

Representing all Blueberry Growers
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N.C. State scientist searches for plants that help human health

By Dee Shore, NCSU

From Bhutan's rugged Himalayas to Ecuador's cloud forest to Alaska's frozen tundra, Dr. Mary Ann Lila searches high and low for what could be called pharmaceutical plants - and not the brick-and-mortar kind that make medicines. She seeks the leafy kind, full of chemical compounds that can stave off human disease, promote endurance and strength, improve metabolism and erase signs of aging.

Lila works from the N.C. Research Campus in Kannapolis, where she directs N.C. State University's Plants for Human Health Institute. The institute strives to shift the way the American public views and uses plant food crops as sources not just for nutrients but also for phytochemicals that protect and enhance human health.

The two-year-old institute, part of the College of Agriculture and Life Sciences, takes a multidisciplinary approach to pursuing that goal through research related to plant genomics and metabolomics, biochemistry, breeding and post-harvest physiology.

Lila, a professor in the Department of Food, Bioprocessing and Nutrition Sciences, is one of five N.C. State faculty members now working in the institute. The institute is expected to grow to 15 faculty members.

Lila's current research focuses on three areas: studying health-enhancing compounds in blueberries and other berries, isolating phytochemicals that counteract malaria, and working with scientists and students from around the world to explore natural products for biomedical use.

During a recent seminar at the research cam-



Dr. Mary Ann Lila at her N.C. Research Campus office.

pus, Lila discussed the latter project, which has taken her to Central and South Asia, New Zealand and Australia, Alaska and the Dakotas, Central and South America, and Africa.

These efforts are part of the Global Institute for BioExploration, or GIBEX, a research and development network Lila helped found while she was on the University of Illinois at Urbana-Champaign faculty. The partnership also includes N.C. State and Rutgers universities.

The group works with scientists, students and traditional healers in developing nations and with Native Americans to identify plants that

Continued on page 2

hold promise for human health.

GIBEX doesn't take any plants from the locations where it works, but it trains and equips local scientists with cost-effective drug-discovery tools and technologies that are portable and easy to use, Lila said. That way, discoveries can be made in the field, with the intellectual property remaining with the local population.

While GIBEX scientists use modern research-based technology to screen plants for medicinal properties, they depend on centuries-old native understanding of the healing properties of plants as their starting point.

"We work a lot with traditional healers or the scientists at the university who still, a lot of times, have a foot in both camps: They are modern scientists; they use advanced technologies such as high performance liquid chromatography, but they still practice some traditional medicine. It's what they grew up with," Lila explained.

"But mostly the traditional medicine hasn't been validated. They don't have the capacity to validate it. They don't have the instrumentation. They don't have the money to do the bioassays we can do here. So what we are really doing is putting some substance behind what your grandmother always told you."

Since GIBEX was started in 2003-04, it has used this approach to identify 17 plant extracts that have been licensed to pharmaceutical companies, Lila said.

These extracts involve so-called secondary compounds -- phytochemicals that aren't directly involved in a plant's normal growth, development or reproduction, she explained. Instead, these chemicals are created to help the plants protect and defend themselves and attract pollinators.

"Pigments such as carotenoids in tomatoes and anthocyanins in blueberries are examples.

They won't necessarily accumulate in the plant unless the plant is under stress, and that's why wild plants tend to have the highest concentrations of these secondary components," she said. "Now interestingly, these same components that a plant uses to enhance its own survival under stress can interact with human therapeutic targets when the plant is ingested as food," she added. "They will interact with human therapeutic targets to specifically counteract human disease and improve human metabolism."

While Lila spends some of her time in the field looking for plants with such properties, she also conducts complex laboratory research aimed at understanding the precise health benefits of particular phytochemicals and at shedding light on the previously hidden ways that the chemicals build people's muscles, boost immunity, inhibit cancer, reduce inflammation and more. One of Lila's recent studies found, for example, that concentrated amounts of blueberry anthocyanin reduced glucose levels in diabetic mice better than metformin, a drug widely prescribed for type 2 diabetes.

In looking ahead, Lila said she hopes to continue to discover plants that could become agricultural crops that boost human health. At the same time, she hopes the Plants for Human Health Institute she leads will play a key role in helping the public better understand what's known about phytochemicals and how people can use them to enhance their health.

For Lila, that begins with personal practice. The researcher starts every day, she said, by eating at least a half cup of her favorite superfood: blueberries.

-- Written by Dee Shore, 919.513.3117 or dee_shore@ncsu.edu

Sampson County Blueberry Tour

The Bladen County Educational Blueberry Tour will be held on June 21, 2010. This year's host is Chester Barnhill, owner of Sweet Berry Farms in the Rowan Community of Bladen County. Our host very informative, interesting, and hospitable. The tour begins at the propagation beds and continues full circle to the finished product of packaged blueberries ready for market. Lunch will be Melvin's hamburgers and hot dogs, Coke or Pepsi and chips. The cost for the meal will be \$3 per person.

Participants will meet at the Powell Melvin Agricultural Service Center, 450 Smith Circle Drive, Elizabethtown, N.C. 28337 at 8:30 a.m. Transportation will be furnished. Hopefully departure will be before 9:00 a.m. and the return to the Service Center around 3:45 p.m. Please call one of these numbers if you plan to attend:

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Blueberry maggot monitoring underway *by Dr. Hannah Joy Burrack*

As part of a NC Blueberry Council, Inc. funded project to develop insect pest monitoring programs for blueberries, our lab has been trapping weekly to determine the population density of blueberry maggot (*Rhagoletis mendax*) in North Carolina blueberry growing regions.

The blueberry maggot is a true fruit fly (Family Tephritidae), with 1 generation per year in NC. Blueberry maggot has a narrow host range, feeding on commercial blueberries and their close wild relatives. Blueberry maggot can be an extremely serious pest in blueberries. The larvae (maggots) feed internally in fruit and damage can be very hard to detect on the surface. If left unchecked, blueberry maggot infestations can be extremely high, but in North Carolina, the extensive use of pesticides and relatively concentrated commercial blueberry growing region has resulted in suppression of blueberry maggot populations to below detectable levels in many areas.

Most large blueberry growers in NC export at least part of their crop to Canada, which imposes quarantine restrictions on blueberries imported from areas where blueberry maggot is found. In order to be accepted for import into Canada, growers must comply with the Canadian Food Inspection Agency's phytosanitary requirements, which require 1 of 2 blueberry maggot management strategies be adopted. The *Calendar Spray Program* requires pesticide treatments (of any material registered for blueberry maggot and recommended by local extension personnel, in other words, me) begin at first trap capture and continue every 7-10 days through the end of harvest. The *IPM Program* requires that each farm be monitored for blueberry maggot flies with yellow sticky traps baited with an ammonia food lure at densities specified by the quarantine protocol. Growers in the IPM Program apply pesticide only if a blueberry maggot fly is caught and make a minimum of 2 applications. If no further flies are caught, pesticide applications cease until the next trap capture. The North Carolina Department of Food, Agriculture & Consumer Services (NCDA & CS) oversees the certification program for blueberry maggot and only works with growers using the calendar program. Our trapping effort is designed to provide both blueberry growers and NCDA & CS with the information necessary to allow interested growers to implement the IPM program in the coming years, and hopefully to reduce pesticide applications.

This program covers 14 separate fields which total just over 1500 acres in Bladen and Pender Counties and includes a total of 149 individual traps. Two additional sites in Rockingham County, NC are also be monitored because these locations have a history of blueberry maggot infestation, while our eastern NC sites have not had detectable blueberry maggot populations for at least the last 3 years.

To date, we have captured only 1 blueberry maggot fly, a male caught during the week of May 17th. The grower is certified by NCDA & CS under the calendar spray program, so he was scheduled to begin treatments that week and to continue treating weekly until the end of harvest. No additional trap captures at this, or any other, farm have occurred thus far. If trap captures remain this low through the remainder of the season, there is real potential to decrease the number of pesticide treatments applied in the future.

Blueberry maggot fly trap captures to date are updated weekly, and all changes can be seen in real time at <http://tinyurl.com/2b8qjcm>. For photos and other information visit online: <http://tinyurl.com/25lkj8p>.



Hannah Joy Burrack is Assistant Professor and Extension Specialist, Associate Member of the Graduate Faculty, Department of Entomology, North Carolina State University. Tobacco, Small Fruit and Specialty Crop Entomology, hannah_burrack@ncsu.edu



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Legislative Update—Joanne from Jones



The North Carolina General Assembly returned to Raleigh on Wednesday, May 12 to begin the second year of the two year legislative session. The primary focus for members as they return will be dealing with budget issues and looking for initiatives to create jobs. It

also appears that both the Senate and House will work hard to resolve the budget issues quickly, take care of a few other important items and adjourn. This year has the makings of a short session.

It does not appear that there will be any comprehensive legislation considered during the short session dealing with water quantity issues. Since the end of last year's legislative session, the Water Study Commission as well as the Commission's working groups held meetings to further discuss water quantity issues. As a result of these meetings, a total of ten legislative proposals came out of the full Commission, two of which deal directly with agriculture. The two agriculture related proposals are now in the form of bills that were introduced in the House last week.

The first one which is **HB 1745**, directs the NC Department of Agriculture and Consumer Services and the NC Department of Environment and Natural Resources to continue to work with the Farm Bureau and other agricultural leaders and organizations to develop a plan, which will be updated on a regular basis, that will identify agricultural water infrastructure needs for farmers. This will help in placing the needs of agriculture before the General Assembly on a regular basis.

The second proposal which is now **HB 1748**, directs the NC Department of Agriculture and Consumer Services and the NC Department of Environment and Natural Resources to design a cost share program to assist farmers and landowners who want to implement Best Management Practices to protect water resources related to agriculture water use.

I will continue to monitor the progress of these

bills as well as any other issues of interest to the Council.

On Friday, May 7th, Julie Woodcock & I attended a commodity group meeting at the McKimmon Center in Raleigh where we heard from Chancellor Woodson as well as other elected officials. While attending the meeting, we had an opportunity to speak with Dean Johnny Wynne regarding the blueberry industry and the importance of the research efforts of the university at the Castle Hayne research station. Dean Wynne assured us of his commitment to our valued personnel for the blueberry industry, even calling them by name. This is very important concerning the budget deficit again for this year's state budget.

5/19/10: The House Agriculture Committee met this past week at the General Assembly and asked David Smith, - **Chief Deputy Commissioner over Administration** for the Department of Agriculture to present the proposed budget of the Governor and Senate. Mr. Smith did so and some of the highlights are below.

Speaker: **David Smith**, discussed the general fund operations within the Department of Agriculture.

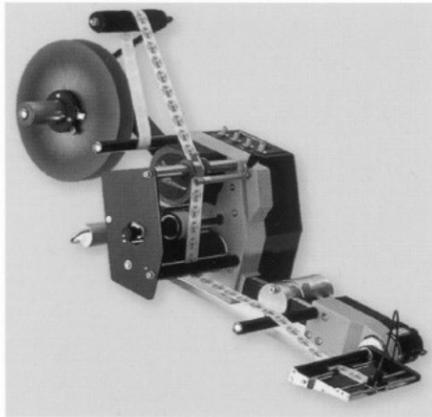
This years budget has been reduced by \$4.7 million, projected budget is around \$59.8 million 1349 positions within the Dept. of Agriculture 84% of money goes to salary expense, only 16% of money goes to operational expenses. The budget received the full 7% cut from Gov. Purdue's budget creating concern that the Department of Ag cannot withstand a cut that large.

The **Budget is \$500,000 less than it was 10 years ago!** Some hits the Department of Agriculture has suffered include reduced marketing and inability to keep up with technological advances.

The House will take its turn at the budget next and then the final differences will be determined and sent back to the Governor. **I will monitor the budget closely for The NC Blueberry Council's interests this year**

Respectfully, Joanne Stevens

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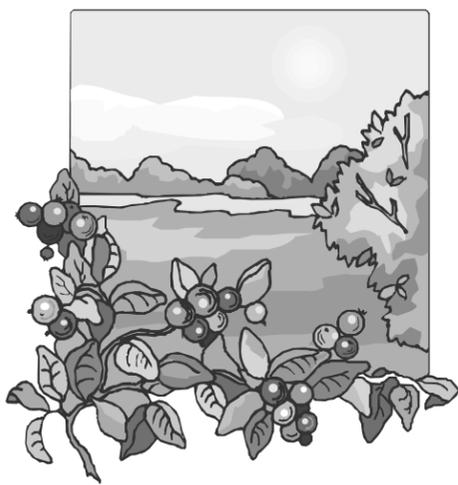
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Blueberry Conference
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The North American Blueberry Research and Extension Workers Conference (NABREW) has been a key educational forum for blueberry researchers, Extension educators and industry leaders since the first meeting in 1960. This year's conference will run include oral and poster presentations and will conclude with a one-day tour of the Michigan blueberry industry. After a welcome reception on the 25th, sessions will include regional industry reports; breeding and genetics; cultural practices; pest, disease and weed management; organic production and post harvest handling. Dr. Mike Mainland of NCSU will present the keynote address, "The History of North American Highbush Blueberry Culture" on July 26th. Sessions on genomics and organics will be the highlight on Tuesday, July 27th followed by a conference dinner at the Kalamazoo Air Zoo complete with free flight simulator rides.



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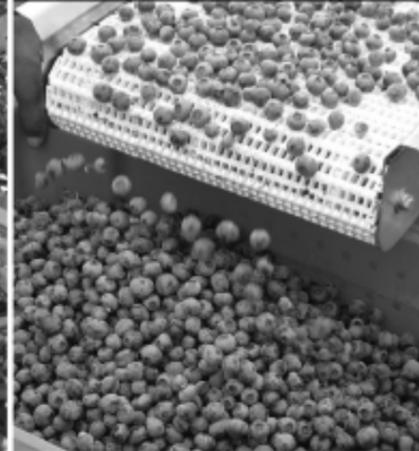
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City of Hope Researching Blueberries for Some Forms of Breast Cancer

City of Hope researchers taking a close look at the powerful phytochemicals in blueberries. "It possibly could prevent the spread of the cancer," said City of Hope research fellow Lynn S. Adams, Ph.D. And not just any cancer, but one that generally carries a poorer prognosis -- triple-negative breast cancers. Triple-negative tumors are not driven by estrogen, progesterone or HER2 proteins, so it can't be treated with latest targeted therapies. "The feature of the cancer tends to be very aggressive," said Shiuan Chen, Ph.D., director of City of Hope's Division of Tumor Cell Biology.

But when researchers applied blueberry extracts to cancer cells in the laboratory it appeared to stop the growth and spread of a tumor. "We actually believe that it's a combination of all the different phy-

tochemicals in blueberries working together that aid in increasing its activity," said Adams.

While more research is needed to determine how many blueberries a person will need to eat to reap benefits. "It comes out to be about two cups a day from what our animals were ingesting. But it is difficult to say that something that works in an animal study will work the same in a person," said Adams.

The next step is to do human clinical trials on breast cancer patients. "We want to give people every weapon in the arsenal that we can to help the prevention and reoccurrence," said Adams.

City of Hope researchers say if you are eating certain types of fruits and vegetables regularly, it's a good idea to alert your doctor because certain phytochemicals can interact with medication.



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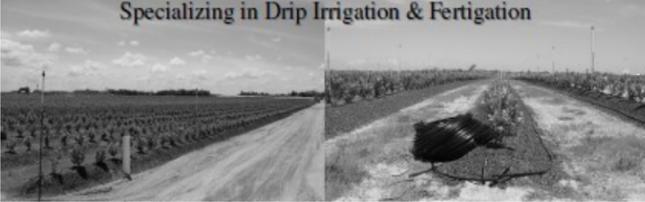
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- 1/4 cup butter, softened
- 1/2 cup packed brown sugar
- 1 large egg
- 1 tsp vanilla
- 1 cup flour
- 1/2 tsp. baking powder
- 1/2 tsp. baking soda
- 1/4 tsp. salt
- 1/2 cup well-shaken buttermilk
- 1 cup blueberries, fresh or frozen

coarse sugar, for sprinkling (totally optional)

Preheat the oven to 350°F. In a medium bowl, beat the butter and brown sugar for a minute or two, until fluffy. Beat in the egg and vanilla.

In a small bowl, stir together the flour, baking powder, baking soda and salt. Add half to the butter mixture and stir just until blended; add the buttermilk in the same way, then the rest of the flour mixture. Spread the batter into a 9" pan that has been sprayed with nonstick spray, and scatter with blueberries. If you like, sprinkle with coarse sugar.

Bake for 20-25 minutes, until golden and springy to the touch. Cool in the pan on a wire rack.

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The Fruit and Vegetable Weed Group at NC State has been working on developing a web site for weed science related information. With the help of Ag Renaissance we now have something that is ready to be used. The web site is still being developed and we hope to have a completed site by this fall but there is good information on it now. You can get directly to the fruit and vegetable herbicide recommendations in the Ag Chem Manual from the site and other one page recommendation each individuals crops are going to be developed. One of the most exciting portions of the web site is the information on herbicide injury. Herbicide injury information on the web for fruit and vegetable crops is very limited and we are developing a photo library of herbicide symptomology on crops and weeds. You can see we have gotten off to a good start. Some the pictures were sent to us and if so we credited the individual who took the photo. If you have comments or ideas let us know. The contact information for myself, Katie, David, and Roger is on the site.



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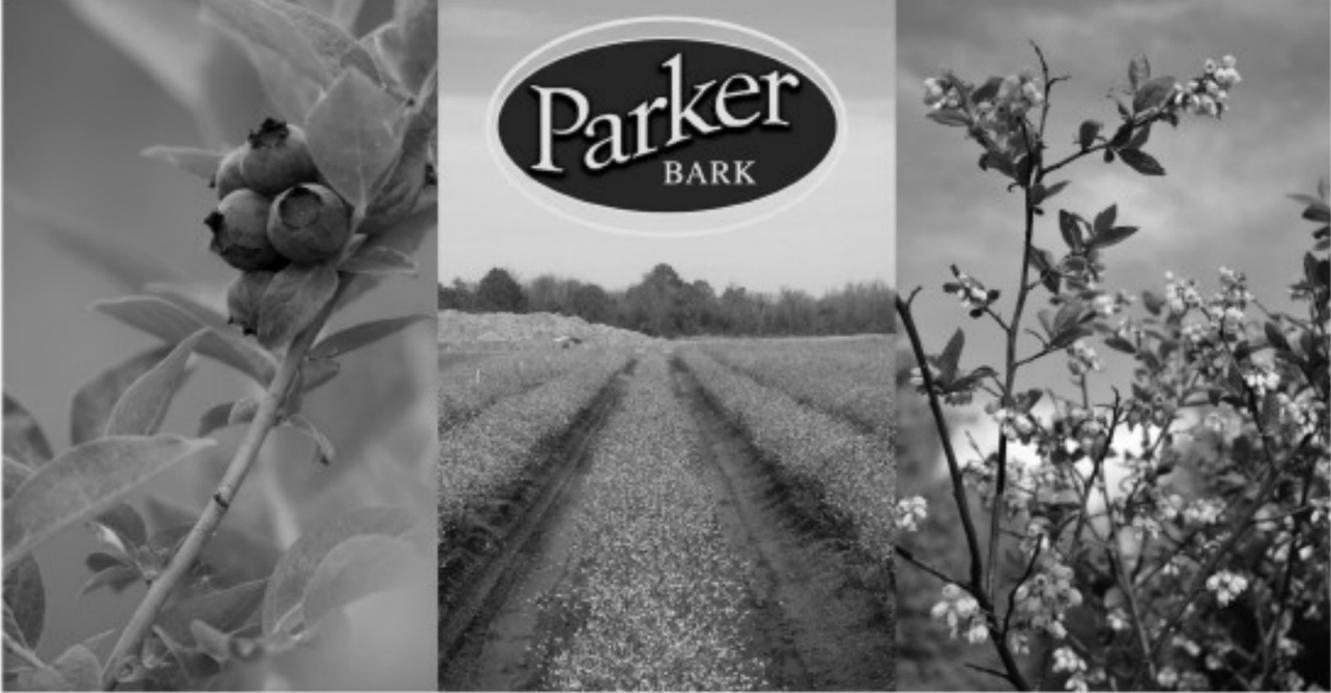


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