

## THIRD GENERATION BIOFUEL FROM DIATOMS

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## DIATOMS

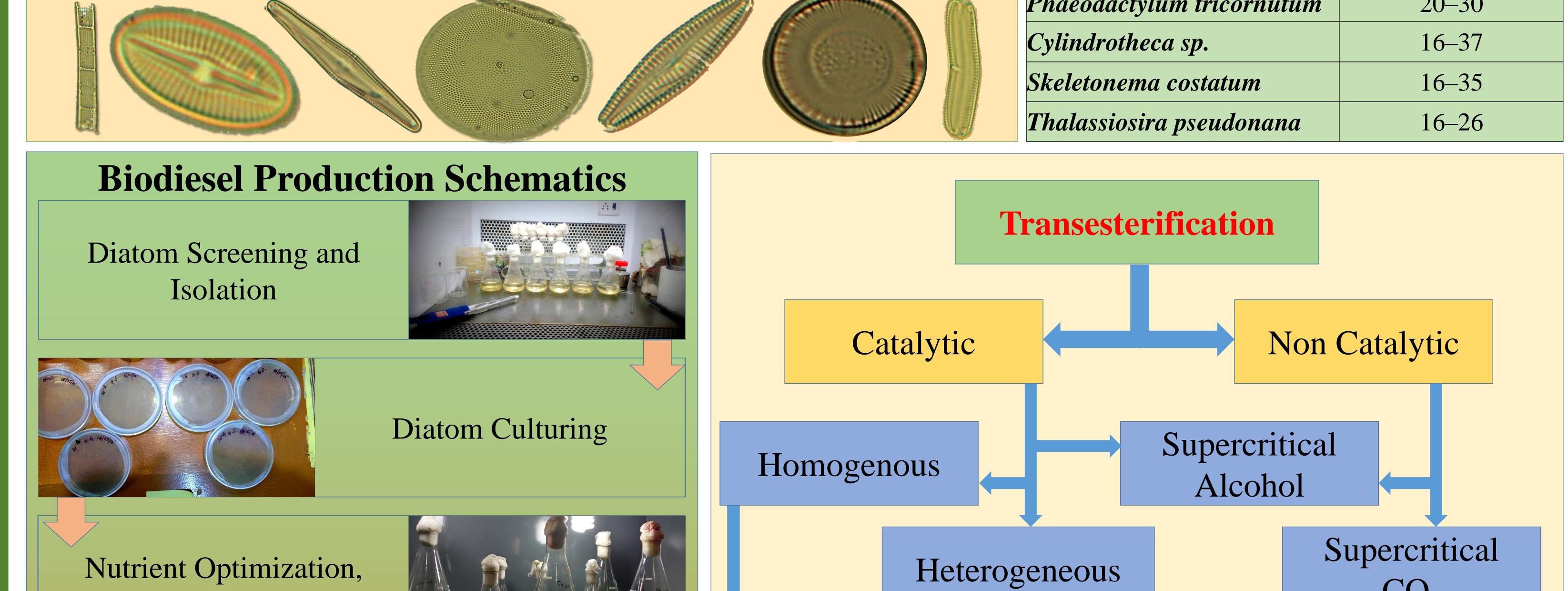
- Diatoms are a major group of microalgae that belongs to the class "Bacillariophyceae".
- There are two classes of diatoms Pennate (benthic) forms and Centric (planktonic) forms.
- These diatoms when starved of nutrients like nitrates or silica, store the energy produced by photosynthesis as lipids.
- These lipids are similar to vegetable oils which could be used as biodiesel feedstock
- Hence diatoms are considered as a potential biodiesel precursors.

Diatom	Lipid content
	(% dry wt)
Nitzschia sp.	45–47
Nitzschia dissipata	28–46
Navicula pellucosa	27–45
Isochrysis sp.	25–33
Thalassiosira weissflogii	22–24
Phaeodactvlum tricornutum	20–30

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## Cultivation & Scale-up





Biomass harvest & Pretreatment Lipid Extraction & Algae Biodiesel **Transesterification** Glycerine **Biodiesel** 

Homogeneous acid catalyst ■HC1  $-H_2SO_4$ **RSO**<sub>3</sub>H (Sulfonic acid) Boron trifluoride  $-H_3PO_4$ 

Homogeneous base catalyst NaOMe, KOMe Metal oxides Supported • NaOH, KOH heteropolyacids H<sub>3</sub>PO<sub>4</sub> Heterogeneous solid Homogeneous immobilized Enzyme/Biocatalyst Enzyme/Biocatalyst Solid acid catalyst (free/mobilized) Lipase

Heterogeneous base catalyst Single component metal oxides Zeolites Supported alkali metal

- Clay minerals
- Non oxides
- $\blacksquare$  H<sub>3</sub>PO<sub>4</sub>

Heterogeneous acid catalyst

+Lipase



Ion exchange resins

Sulfonated solids