Biodiesel algae: Starvation diets damage health

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It may be better to tolerate lower oil content in algae grown for biodiesel to boost growth and overall productivity, says research from the University of Sheffield.

The research shows that the commonly accepted method of depriving algae of key nutrients such as nitrogen in order to boost its oil content may be detrimental to overall oil yield in the long term.

"Total oil production depends not just on the oil content of the algal cells but how quickly the cells grow and multiply," says Dr Stephen Wilkinson of the University's Department of Chemical and Biological Engineering. "We found you get more oil production overall if you give the algae all nutrients they need to grow fast rather than trying to increase the oil in each cell by limiting the availability of nitrogen."

In a study funded by the Carbon Trust and US consulting engineering firm MWH Global, Dr Wilkinson, along with colleagues from the University of Manchester, examined a species of algae called *Dunaliella salina* at different cell densities grown at a range of temperatures to determine the rate of growth and lipid production.

Some samples were deprived of nitrogen, whilst others were allowed to grow naturally. During the course of the 4-week study the overall yield from the nitrogen starved crops was in fact lower than many of the crops that had been allowed to grow naturally.

Another key finding of the study was that productivity could also be increased by increasing cell density. The researchers used centrifugation to create more crowded algal cultures and were surprised to see that this these samples could still grow very well.

"Large-scale production of algal biofuels will need big ponds taking up a lot of space," says Dr Wilkinson, "so anything we can do to squeeze more oil out of a smaller land area is very important."

The study is published in the *Journal of* Chemical Technology *and Biotechnology*.

More information: Optimization of lipid production for algal biodiesel in nitrogen stressed cells of Dunaliella salina using FTIR analysis, DOI: 10.1002/jctb.4027

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