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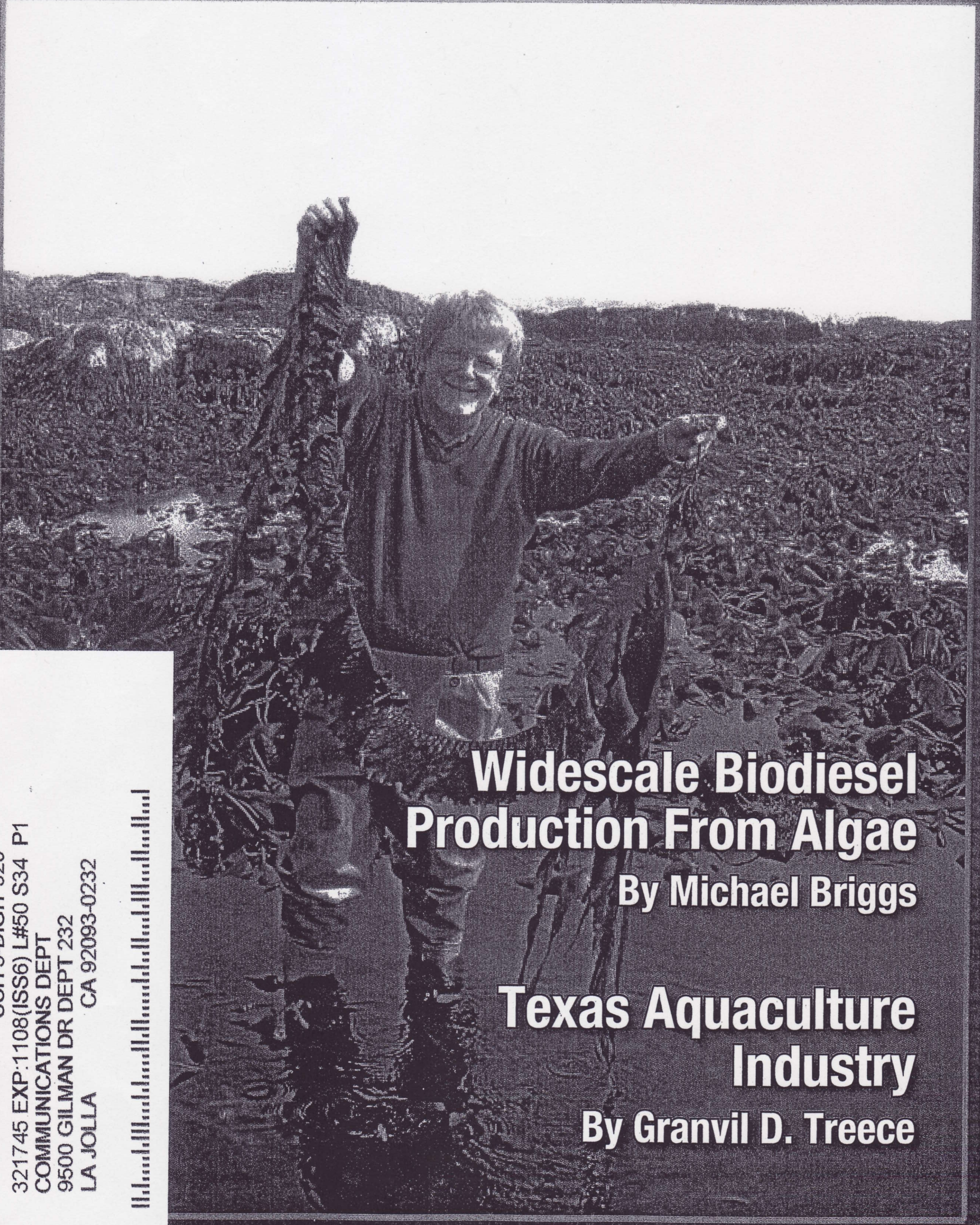

Widescale Biodiesel Production From Algae

By Michael Briggs

Texas Aquaculture Industry

By Granvil D. Treece

a class operation."

Jerry Daigle, state soil scientist for the U.S. Department of Agriculture's Natural Resources Conservation Service, urged farmers to consider the no-till option. He said the approach has its detractors, but it is a viable practice in Louisiana.

"It works even on Sharkey clay soil," he said.

Daigle said using a cover crop - especially nitrogen-producing legumes - should not be overlooked.

Mystery Deepens on Toxic Algal Blooms Bacteria Now Suspect

The mystery deepens on toxic algal blooms-explosions in populations of microorganisms, which may taint seafood or turn the sea muddy red.

According to new results from California Sea Grant researchers, some toxic algal blooms may be, in effect, triggered by bacteria. The bacteria in question are special-not the kind you scrub off your hands. These bloom-relevant species live in association with marine algae.

Nobody knows for sure what the bacteria do for the algae. But it is known that without the bacteria, the algae die. Ongoing California Sea Grant research, led by professor Carl Carrano of San Diego State University, suggests the bacteria may be providing algae with iron.

The bacteria under study all produce a compound the same compound-that changes the form of iron in seawater, Carrano said. The compound (called vibrioferrin) transforms biologically unavailable iron into stable, biologically useful forms.

It is not yet clear on what scale this transformation of iron occurs. Biologically useful iron, though, is a precious commodity in many parts of the ocean. If bacteria have a significant role in bumping up iron sources, they would be key in explaining blooms in areas where iron alone is the limiting factor for growth.

How often this occurs and where remain open questions. Nobody has yet tried to correlate vibrioferrin levels in seawater with harmful algal bloom formation or its intensity. But this may come and it could lead to a very novel, early algal-bloom warning system.

Carrano and colleagues Frithjof Kuepper and David Green at The Scottish Association for Marine Science in Oban, Scotland, have recently found that vibrioferrin may also help algae and/or bacteria communicate among each other.

In their experiments, they have documented that the compound vibrioferrin can bind to boron.

"Natural products containing boron are very rare," Kuepper said. "The most notable bacterial product using boron is a quorumsensing molecule." Quorumsensing molecules allow bacteria to coordinate gene expression. They kick into action only when there are a lot of bacteria present.

"We believe that some toxic algae can effectively wire tap bacteria's communication system," Kuepper said. "The boron compound tells the algae it is OK to grow because there is enough iron."

In this scenario, vibrioferrin first produces iron, then as bacteria populations rise, acts as a signaling compound.

Much needs to be learned before the researchers' ideas exist beyond the realm of speculation. But what they have found so far dovetails nicely with others' findings.

Professor Alison Butler of UC Santa Barbara, a former California Sea Grant researcher who led some of the first studies of marine iron-binding compounds, said that it has already been shown that some eukaryotic cells (cells with a nucleus) can reduce iron from iron-siderophore complexes. (Vibrioferrin is a type of siderophore.)

Professor Mark Wells of the University of Maine in Orono, meanwhile, has published findings showing a link between iron and copper concentrations and the toxin domoic acid-the causative agent of amnesic shellfish poisoning.