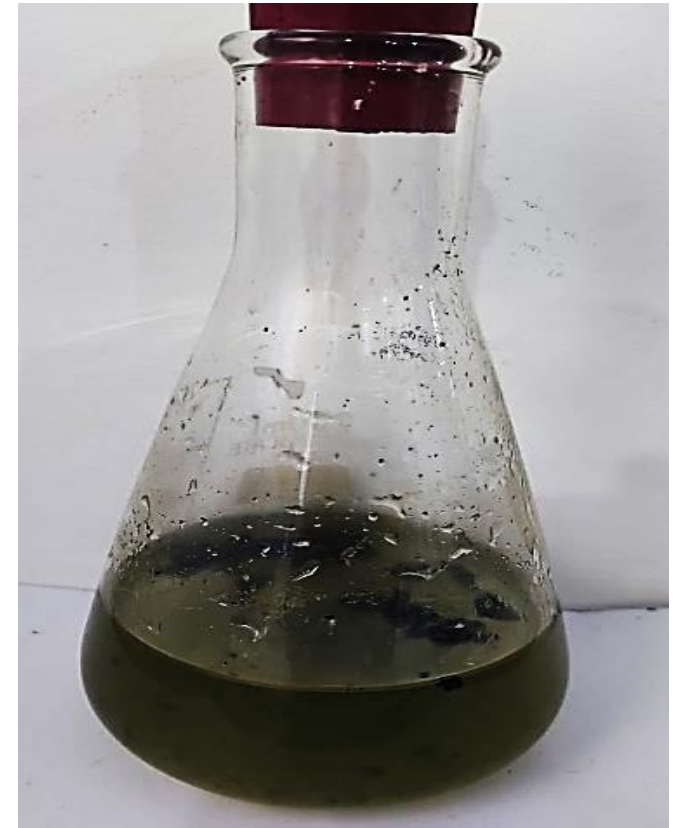
- 2.13 gm oil sludge was suspended in 250 ml of water preheated to 80°C
- After decanting excess water, algae was added to suspended sludge in 1:1 (v/v) ratio.



Suspended Oil sludge in water



Algal dosed Oil sludge (OD – 0.4)

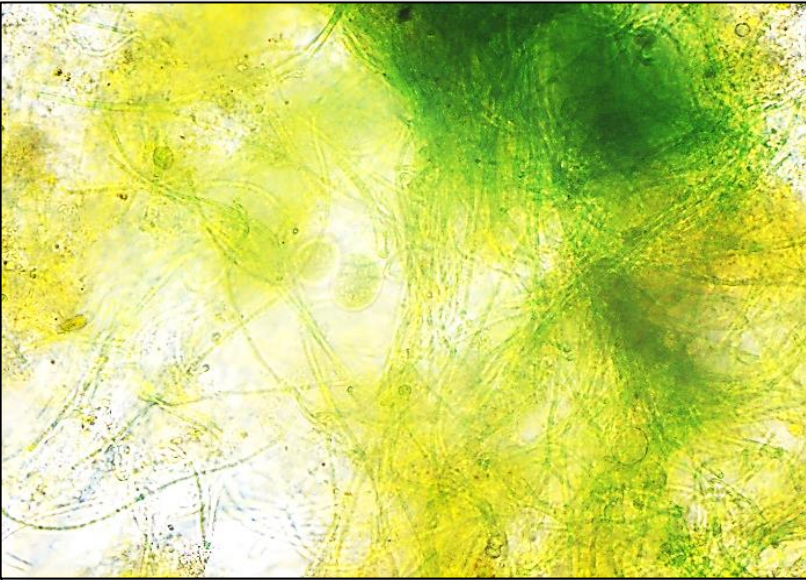


Algal growth in 3 days (OD – 0.6)

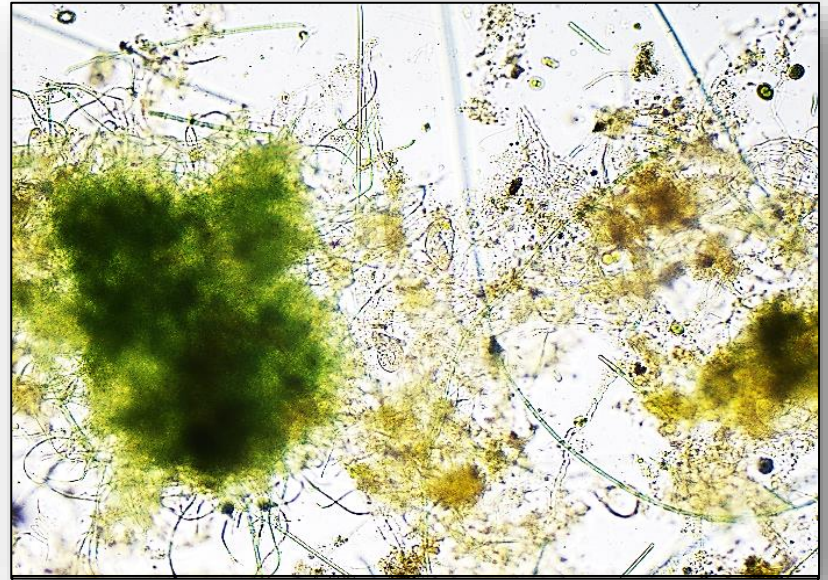


Microscopy

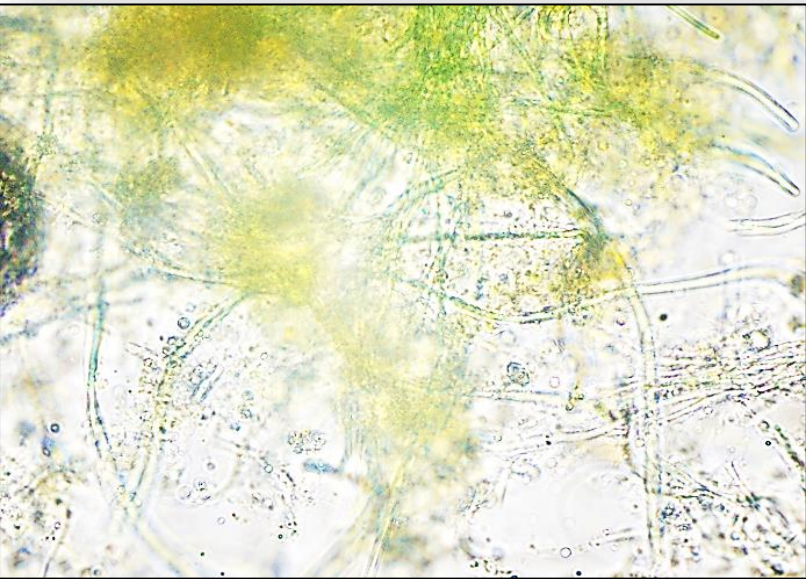
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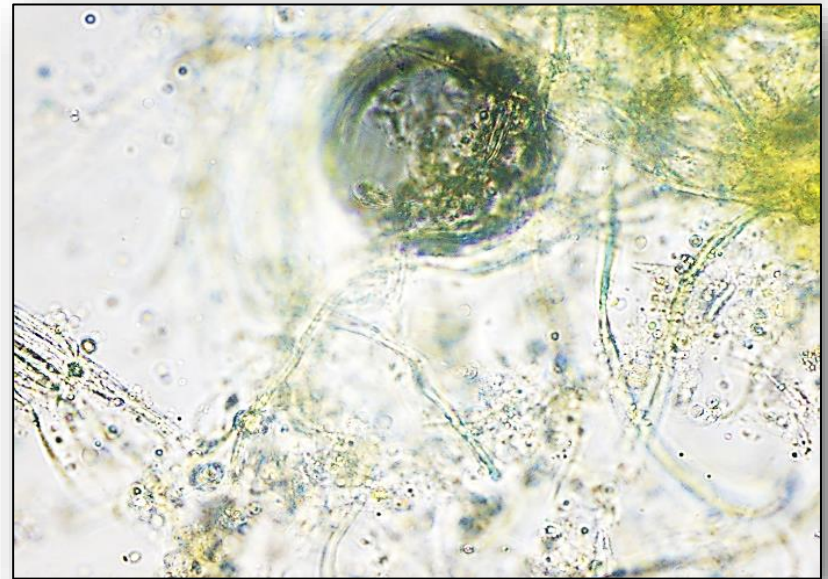
Algal cells just after dosing (Day 0)



Algal growth in oil sludge (Day 2)



Algal growth in oil sludge (Day 3)



Algal growth in oil sludge (Day 3)



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Remarks

Preliminary testing *visually* confirm that algal consortia developed in Trinity Research Lab can effectively degrade oil sludge.

The degradation time is 3 – 4 weeks, but with further optimization can be reduced.

GC-MS analyses will further confirm the extent of sludge degradation and oil accumulation by algae.

Currently we are optimizing the treatment time and quantifying the sludge degradation using standard analytical procedures.

The generated algal biomass opens an important stream for revenue generation. It can either be used to extract algal oils, or the biomass may directly be burnt as fuel