ASSAM is a biological hotspot with many rare and endemic plant and animal species. These rich and diverse bioresources of the region are yet to be explored for their potential biotechnological applications.

The North Eastern region of India, particularly Assam, has a rich diversity of freshwater microalgae. Research involving the isolation and screening of freshwater microalgae for potential strains suitable for sustainable production of renewable biofuels and development of technology for mitigation of harmful greenhouse gases is the primary agenda in this region. Although many successful findings have been reported, the microalgae are yet to be commercialized.

Many microalgal species have been isolated and screened for oil content in this region. Among the isolated microalgae, *Botryococcus braunii*, *Ankistrodesmus* sp, *Scenedesmus* sp, *Euglena* sp, *Haematococcus* etc are a few oleaginous microalgae noteworthy for biodiesel production.

Carbon dioxide is regarded as the major atmospheric pollutant that contributes to greenhouse effect. Biological carbon dioxide mitigation approaches have drawn much attention as they lead to production of biomass energy in the process of carbon dioxide fixation through photosynthesis. Microalgae are photosynthetic microorganisms that use solar energy to combine water with carbon dioxide to create biomass. As these cells grow in an aqueous suspension, they have more efficient access to water, carbon dioxide and other nutrients. They offer several advantages over higher plants, including their higher photosynthetic efficiency, higher growth rates and higher biomass production compared to energy crops.

The worldwide search for sources of oil as an alternative to fossil fuels has found a new hope in algal species. Algae can produce more oil per hectare than most other biofuels and can be cultivated on non-arable land, reducing the competition with food crops for land.
and cyanobacteria with significant lipid content. The microalgal species found in Assam hold the potential to serve as a resource base for biotechnological intervention in increasing the bioactive output and initiating commercial exploitation in future.

The rich biodiversity of Chandrapur, Assam can be a veritable treasure house of algal species. It is situated at a distance of about 20 km from the heart of the Guwahati city. The climate of this area is humid and sub-tropic. The average rainfall is 1250 mm. The average minimum and maximum air temperatures are 11.5°C and 37°C, respectively. The relative humidity is around 80%.

Many of these microalgal species can be rich sources of biofuel and can also be utilized for mitigation of carbon dioxide gases through application of suitable technology. With this in mind, the Gauhati University team of researchers led by Professor Mohan Chandra Kalita, Environmental Biotechnology Laboratory, Department of Biotechnology, Gauhati University Assam, is searching for potential biodiesel-yielding strains as well as efficient algal strains to mitigate green house gases.

For this purpose a survey was carried out in the Chandrapur area and samples were collected from nearby aquatic systems like ponds, lakes, rivers, wastewater from factories, wetlands, drainage systems from various industries etc. We found presence of many brick industries in this area continuously releasing poisonous flue gases, which is a major threat to the environment. Other industries and factories are also releasing tons of wastes round the year into the neighbouring river streams.

We collected wastewater samples from drainage systems coming from these industries and found presence of many microalgal strains. Most of the brick industries are surrounded by ponds, lakes and wetlands. Thus, efforts can be made to develop open pond systems or raceway ponds for mass culture of microalgae in such a way that the industrial flue gases can be directly delivered to the pond system for feeding the microalgae cells for biomass production from which biofuel can be produced. This is an industrial refinement system leading to abatement of greenhouse gases and production of biofuel.

Usage of fast growing oleaginous microalgal species could further enhance the feasibility of the technology. Our investigations have indicated the existence of oil-generating microalgae such as Chlorella sp, Haematococcus sp, Scenedesmus dimorphus, Scenedesmus quadricauda, Ankistrodesmus sp and also including Botryococcus brauni which is reported as the highest oil yielding microalgae till date. Further researches are going on to quantify the abundance of their occurrence.

A systemic survey and collection will lead to discovery of more microalgal and cyanobacterial strains in the Chandrapur area. Some of these will have substantial oil content that can be provided to the algal repository and used for bio-diesel production at a commercial scale.

At the Environmental Biotechnology Laboratory, Department of Biotechnology, Gauhati University, Assam the isolated strains are being purified, identified, cultured and maintained in a suitable culture. Further researches will be carried out for their lipid classes that can be identified with the help of gas chromatography and mass spectroscopy. Stress will also be given on search and characterization of efficient microalgal strains for tolerance to high concentration of industrial flue gases and also developing a technology to mitigate factory flue gases to reduce the amount of green house gases in the atmosphere.

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