Solutions for 'culture crashes' in algal production sought

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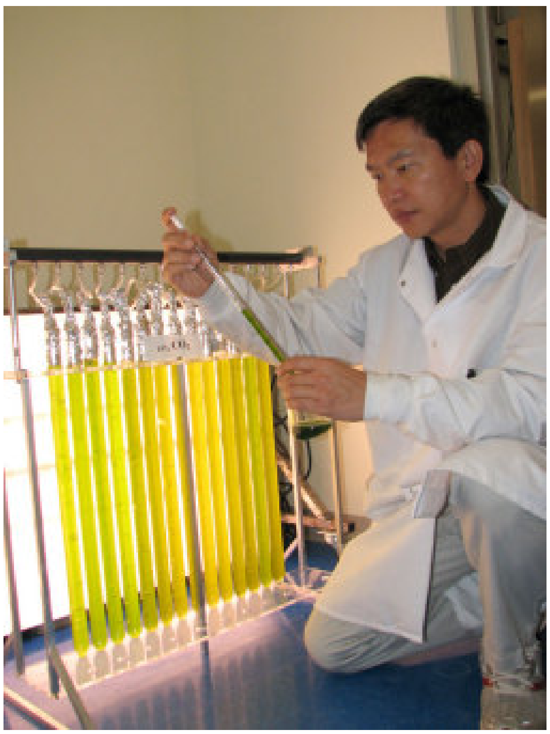

ASU scientist Qiang Hu and his team are studying the factors involved with algal crop failure. Credit: Arizona Board of Regents

(PhysOrg.com) -- Algae can seem quite stubborn and hardy when trying to rid them from your pool, but when it comes to mass producing algal feedstock to be used in the conversion to biofuel, more things can happen to destroy this type of crop than most realize.

Of many culprit organisms that may result in the deterioration of algal culture performance and biomass yield, grazing zooplankton, or so called predators, often are responsible for frequent culture ‘crashes’ and loss of productivity altogether. Except for a few algal strains that can tolerate extreme growing environments that are deterrents to many contaminants, the hazard of predator contamination is so great that sustainable cultivation of many algal crops of economic interest – in particular, oil-producing algal strains on a large scale – has not been possible.

However, with a recent five-year $1 million grant from the U.S. Department of Agriculture (USDA), Arizona State University scientist Qiang Hu and his research team are studying the factors involved with algal crop failure.

Hu, a professor in the College of Technology and Innovation and co-director of the Arizona Center for Algal Technology and Innovation (AzCATI)/Laboratory for Algae Research and Biotechnology (LARB), explains that the cost of crop failures could be in the multimillions of dollars to this emerging green industry if devastating grazing zooplankton have their way.

Zooplankton are microscopic animals that often are identified as amoebas, protozoans, ciliates and rotifers. All are predators on microscopic algae, which represent the base of the aquatic food chain.

“Without a detailed understanding of the factors influencing the occurrence, population dynamics, impact and control of zooplankton, it could potentially prevent algae from being a practical source of oil crops for production of bioenergy and bioproducts,” Hu said.

To study the zooplankton, Hu and his team will survey zooplankton contamination in commercial algal production systems, as well as in their own algae testbed facilities at ASU Polytechnic campus, where a number of production strains are cultivated in various types of culture systems all year round. Simultaneously, they will determine living and non-living influencers on zooplankton, aiming at developing an empirical model for assessment and prediction of potential impact of zooplankton contamination on overall algal culture stability and biomass production potential.

By introducing state-of-the-art bio-imaging and DNA fingerprinting techniques, they will develop a rapid, sensitive monitoring and an early warning system. In parallel, they will evaluate several innovative control measures, and ultimately develop a Best Management Practices Plan (BMPP) for prevention and treatment.

"The comprehensive BMPP will be the key to achieve sustainable production of algal feedstock, and thus enable successful commercialization of algae-based biofuels and bioproducts," Hu said.

"Results from the research plan to be shared widely with the biotechnology community and benefit the algal biofuels industry, through publications and conference presentations, as well as workshops and training courses provided by LARB and AzCATI," said Milton Sommerfeld, professor and co-director of LARB and AzCATI.

Provided by Arizona State University

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