Fall 2010

Bulletin news from the experiment station associates

Invasive Plants in Connecticut Lakes

by Robert C. Pollack

SCIENTIST GREG BUGBEE SAT AT THE HELM OF THE 18 FEET ALUMINUM BOAT OWNED BY THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION AS IT ROARED DOWN CANDLEWOOD LAKE, HIS BROWNISH HAIR AND MOUSTACHE FLARING IN A BRISK WIND.

Scientists are often portrayed as ivory tower people. But if you had been with him as he jockeyed the craft, replete with sophisticated sonar and Geographic Positioning Satellite equipment, up and down the state's largest lake, that image would have been shattered.

Bugbee, 55, has been in charge of the Station's invasive aquatic plant program since 2003—a program made possible by an annual grant of about $240,000 from the U.S. Agriculture Department and numerous other smaller grants.

The program is in existence, Bugbee made clear, largely due to the efforts of U.S. Rep Rosa DeLauro (D-New Haven), who was concerned about the impact invasive plants and algae are having on the state's 3,000 lakes.

Now, on a clear, hot, sunny mid-August day, Bugbee was doing what he and 12 other Station researchers do every summer—mapping the invasive plants and algae which make swimming difficult and can bring outboard motors to a grinding halt. But it did not impede the station boat, one of four it owns, driven by a 40 horsepower motor.

There are as many as 18 species of invasive plants and as the craft veered toward one of dozens of coves in the 5,500-acre lake, it became clear that Eurasian watermilfoil was chief among them here. "It comprises 99 percent of the problem," Bugbee said.

The plants were clearly visible in 12 feet of water, looking like clusters of green tentacles as the craft whizzed over them. Aquatic vegetation surveys are conducted with the aid of a computer and Trimble global positioning system, which clearly maps the width and

Continued on page 2

Greg Bugbee using a rake to collect samples of invasive aquatic plants.

depth of the plants. A digital depth finder keeps track of the exact depth and samples of the plants were obtained in shallow water with a rake; a grapple was used for deeper spots.

Bugbee said five methods are being tried to control the invasive plants and algae—which turn another big state waterway, Lake Zoar, into a sheet of ugly green in hot weather. One is the use of herbicides, which can be effective for short-term control.

Another control method is "drawing down" state lakes by about three feet—which has shown limited success in killing the plants in freezing winters. Lowering them by 10 feet has proven more successful and shows great promise. Then there is the mechanical method, accomplished by pulling out the plant by hand or using machines to harvest them, much like a farmer harvests hay.

Biological control methods include introducing grass carp to literally eat the weeds or introducing insects such as the watermilfoil weevil, which does the same and is now being tried at Candlewood.

Accurate reports on the mapping and control methods for the state's 167 biggest lakes are fed to the U.S. Department of Agriculture and Bugbee, an experienced boater who lives on Clear Lake off Route 80 with Judy, his wife of 27 years, spends a good part of the summer on the water.

"The invasive plants, which come here from abroad—can enter our lakes when people dump their aquariums into lakes and through other means we are not certain of—can cause havoc during the summer," Bugbee said. "And this summer has been especially bad because of the intense heat."

He talked about the many roles The Connecticut Agricultural Experimental Station plays in everyday lives ranging from finding out how to best control insects that threaten state trees and crops to making sure Connecticut's water and food are safe.

"I love what I do," said Bugbee. "It gives me a chance to contribute something to the quality of life here in Connecticut."

Who To Call at the Station

Analytical Chemistry	
Food Safety & Environmental Monitoring	(203) 974-8523
Biochemistry & Genetics	(203) 974-8458
Entomology	
Bed Bugs	(203) 974-8478
Butterfly Gardening	(203) 974-8600
Insect Id & Control	(203) 974-8600
Growing Vegetables Organically	(203) 974-8480
Lady Beetles	(203) 974-8480
Tick Testing & Control	(203) 974-8485
Honey Bee Monitoring	(203) 376-4503
Vegetable Insects	(203) 974-8600
Asian Longhorned Beetle & Emerald Ash Borer	(203) 974-8474
Forestry & Horticulture	
Composting & Mulching	(203) 974-8516
Deer Browse Damage	(203) 974-8527
Forestry	(203) 974-8495
New Crops For CT Farms	(203) 974-8516
Wine Grapes	(203) 974-8491
Plant Pathology & Ecology	
Chestnut Trees	(203) 974-8498
Earthworms	(203) 974-8503
Plant Diseases & Controls	(203) 974-8601
Plant Propagation	(203) 974-8601
Pruning Woody Ornamentals	(203) 974-8601
Small Fruits & Tree Fruits	(203) 974-8601
Vegetable Diseases	(203) 974-8601
Environmental Sciences	
Container Gardening	(203) 974-8512
Invasive Plants in Lakes & Ponds	(203) 974-8512
Lawns	(203) 974-8512
Mosquito/Encephalitis Virus Testing	(203) 974-8510
Soil Improvement	(203) 974-8512
Soil Testing	(203) 974-8512
Valley Laboratory	
Weed ID & Control	(860) 683-4984
For Topics Not Listed	(203) 974-8500

More than 60% of Connecticut lakes and ponds contain one or more invasive plant species.

Recent Work by Station Scientists

SCIENTIFIC DISCOVERIES

Louis A. Magnarelli, Scott C. Williams, and Erol Fikrig (Yale University) determined that deer were frequently exposed to ticks and two different bacterial disease organisms during all seasons. They also found that November and December is a suitable time period to obtain blood samples from these animals to monitor for Lyme disease and granulocytic anaplasmosis at selected sites in Connecticut.

Richard Cowles, in collaboration with URI Ph.D. student Darryl Ramoutar and his advisor, Steven Alm, determined that combining certain fungicides or plant growth regulators with pyrethroids could restore the effectiveness of the insecticides against pyrethroid-resistant annual bluegrass weevils. This may be practical on golf courses, where pyrethroid resistant annual bluegrass weevils are difficult to manage and both the fungicides and plant growth regulators are commonly used.

Richard Cowles determined that a spray of a systemic insecticide, dinotefuran, to the base of Christmas trees can be an effective method to manage armored scale pests on Christmas trees. This application method conserves the complex of predators and parasites that attack the scales, can be applied with inexpensive equipment that any grower can afford, and is expected to minimize other negative environmental impacts associated with the use of insecticides.

Theodore Andreadis, Philip Armstrong, and Goudarz Molaei have determined that the freshwater inhabiting woodland mosquito, *Culiseta melanura* serves as the principal vector of eastern equine encephalitis virus in the northeastern U.S. responsible for viral amplification among local wild bird populations as well as occasional transmission to humans and horses.

Robert E. Marra showed that the internal condition (sound, decayed, or hollow) of maple, beech, and birch trees in the forest can be assessed nondestructively using sonic and electrical-impedance tomography. This equipment, in widespread use in Europe but rarely used in the United States, measures the rate at which sound waves and electrical currents travel among multiple points around a tree's trunk.

Wade Elmer and Joseph Pignatello have shown that biochar, a carbonaceous charcoal substance, can reduce the damaging effects of toxic allelochemicals that are released from rotting asparagus roots. Biochar improves growth, increases colonization by beneficial fungi called mycorrhizae, and reduces disease from root rotting fungi called *Fusarium*.

Claire E. Rutledge and **Mioara Scott** use the native beetle-hunting wasp *Cerceris fumipennis* as a biosurveillance tool for the detection of the exotic Emerald ash borer (EAB). In monitoring 55 colonies in summer 2010, they did not find EAB in Connecticut.

ARTICLES PUBLISHED

The tobacco blue mold pathogen, *Peronospora tabacina*, has been periodically re-introduced to the Connecticut River Valley cigar wrapper tobacco area of Connecticut and Massachusetts. Blue mold occurred from 1937 to 1956, 1979 to 1981, and most recently from 1996 to 2008. **James LaMondia** correlated disease severity with January temperatures when the pathogen was present in moderate amounts the previous year, indicating that overwintering had occurred. January temperatures may be used to predict the need for early season fungicide applications to control disease from local overwintering inoculum following moderate to high blue mold severity. (*Plant Disease* 94[1]:119-124)

Theodore Andreadis and **Roger Wolfe** (CT DEP) evaluated the invasion success and impact of the invasive exotic mosquito *Ochlerotatus japonicus* in Connecticut and concluded that this mosquito is competitively reducing populations of several native mosquito species inhabiting natural rock pool and used tire breeding sites. (*Journal of Medical Entomology*, January 2010)

Goudarz Molaei, **Theodore Andreadis** and colleagues from Rutgers University, using DNA technology examined the blood-feeding habits of the invasive exotic mosquito, *Ochlerotatus japonicus* and found over one-third of the mosquitoes acquired blood from humans. (*Journal of the American Mosquito Control Association*, June 2009)

Theodore Andreadis documented the introduction and seasonal establishment of the Asian tiger mosquito, *Aedes albopictus* at a commercial tire recycling facility in northeastern Connecticut that likely occurred via transport of infested tires originating from northern New Jersey or NYC. However, the mosquito failed to successfully overwinter and become colonized in the forested woodlands the following year. *(Journal of the American Mosquito Control Association*, March 2009)

Anuja Bharadwaj and **Kirby C. Stafford III** concluded that an application of the entomopathogenic fungus *Metarhizium anisopliae* Strain F52 can reduce the abundance of the blacklegged tick in the residential landscape. (*Journal of Medical Entomology*, 47(5): 862-867)

In 2009, Station Scientists tested 291,641 mosquitoes and found 35 pooled samples with West Nile Virus, 123 with Eastern Equine Encephalitis virus (which has a 60% mortality rate in humans) and 43 with Jamestown Canyon virus. For more information, see Mosquito Surveillance at www.ct.gov/caes.

Station Scientists Test Gulf Seafood for Oil Contamination

by Robert C. Pollack

The chemical laboratory at The Connecticut Agricultural Experiment Station has had a large hand in the decision to reopen commercial fishing waters off the coasts of Louisiana, Alabama and Florida, putting hundreds of people back to work.

The New Haven lab, under the direction of Chief Chemist Jason White, was one of three in the country selected in late July to test seafood samples from the Gulf of Mexico to see if they were contaminated by the huge BP oil spill—the largest ever recorded in U.S. waters.

That selection led to a blizzard of media coverage that station officials called among the most intense they had ever experienced. But as White pointed out, the fact that testing shrimp and other Gulf seafood had (as of mid-September) not uncovered any unsafe levels of polycyclic hydrocarbons—chemicals associated with petroleum—is "what makes this project so important."

Actually, he said, there are 15 different chemicals in that group, seven of them carcinogens, that are "a cause for concern" if found in seafood. But to date, not a single sample has yielded unsafe results.

"We helped get fisherman fishing again," White said, adding the lab is using a new testing method which they helped develop that is much faster than the one it replaced.

As of September 10, 2010, White said the lab had tested 77 samples—the majority shrimp and finfish—which took some 400 hours to complete.

A seafood sample from the Gulf of Mexico sent to the Station by the U.S. Food and Drug Administration (FDA).

He pointed out that one sample could contain 20 jars of shrimp, crab or other seafood. The process entails first thawing the seafood samples, which arrive frozen on dry ice, then grinding them in a blender and putting them in test tubes. The material is then run through a high-pressure liquid chromatograph, which detects a spectrum of chemical properties associated with oil.

White said that researcher Terri Arsenault conducts the extraction process after the samples are thawed and homogenized and Dr. Walter Krol analyzes the specific chemicals they contain. Both work in the station's Department of Analytical Chemistry.

"We can test samples with this method much faster than with the old procedure. We would have only completed a handful of them by now if we had still been using it," White said. "We have to report our findings to the FDA within 24 to 36 hours of getting samples."

The Food and Drug Administration (FDA) authorized the station lab to do the testing with two others—one in Minnesota and one in Ohio—but two more labs have just been authorized.

The National Oceanic and Atmospheric Administration (NOAA) is the federal agency responsible for shutting down commercial shrimping and fishing when oil or other pollution makes seafood in a specific area potentially unsafe to eat. It, along with the FDA, is also the agency that can reopen those same waters when testing proves seafood found there is safe.

White pointed out that right now, the jury is still out on whether the many millions of gallons of oil that surged into the Gulf from the BP spill are still lingering underwater in so called "plumes" or have been permanently dispersed by chemicals and the cleansing action of the ocean itself.

"Both Terri and Walter have done excellent work on the testing," White said. "And we hope the samples continue to come up comparatively clean. And there is no question it's going to keep us busy for some time to come."

"Putting science to work for society is one of our key mottos," said station Director Louis A. Magnarelli. "This seafood testing project turns those words into reality," he said.

SAMPLES TESTED:
July 1, 2009-June 30, 2010

Product samples were tested by the Department of Analytical Chemistry for the following agencies:

Department of Agriculture	313
Department of Consumer Protection	585
Department of Environmental Protection	140
CAES Departments	80
Municipal Health Departments, Police, Nonprofits	7
GRAND TOTAL	1056

Station Events *by Pamela Weil, President, Experiment Station Associates*

Governor M. Jodi Rell signs the patent bill for The Connecticut Agricultural Experiment Station on June 25, 2010 in front of the Jenkins Laboratory. To her right is Dr. Louis A. Magnarelli, the experiment station director, and to her left is Representative Gary Holder-Winfield of New Haven and a co-sponsor of the bill.

Governor Rell Signs Bill on June 25

Governor M. Jodi Rell visited the New Haven facility to announce the allotment of $1.26 million for much-needed renovations of the Jenkins Laboratory and to sign a bill that would allow The Connecticut Agricultural Experiment Station to seek patents, trademarks or licensing agreements for discoveries and inventions developed by employees.

The Jenkins Laboratory was built in 1932 and needs updating, including handicap accessibility.

The patent bill, co-sponsored by state Rep. Gary Holder-Winfield (D-New Haven), will protect Station scientists who have recently developed new insect- and/or disease-resistant varieties of strawberry and tobacco plants.

Governor Rell spoke of the great importance of the work done at the Station and said, "Everything you do affects every one of us. I wonder if the public understands and appreciates what goes on here."

Station Director Dr. Louis Magnarelli said, "This was a wonderful day for us."

Plant Science Day on August 5

Over 1,000 people came to Lockwood Farm on the 100th anniversary of Plant Science Day to learn more about our environment and the work being done by Station scientists to preserve and protect it.

The keynote address, "What Fossil Plants Can Tell Us About Climate Change," was given by Dr. Dana Royer, a geologist and assistant professor of earth and environmental sciences at Wesleyan University.

It was a fascinating look at Dr. Royer's compelling research. Can plants tell us if the earth is getting warmer? Yes, because leaves can be a climate indicator. Dr. Royer and his associates have studied leaf shape as it relates to temperature and carbon dioxide.

"As you move to colder and colder places, leaves have teeth," Dr. Royer said. He showed examples of leaves and leaf fossils and said that leaf margins can be analyzed and a mean temperature calculated from the data.

Leaf stomata (pores on leaves that receive carbon dioxide as food) can be measured to chart the amount of carbon dioxide in the air. When carbon dioxide is low, the number of stomata (density) increases. Only the leaves of the Ginkgo (Gingko biloba) and Dawn Redwood (Metasequoia glyptostroboides) trees were evaluated for this study because these species exist today and existed millions of years ago.

Based on his research, Dr. Royer estimates that by 2100 both the carbon dioxide level and mean temperature on earth will rise. The carbon dioxide level is expected to be 500-1000 ppm. Currently, it is 390 ppm. Mean temperature could rise by as much as 11°F.

"At some point," said Dr. Royer, "the ice sheet will decay" although how fast that would happen depends on a variety of factors.

Lockwood Lecture on Monday, October 25

Dr. Odile Carisse, plant pathologist for Agriculture and Agri-Food Canada, will speak on "Molecular Tracking of Airborne Inoculum: Impact on Grape Disease Management."

Tea will be served at 10:30 am and the lecture will begin at 11 am in Jones Auditorium, 123 Huntington Street, New Haven.

For information call 203-974-8500 or visit www.ct.gov/caes. There is no charge to attend the lecture.

The *Bulletin* is published by the Experiment Station Associates and mailed to our members. To receive future issues of the *Bulletin*, please join our organization. In addition to the *Bulletin*, members receive invitations to exclusive field trips and other events.

The Experiment Station Associates was formed in 1990 to encourage and support the work of the scientists at The Connecticut Agricultural Experiment Station.

For additional information, please contact Pamela Weil at 203-259-5173 or pamelaweil44@gmail.com.

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