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Fuel of the future

07 March 2012 | News

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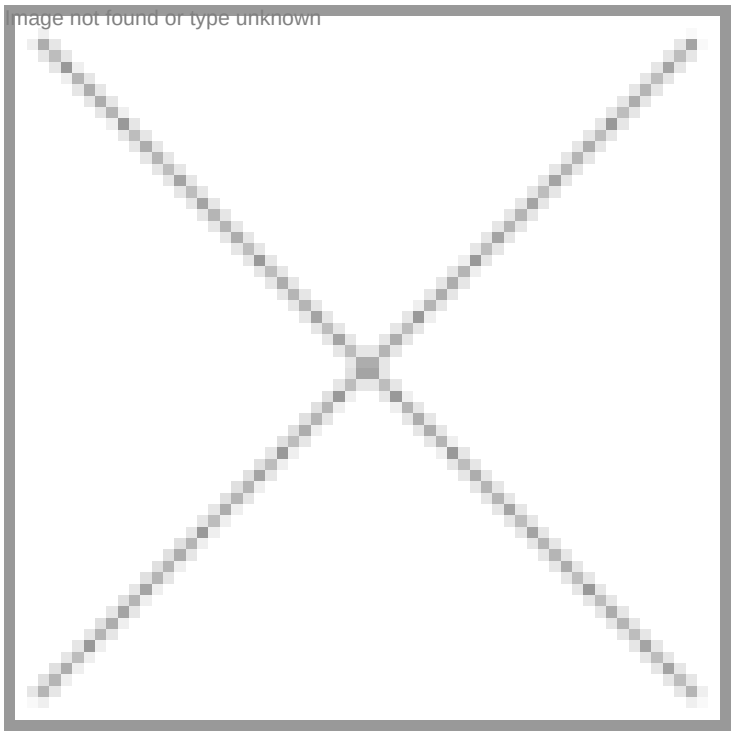

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Algae as an alternative source of biofuel can be an effective answer to the escalating price of petroleum and the concern over global warming

Genesis

Microalgae were first mass cultured on rooftop at MIT during the early 1950s and it was in that project itself that algae biofuels were first spoken of. Between 1980 and 1995, the US DOE-NREL initiated an aquatic species program for microalgae oil production.

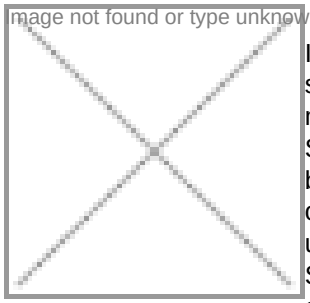
The Technology

A wide range of algae can produce lipids from solar energy, CO_2 and appropriate water source. These lipids are stored in lipid vesicles as energy reserves and can comprise up to 60 percent of the dry weight of the algal cell. Both micro and macro algae appear to be a major source that can sequester high level of CO_2 and can replace fossil fuels. Biodiesel production from algae is done through screening and isolation of strains with high growth rate and high oil content using various techniques.

The Impact

With the current worldwide focus on cleaner fuels and environmental awareness, algal biodiesel is an attractive option. Specific production of oil per unit of biomass is extremely high in algae as compared to other seed crops. When compared with the current biodiesel technologies that utilize food crops, algal technology can prove to be a major boost. Breakthroughs in this area can contribute to the country's commitment to reduce its carbon emissions.

With energy consumption increasing and the finite sources of fossil fuels diminishing, algal biofuels can be an alternative solution if they meet the same commodity standards of price, quality and service. It can prove to be a cheaper source of biofuel as specialized algae for production of one million gallon of biodiesel per year requires less than 100 acres of land, whereas other sources such as jatropha and soybean need 4,500 acres and 16,000 acres of land, respectively. About $1 billion has been spent globally till now for developing algal biofuel. In 2010, the US Department of Energy announced $80 million in funding for research on algae-based biofuels. Japan too is geared up for the production of micro algae. In China, government support is mainly through policy to algae biofuel projects. South Korea has invested $275 million for developing bioenergy from algae. In India, research institutes, including Council for Scientific and Industrial Research (CSIR) labs, have been working on algae biofuels.



India has a great potential in algae biofuel as it can make use of 7,000 km of its coastal line. A joint scientific project by nine laboratories of the CSIR has been testing biodiesel sourced from microalgae growing naturally in India's west coast. The nine-laboratory consortium, with Central Salt and Marine Chemicals Research Institute (CSMCRI) as the nodal lab, recently tested a biodiesel mix (20 percent biofuel, 80 percent petroleum) produced from microalgae. Moreover, other marine microalgal strains, especially those with high lipid productivity, are being investigated under the project. The Marine Biotechnology Laboratory, University of Delhi, led by Dr Dinabandhu Sahoo, scientist, developed and implemented the first coordinated project on large-scale algae cultivation in India, with the help of the Department of Science and Technology, Government of India.

Chennai-based Sea6 Energy is also working on the production of red seaweeds (macro algae). The company has already proved on lab scale that ethanol can be produced from red seaweed and is now looking forward to set up pilot facilities to demonstrate this. The company, in partnership with Bangalore-based Noyozymes, is looking for a solution to its need for enzymes to hydrolyze carbohydrates to monosaccharides. It is looking for the enzymes that can work commercially in the salt water system, which otherwise is very corrosive.

Another company based in New Delhi, AquaAgri, is into the cultivation of seaweeds at mass scale. The company produces and supplies raw materials to the biofuel industry depending on requirement.

Rahul Koul in New Delhi with inputs from Vipul Murarka