

Recent Work by Station Scientists

SCIENTIFIC DISCOVERIES

Brian Eitzer, along with colleagues at Purdue University, have been studying neonicotinoid pesticides in various types of samples taken near cornfields. They found low levels of these pesticides in the soil, dandelions, honey bee collected pollen, and honey bees. Higher levels of these compounds were found in some of the exhaust material produced during corn planting. The results suggest that there are possible unexpected routes of exposure of honey bees to pesticides.

Purple marsh crabs (*Sesarma reticulatum*) are herbivores that are found in high densities in Sudden Vegetation Dieback (SVD) sites. **Dr. Wade H. Elmer** reared purple marsh crabs in captivity and demonstrated that they preferred to feed upon drought-stressed, diseased *Spartina* plants more than healthy plants. These findings may suggest that the marsh crabs are attracted to SVD sites after a stress event.

In July 2011, there was unfortunately a positive find of *Phytophthora ramorum*, the causal agent of Ramorum Blight (or Sudden Oak Death) in a residential property in New Haven County. This was detected through the Station's participation in a "trace-forward" survey initiated by the USDA-APHIS-PPQ on plants sent by mail to private residences throughout the U.S., including Connecticut. Plants were from a nursery in Oregon that had tested positive for *P. ramorum*. Samples were collected by **Dr. Victoria Smith** (Deputy State Entomologist) and nursery inspectors, and brought to the lab for testing by **Drs. Sharon M. Douglas and Robert E. Marra**. Samples from *Rhododendron* sp. 'Pronum' tested positive for *P. ramorum* using real-time PCR and by culture. Follow-up surveys of host material and soil on the property are in progress.

ARTICLES PUBLISHED

Craig Musante and Jason C. White have found that nanoparticles such as

silver and copper displayed significantly greater phytotoxicity to squash plants grown hydroponically than did the equivalent bulk materials. Conversely, gold and silicon displayed toxicity did not vary with particle size. In addition, solution conditions such as the presence of humic acid also differentially impacted bulk and nanomaterials with respect to physical and biological activity. These findings are significant because current regulatory guidelines assume nanoparticles and corresponding bulk elements have equivalent toxicity. (*Environmental Toxicology*, December 2010).

Drs. Wade H. Elmer and Robert E. Marra have described a new species of *Fusarium* that they named *Fusarium palustre* (from Latin palus, referring to the marsh habitat in which this fungus is found). The fungus is moderately pathogenic on marsh grass, *Spartina alterniflora*, and is found associated with plants in areas where Sudden Vegetation Dieback occurs. (*Mycologia* 103:806-819, 2011).

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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Experiment Station Associates Membership Application

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Bulletin

news from the experiment station associates

New Strawberry Plant Developed by Station Scientists

by Robert C. Pollack

THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION HAS APPLIED FOR THE FIRST PLANT PATENT IN ITS HISTORY THANKS TO A NEW STRAIN OF STRAWBERRIES DEVELOPED BY TWO STATION SCIENTISTS.

The strain is resistant to both a destructive fungus called the black root rot fungus and the black vine weevil and the patent could only be applied for after the General Assembly passed a special bill last year. It has the potential to generate as much as a penny per plant from commercial nursery sales of the patented strawberry and sets the stage for other plant patents for unique station inventions.

Dr. Richard Cowles, an entomologist, started working on the black vine weevil problem relating to strawberries some 14 years ago and joined forces with Dr. James LaMondia, a plant pathologist, doing surveys on various threats to the health of farm-produced fruit.

It quickly became apparent, Cowles said, that the black root rot fungus was even more damaging to strawberries than the weevil and to be effective, any hybrid developed would have to be resistant to both.

With the help of a federal grant, Cowles began "crossing" different kinds of strawberries in 2000. "Between 3,000 and 4,000 seedlings were planted from those crosses," he said.

"We grew them in a plot at the Valley Laboratory Research Farm in Windsor, where strawberries have been grown for the past 30 years. Plants surviving and producing high quality fruits while under assault from root diseases can be expected to have superior resistant traits."

"It was a painstaking but exhilarating project," LaMondia said, "Thousands of strawberry growers face huge problems from both the fungus and the weevil and have to plow and replant every two to three years at considerable expense when a crop is damaged by either or both."

"If the long-term tests in commercial fields duplicate what we have found in our testing

Continued on page 2



Berries from a Rubicon strawberry plant are plump and sweet.



Richard Bergmann



Ellie Tessmer

The ESA field trip in October was a great success. Fifty ESA members and guests visited three wholesale Connecticut nurseries for behind-the-scenes tours. Thanks to our hosts: Greg Schaan, President of Imperial Nurseries, Inc.; Donald Ford, owner of Stonegate Gardens and Marc Laviana, President of Sunny Border Nurseries, Inc. And a special thanks to ESA Board member Barbara Yaeger (far left in above left photo) for organizing the trip. In the above right photo, Marc Laviana of Sunny Border speaks to our group.

To read more about the trip, visit the Station website www.ct.gov/caes/ and click on Experiment Station Associates in the lefthand column. You'll find an excellent account of the trip written by ESA Board member David Yih.

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in Windsor, this new berry—which we have named ‘Rubicon’ because it is ruby in color, is grown in Connecticut, and for us, discovering it was akin to crossing the Rubicon—can be a huge help to them.”

Cowles pointed out that “various methods growers now use to combat black root rot and the black vine weevil including insecticides have proven both expensive and largely ineffective. This could be a real breakthrough.”

Both men said that for the new berry to be a success, it not only had to be resistant to both the weevil and fungus, but pleasing to the eye, large in size, grow in big clusters and above all, delicious.

Cowles said a “Eureka” moment occurred when a number of people

were sent to the strawberry fields in Windsor “and almost all of them gravitated to the ‘Rubicon.’”

“They raved about it and we knew then we had something special.”

“Our plants produce extraordinarily uniform fruit of good size with a bright, vermilion color and a pleasing balance of sweet, sour and strong strawberry fragrance.”

Cowles said that in 2010, it also demonstrated tolerance to frost during bloom and is somewhat less susceptible than its parent ‘Idea’ strawberry to leaf scorch disease.

Cowles and LaMondia had gotten down to three or four strains before deciding that ‘Rubicon’ was the one. It originated from a cross between ‘Idea’

and ‘Primetime’ strawberries and when you talk to either scientist, you are pulled into the creative process of trial and error, inventiveness, patience and enthusiasm that combine in virtually every scientific endeavor to solve a problem, improve the quality of life or discover something new.

“We hope to get our patent approved in the next year or so,” LaMondia said. “It is the first plant patent the station has ever applied for and getting a bill passed by the state legislature that made it possible was really special.”

The strawberry breeding program has drawn praise from station Director Lou Magnarelli, who said the imagination and hard work of both Cowles and LaMondia is “what this experiment station is all about.”



Gregory M. Schaan, our keynote speaker.

more than 3,350 greenhouse, nursery, floral and landscape businesses, which together produce an income of over \$1 billion annually. This represents more than half of the total agricultural income of Connecticut.

At least 48,000 people are employed in the horticultural industry, representing a payroll of more than \$490 million annually.

In most years, over 40% of plants produced are shipped outside the state, bringing cash back into the state.

Federal law requires that plants be inspected and certified clear of pests and diseases before they can be sent out of state. This is done by employees of The Connecticut Agricultural Experiment Station.

Also, folks at the Station help the horticulture industry in many other

ways, including assisting with disease and pest identification, recommending the best treatment options, and helping to develop products and programs.

Mr. Schaan concluded his presentation by saying, “We are very fortunate to have this wonderful facility and talented staff in our state!”

We can all agree with that!

Station News by Pamela Weil

2011 Was A Rough Year

It’s been a rough and rocky year for Station employees, their families and we who support them. We all knew that the state budget needed to be trimmed, and in 2010 the Station received about \$7 million of state money (out of a total operating budget of about \$10 million).

The question was: How large would the hit be? Would the Station be able to maintain its excellent quantity and quality of services? Did the new governor and his staff understand the vital role played by Station employees in protecting the health of state residents and supporting the various agricultural businesses which contribute to our state’s economic well being? The answer was “No.”

On May 6, 2011, Mr. Benjamin Barnes (Secretary of the Office of Policy and Management [OPM], the Governor’s budget office) proposed Plan B, a list of state agencies and how they might be affected by a reduced state budget.

Plan B hit the Station hard: It eliminated all 67 state funded positions at the Station, effectively closing it down. Only two other agencies were targeted at this drastic level.

A letter was mailed to all ESA members asking you to write and/or e-mail Governor Malloy, Senator Toni Harp and Representative Toni Walker, cochairs of the Appropriations Committees, and your local legislators.

And write you did! Thanks to all of you for your heartfelt and prompt letters! “Public support shows that Connecticut residents see the value in the agency and what it does,” says Station Director Dr. Louis Magnarelli. “Public support saved our agency, and we cannot thank you enough for coming to our aid during this time of crisis.”

On June 28, the Office of Policy and Management proposed another document assessing budget cuts, and the Station budget was cut 29.9%, among the highest of all state agencies.

In order to meet these budget cuts, Station personnel had to be laid off, and 5 scientists and 3 support staff were put on alert.

However, in August the unions ratified the concession package and employees did not have to be laid off after all. Two support staff left voluntarily for other positions.

At the present time there are 7 vacancies at the Station; the OPM is holding back \$466,000 to help to balance the budget.

Dr. Magnarelli comments, “Although there are a number of important vacancy positions which will not be filled this year or next year, we are pleased to have our key programs in public health and agriculture still operating at a decent level.”

There are some positive signs for the Experiment Station. Governor Malloy and the OPM supported the allocation of \$500,000 in bond funds to build a research laboratory in Griswold, CT on the state property now under the care and custody of the Experiment Station. This facility is needed to investigate mosquitoes and Eastern Equine Encephalitis virus in southeastern CT but will also support field studies on agriculture and forestry.

We hope that Governor Malloy and his staff will understand the importance and value of the Experiment Station and that they will be supportive in the years ahead.

ESA Annual Meeting on March 29

This is always an informative and interesting annual event. Two Station scientists will share their latest research findings, ESA Board members will be elected, and refreshments will be served. The meeting starts at 7 pm in Jones Auditorium at The Connecticut Agricultural Experiment Station, 123 Huntington Street, New Haven. There is no charge to attend. For more information, call the ESA President, Dick Bergmann, at 203-966-9505.

New Video Financed by ESA

A key purpose of the Experiment Station Associates is to promote and publicize the work being done at The Connecticut Agricultural Experiment Station.

Karyl Evans of North Haven, daughter of Board member Jean Kreisinger and a professional videographer, offered to produce a video about the Station and market it to local media as a public service announcement. Her fee was paid by the Experiment Station Associates. It’s amazing how much information Karyl packed into this 30-second video!

See it for yourself on the Station website at www.ct.gov/caes/. Click on “Videos” at the top of the left-hand column. One video shows pictures with sound, while the other is just sound.

Two major TV stations in CT and some local cable stations have agreed to show the video as a public service announcement.

Dr. Magnarelli comments, “We plan to show the video at agricultural fairs, conferences, and meetings in the state.”

Station Scientists Kill Ticks with Nootkatone

a natural alternative to pesticides by Robert C. Pollack

A new kind of war on blacklegged ticks—which carry the Lyme Disease bacteria—is being waged by Entomologist Kirby Stafford and post-doctoral scientist Anuja Bharadwaj.

The disease claimed 4,156 confirmed or probable victims in 2009, a figure that dropped to 3,068 last year due to a cyclical reduction in the tick population. While there are a number of synthetic pesticides that are effective in killing the arthropods, many people, especially those with young children, balk at using them because of their potential toxicity and seek more natural alternatives.

The U.S. Center for Disease Control and Prevention (CDC) awarded the station a \$812,500 grant in 2008 over four years to test a chemical called Nootkatone, which is found in the essential oils of Alaska Yellow Cedar, grapefruit, and some other plants. The CDC found Nootkatone had shown promise in killing ticks in the laboratory.

Stafford said while there is no question Nootkatone kills these ticks—commonly called deer ticks—the problem is it breaks down very quickly and, used by the fragrance and food industry in small amounts, is too expensive at present for widespread use. Stafford said Nootkatone was tested at 12 homes in the first year and it proved to be 100 percent effective for a few days. “But it didn’t last long enough, less than a week,” he said.

Collaborating with the U. S. Department of Agriculture’s Agricultural Research Service, Stafford led the effort to evaluate longer lasting formulations for Nootkatone so it could be used in the field. “One idea was to encapsulate it in lignin, a compound found in wood, to release it far more slowly.”



The contracted applicator, Paul Saltanis of Country Green, applies the nootkatone while Anuja Bharadwaj and technician Heidi Stuber observe.

Kirby Stafford

The lignin formulation in the following year lengthened the time the chemical did its work providing 100% control for many weeks. A drop in the tick population in 2010 made evaluations more difficult, but Nootkatone provided 67% control.

Ticks have eight legs and contrary to popular opinion, are not insects but arthropods and are related to spiders.

The project to develop a practical alternative to synthetic pesticides in killing ticks has far-reaching significance because Lyme Disease is a growing threat all over the country. Its first symptom for about 50% of those infected is a small, red bull’s-eye rash at the site of a tick bite. The rash usually appears a week or two after a painless bite, but can appear within 3 to 30 days. And if the tick rash is very small and in a hairy place, it may never be noticed.

Other early, acute Lyme symptoms are flu-like—fatigue, achy muscles or joints, fever, chills, stiff neck, swollen glands, and a headache. If Lyme is identified in this early stage and treated with an appropriate course of antibiotics, it usually goes away. Treatment, however, doesn’t provide immunity; you can get Lyme again if

another infected tick bites you. There is no human Lyme disease vaccine.

Untreated, the bacteria can lie dormant and appear months or even years later. Lyme mimics the symptoms of over 350 diseases, including multiple sclerosis, lupus, Rheumatoid Arthritis, and Parkinson’s, so early diagnosis and treatment are paramount.

But Stafford and the CDC believe the best way to stop the spread of Lyme Disease is to control the tick population. And since ticks are often found in backyards, developing the non-pesticide approach in killing and controlling them is clearly a vital step forward in preventing the disease.

“We think our use of lignin, a cellular-based compound found in plant and wood cells to encapsulate Nootkatone has shown definite promise, but we need to extend its life much further and find a way to make it more affordable,” Bharadwaj said.

“I love working with Dr. Stafford on this project. I myself have a young son and would not want him playing in a yard heavily treated with pesticides if an effective, more natural compound was available.”