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## Microalgae of Northeast India for bio-energy and other products of commercial potential based on the biorefinery approaches

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In the recent times, microalgae have been the immense source of attraction as a highly potential and promising renewable biomass source of energy, biomitigation and sustainable valuable products. Biotechnological explorations of the underutilized bountiful indigenous algae diversity of NE India, have potentially opened up a new avenue for sustainable product development including biofuel production. Several microalgae species have been marked as potential source of naturally occurring high valued products such as lipids, vitamins, proteins, carbohydrates, antioxidants, colorants, food supplements and other bioactive molecules. The North East India, apart from being one of the mega biodiversity hotspots in the world, has bestowed upon with vivid freshwater microalgal resources. These diverse bio-resources of the region are yet to be explored to the extent for their potential biotechnological applications. Recent studies carried out are envisaged with the isolation and screening of freshwater biodiesel potential microalgae of the region yielding with the isolation of 24 indigenous freshwater microalgae species, which require further works for possible commercial utilizations and biotechnological applications. Among the isolated microalgae, *Chlorella* sp., *Botryococcus braunii*, *Ankistrodesmus* sp., *Scenedesmus* sp., *Euglena* sp., *Haematococcus* sp., *Navicula* sp., and *Nitzschia* sp. are known to be a few oleaginous microalgae noteworthy for biofuel production. Oil (lipid) contents were quantitatively evaluated in laboratory cultures of isolated *Ankistrodesmus* sp., *B.braunii*, *Scenedesmus* sp., *Chlorella* sp. and *Chlorococcum* species. The lipid content of some of the isolated microalgae species grown in normal BG11 medium were found to be in the range between 11.3–42.0% of dry weight. Analysis of the carotenoid contents of the selected native microalgae species also revealed higher content of lutein, lycopene and astaxanthin, which can be produced as other high valued products for additional fund generation in the course of liquid biofuel production. The liquid hydrocarbon producing green microalgae *B. braunii* is found to be significant among the isolated microalgae, which exhibited hydrocarbon in the range between 21.9-60.7% of dry weight. Some of these isolated microalgae e.g. *Scenedesmus* sp. (8-56% Protein; 10-52% Carbohydrate), *Chlorella* sp. (51-58% Protein; 12-26% Carbohydrate), *Euglena* sp. (39-61% Protein; 14-18% Carbohydrate & 14-20% Lipid) are also reported to contain high percentage of carbohydrate and protein in addition to its moderate to high lipid content, which justify the enough scope for utilization of these species in developing a technology for potential biofuel production and other value added products of commercial potential based on biorefinery approaches.

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