

Genetically engineered algae for biofuel pose potential risks that should be studied: ecologist

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(Phys.org) -- Algae are high on the genetic engineering agenda as a potential source for biofuel, and they should be subjected to independent studies of any environmental risks that could be linked to cultivating algae for this purpose, two prominent researchers say.

Writing in the August 2012 issue of the journal *BioScience*, the researchers argue that ecology experts should be among scientists given independent authority and adequate funding to explore any potential unintended consequences of this technological pursuit.

A critical baseline concern is whether genetically engineered algae would be able to survive in the wild, said Allison Snow, professor of evolution, ecology and organismal biology at Ohio State University and lead author of the paper.

"If they're grown in big, open ponds, which is mainly what we're talking about, could the newer types of microalgae get out into nature and mingle? We need to know if they can survive and whether they can hybridize or evolve to become more prolific when they get out of a controlled environment," Snow said.

"If they can survive, we also need to know whether some types of genetically engineered [blue-green algae](#), for example, could produce toxins or [harmful algal blooms](#) - or both," Snow noted.

And because algae are so small and could be dispersed by rough weather or wildlife activity, biologists worry that any [transgenes](#) they contain to enhance their growth and strength could be transferred to other species in a way that could upset a fragile ecosystem.

"The applications are new and the organisms are less well-known. They range from being very tame 'lab rats' that won't survive in nature to wild organisms that can presumably cross with each other unless some measures are taken to prevent crossing. It's a very new situation," Snow said.

Snow co-authored the article with aquatic ecologist Val Smith, a professor in the Department of Ecology and [Evolutionary Biology](#) at the University of Kansas.

Snow has a history in this area of research. She led a study in 2002 that was the first to show that a gene artificially inserted into crop plants to fend off pests could migrate to weeds in a natural environment and make the weeds stronger. She also has served on national panels that monitor and make recommendations about the release of genetically engineered species into the environment.

There are a lot of unknowns about this area of research and development in microalgae, and that's largely because algae don't have the breeding history that, say, corn and soybeans have, Snow said. In addition, few details are publicly available because much of this information remains confidential as businesses compete to be the first to commercialize their genetically altered algae.

"We're hoping to reach several audiences - including ecologists, molecular biologists and biotech business owners - and bring them together. There's a community of people like me who study genetically engineered crops and how they interact with the environment, and we

need to get this started with algae.

"There's a lot of hype and speculation about algae as a [biofuel](#) source, and it's hard to gauge exactly what's going on. We see many indications, especially funding, that private companies and the government have decided this is important and worth pursuing," Snow said. "So much will depend on the economics of it. Whether you can get a lot of energy out of algae depends on these breakthroughs with biology, technology, or both."

In the same way that certain crop plants are bred with genes to help them repel pests and tolerate harsh conditions, different species of algae are likely being genetically engineered to grow rapidly because mass quantities of these tiny species will be needed to produce adequate fuel supplies.

The authors recommend, for starters, a comparative examination of genetically engineered algae strains intended for large-scale cultivation with their natural counterparts to determine the basic differences between the two. They also acknowledged that genetically engineered algae might be equipped with so-called "suicide genes" that would make it impossible for the algae to survive a release into the wild.

"If such precautions are taken in lieu of thorough environmental assessments, more information should be required to ensure their long-term success and to prevent (genetically engineered) algae from evolving to silence or overcome biological traits that are designed to kill them," the authors wrote.

Snow also noted that before genetically engineered crop plants can be commercialized, they are grown in various outdoor environments to test their endurance under different conditions. The permitting process for these plots helps inform the government and the public about these

agricultural efforts. Even if the exact genes used to engineer these crops are protected as proprietary information, the species and new traits they carry are made public.

"With algae, this can all happen in a greenhouse because they're so small. That means they're not really accessible for scientists to find out what companies are working with, and it's going to be like that until very late in the process," Snow said.

And to be clear, Snow said she and Smith are not looking to hinder these efforts.

"We're trying to be constructive and get the word out, to get the conversation going," she said.

Provided by Ohio State University

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