Algal Turf Scrubbing: Boon or Blip?

Author: Beardsley, Timothy M.

Source: BioScience, 61(6) : 423

Published By: American Institute of Biological Sciences

URL: https://doi.org/10.1525/bio.2011.61.6.1

BioScience®
Organisms from Molecules to the Environment
American Institute of Biological Sciences

Algal Turf Scrubbing: Boon or Blip?

An article in this issue by Walter H. Adey and colleagues, which begins on p. 434, provides a fascinating look at the early stages in the commercial development of a potentially important biotechnology: algal turf scrubbing. These pulsed-flow systems are now being built and operated on a hectare scale in Florida to extract nutrients from streams, canals, and lakes polluted by agricultural runoff. Not only can algal turf scrubbers efficiently produce a nitrogen- and phosphorus-rich fertilizer, they restore oxygen levels in polluted waters. The algae generated, which are washed off screens weekly, can also be used to produce biofuel: The authors favor a fermentation process that produces alcohols rather than extraction of oils from the diatoms that largely populate the devices. A potentially higher-value product is omega-3 fatty acids for use as nutraceuticals.

The interest lies, of course, in the fact that cleaning wastewater and agricultural runoff contaminated with nitrogen and phosphorus is an immediate need in many places where natural waters are polluted, and a system that can use sunlight as a source of energy to do so is bound to reflect a gleam in an entrepreneur's eye. Add to this the concerns about global supplies of phosphorus for use in fertilizer and about the long-term availability of oil, and the technology starts to look like a green's dream. Some types can even operate in open water, thus minimizing the loss of agricultural land.

The market will render its judgment on algal turf scrubbing over time, but Adey and his colleagues' article does bring into sharp focus the difference between what is economically viable given current hidden subsidies and what might be environmentally desirable. The authors are careful to stress that algal turf scrubbing is not likely to ever be profitable just as a way of making fuel. Although more productive than terrestrial crops, algae, like the corn now used in vast quantities to produce ethanol, are expensive to cultivate, harvest, process, and convert into usable energy. Such barriers place immense difficulties in the way of all attempts to develop alternatives to oil, as was usefully explained by Charles A. S. Hall, Stephen Balogh, and David J. R. Murphy in a 2009 *Energies* article (doi:10.3390/en20100025). In the particular case of algae cultivated for biofuel, scale-up costs have not always been adequately accounted for, and there is disagreement over the economic potential.

The near-term fate of algal turf scrubbing seems likely to depend much more on whether the value in nutrient removal can be realized and applied to the cost of building and running the units. As long as the ecological damage caused by agricultural and domestic fertilizer runoff typically carries little or no economic cost for its originators, it will be hard for algal turf scrubbing to gain a foothold beyond some special sites. If enlightened policy were to impose a predictable cost on such pollution, however, algal turf scrubbers might indeed become a common sight, and waters might be cleaner and more productive—with the fuel and fertilizer byproducts as a bonus. Whether the technology can become a long-term boon, however, is still unclear.

TIMOTHY M. BEARDSLEY
Editor in Chief

doi:10.1525/bio.2011.61.6.1