

Biofuels from algae in Western Australia: From the Lab to the pilot plant and beyond

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The imminence of Peak Oil as well as global warming due to anthropogenic CO₂ emissions has led to great activity to develop environmentally sustainable renewable sources of energy. Algae are seen as one of the best sources of renewable liquid fuels (i.e. biodiesel and bioethanol) as they have lipid productivities which are 5-10 times greater than alternative oil seed crops such as canola and oil palms, and because they can be grown on land unsuitable for agriculture using saline water. Western Australia is especially well suited for algae culture for biofuels because of regions with high sunshine, large areas of flat land and many suitable water sources. However, before algal fuels become a reality many problems have to be resolved, especially the high cost of algae production.

Our research at Murdoch University over the last 20 years has led to the isolation and characterisation of a number of elite strains of local microalgae well suited for commercial-scale culture for biofuels. Together with colleagues from the University of Adelaide we have been trialing these algae in outdoor ponds in Perth to select the best strain and to optimise culture conditions for the production of lipids which are the feedstock for biodiesel production. We have also been developing efficient, low cost methods of harvesting and dewatering the algae and for the extraction of the lipids. Our results show very high productivities over the whole year under Perth climatic conditions.

In November 2010 we commissioned the first Australian algae biofuels pilot plant in Karratha, next to the Rio Tinto Yurrila Maya Power station. The pilot plant allows the testing and optimisation of the algae under the optimum climatic conditions of the Pilbara at a scale that will allow actual production costs for a production plant to be determined and a fully commercial process to be developed. The Pilbara has many advantages for commercial scale algae biofuels production and an American company, Aurora Algae, have also established a pilot plant there recently.

This talk will cover the journey from the lab to the pilot plant and beyond and our findings and the future challenges to developing this new industry for Western Australia.

