

The Tiller

Plants & Soil: Tools for a Cleaner Environment

Department of
**PLANT & SOIL
SCIENCE**



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Making Way



Backhoes and bulldozers tackle the Ag-Engineering building, tearing it down.
Prior to demolition, all salvageable materials were removed and recycled through Recycle North Building Materials Center. <http://www.recyclenorth.org/html/bmc.htm>

Jeffords Hall Breaks Ground

The UVM Board of Trustees approved the naming of the new Plant Sciences Building as Jeffords Hall. This acknowledges the \$3 million federal contribution to the building, crafted by the former Senator. Ground-breaking occurred on May 16 with full fanfare and more than 200 people in attendance. Assistant Professor, Sarah Lovell, consulted on the design of the landscape to incorporate production and ecological functions. Edible gardens will reflect an ‘urban agriculture’ theme, with annual planting beds on the west side of the building, a ‘green wall’ of Hardy kiwi vine (*Actinidia arguta*) on the south facade, and a framework of perennial species including Highbush blueberry (*Vaccinium corymbosum*) and Shadblow serviceberry (*Amelanchier canadensis*) throughout the landscape. Bioswales containing American elm (*Ulmus americana*) trees planted into a base of mixed herbaceous perennial species will be established along the roads to collect and treat storm water. An arboretum on the northeast side of the building will highlight unusual plants that are cold hardy and well-adapted to the Vermont environment, including species with edible fruits and nuts.

Mark Starrett will contribute more than 100 species from his collections at the Horticulture Research Farm to populate the arboretum. Raised beds will provide space for plant collections and heirloom species to support educational functions of the building. The landscape will become an outdoor laboratory for hands-on curriculum, internships, new summer offerings and research projects. We look forward to these exciting new opportunities to ‘green’ our campus. Occupancy of the new building is scheduled for late summer 2010.

Keep in touch:

- Write to pss@uvm.edu if you would like to be added to our new Alum Listserve and to receive upcoming newsletters.
- Let us know what you are up to. Include a picture if you can.
- Check out what other Grads are doing under the PSS Alumni section on our website at: www.uvm.edu/~pss

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From the Chair



Deborah Neher

This fall marks the beginning of my fifth year as Department Chair in Plant and Soil Science. Enrollment in our courses has dramatically increased this year demonstrating the increased visibility

and excitement about our curriculum and its pivotal role in food systems. We have 51 students who declared majors in Sustainable Landscape Horticulture and Ecological Agriculture. We have expanded our service course offerings from Environmental Science to also include Environmental Studies, Education, and Business students. This past year, we hired two new Assistant Professors, Yolanda Chen (Agroecology of Specialty Crops) and Josef Görres (Ecological Soil Management). Our graduate program continues to grow with increased extramural funding. We currently have 25 graduate students enrolled in our programs, of which 11 are pursuing doctoral degrees. In summer 2009, we plan to debut a collection of summer courses to be held at the Horticulture Research Center. We thank you for your continued loyalty and support of our programs!

Deb



The Tiller is an annual newsletter from the Department of Plant and Soil Science, Vermont College of Agriculture and Life Sciences at UVM.

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A Couple of Diseases that “flew” into the Plant Diagnostic Clinic this year

As winter approaches, we try to remind ourselves there are a few good things about nights at 20 degrees below zero. These frigid nights ensure that some of our fungal diseases that can wreak havoc in our vegetable gardens do not survive the winter. Unfortunately, these fungus diseases do have minuscule spores that can be carried on air currents in the spring from southern states where they do over winter, up to Vermont on storm fronts throughout the summer. Two of these destructive diseases were identified on Vermont vegetable farms and gardens late in the season this past summer. The first fungus (not officially a fungus anymore but a water mold) is *Phytophthora infestans*, the organism that was responsible for the Irish potato famine in the 1840s. We saw this blight first in Lamoille county where it was causing the rapid death of potato foliage in low spots in the field. This disease can quickly spread on potatoes and can attack tomatoes in and out of the greenhouse. With good scouting, it can be held at bay with conventional fungicides, but organic options are limited and need to be sprayed often. Luckily, we saw this destructive disease late in the season when most growers were digging potatoes already, so loss of foliage was not as critical.



The second disease is called downy mildew which overwinters in southern areas and blows up to Vermont in some years depending on the storm fronts. We had perfect conditions for this disease this past summer and found the disease in Vermont in early August causing dieback on cucumbers, pumpkins, greens, basil and crucifers. Most growers choose resistant varieties to combat this disease, but there are several different pathotypes of the fungus that are constantly adapting to overcome this resistance. A couple of growers lost their late planting of cucumbers to this destructive disease.



So, when you are complaining of the cold winter nights, just remember, it does kill these two destructive fungi that cause problems in our crops. Now if we could only do something about the storm fronts and winds in June, July and August....

News from the Vineyard



The vineyard at the UVM Hort Farm has really taken shape this year. The vines were planted in the spring of 2007 but did not grow much or set fruit that year. What a

difference a year makes! Farm manager Terry Bradshaw has been busy training the vines to their trellis using a high-wire cordon system. Anyone who knows grapes, even wild grapes, knows that they can be vigorous and aggressive growers.

The vineyard is part of a multi-state research project to evaluate performance of newer, cold-hardy winegrape cultivars. This vineyard represents the coldest winter and coolest growing season conditions of any of the sites in the East. A randomized experimental design was used to plant the following eight winegrape cultivars: 'Frontenac', 'LaCrescent', 'St. Croix', 'Marquette', 'Prairie Star', 'Corot Noir', 'Vignoles', and 'Traminette'. Additionally, a border was planted of the following eight table (fresh-eating) grape cultivars: 'Beta', 'Concord', 'Einset', 'Mars', 'Reliance', 'Somerset Seedless', 'Swenson Red', 'Vanessa'. The table grapes are not part

of the multi-state project but protect the winegrapes and are of separate interest to growers in Vermont.

Research will be conducted to determine which cultivars not only consistently survive Vermont's winters, but which cultivars are least vulnerable to spring frosts, and which will consistently ripen within Vermont's relatively short growing season. Data on bud survival from the first winter were collected in May and vine development has been monitored over the growing season.



For more information on Cold Climate Grape Production visit <http://pss.uvm.edu/grape>. The 'Vine Phenology' and the 'IPM News' are updated regularly throughout the growing season.

The vineyard research is being funded by a UVM Hatch Grant and a Viticulture Consortium-East Grant for which we are very thankful.

.... Got Bees???



Adding the super

We do! Last winter undergraduate students Greg Soll, 2010 and Corey Paridis, 2009 made understanding bees their goal. With Student Government Assistance funds, and faculty member Sid Bosworth as a sponsor, the new Beekeeping Club was formed. Attending workshops offered by the Intervale Foundation (<http://www.intervale.org/>) they learned how to build hives, install nucleus colonies, and care for the growing brood. They join a long agricultural heritage of beekeeping in Vermont. The 1868 U.S. agriculture survey showed Vermont as being, as it is now, the leading honey producing state in New England with 12,000 to 15,000 hives producing from 400,000 to 1,000,000 pounds of honey annually.



Smoking sedates by cutting back the bees pheromones, making them lethargic.

jaunty yellow hives with a majestic view agree with them.



hmmmm... how much honey can I take...?

If you are interested in learning more, check out Vermont Beekeeping at: <http://www.vtbeekeepers.org/>

Meanwhile, there are some folks in Hills who are looking forward to dipping HRC apples into the first crop of HRC honey. Greg tells us it is unusual for bees to produce enough honey for harvest the first year. Maybe those

Common Ground Student Run Farm



Common Ground faculty advisors and President, from left to right, Yolanda Chen, Ann Hazelrigg and Andrew Herrick.

<http://cgsref.blog.uvm.edu/>

Common Ground invited the Feel Good group out to the farm for a gleaning session. The collected tomatoes were used with donated cheese (Shelburne Farms) and bread (Klingers Bread Co.) for making sandwiches. The less overhead incurred, the more dollars go back to funding community-centered models of development. The UVM chapter of Campus Kitchens is the brainchild of Common Grounder Kate Turcotte, who wanted to kick things up a notch by following the produce out of the field and into the kitchen. Sixty three pounds of vegetables were picked and brought to the Simpson Dining Hall facility where they were prepared as part of meals distributed through various venues, including the Chittenden County Food Shelf.



PSS undergraduate Ben Crockett, '09 pressing cider for an appreciative crowd at the Harvest Festival.

It's been a busy year for Common Ground, on both the farm and campus. At the farm, they cultivated two of their three acres and sold 39 CSA shares to UVM affiliates. For the first time ever, UVM dining services bought five shares. Throughout the summer, the ultra fresh produce was delivered to Waterman Manor and served to new recruits and their families at June orientation events.

On the main campus, they are building connections with two other food related student run groups; Feel Good UVM <http://www.feelgoodworld.org/> and Campus Kitchens <http://www.uvm.edu/~kitchens/>.

The Feel Good group promotes a grass roots approach to educate people about world hunger. Their choice of curriculum? A delicious grilled cheese sandwich made with local ingredients. Campus Kitchens is a collaborative effort between Community Services Projects and University Dining Services. Together they are an anti-hunger resource for the Burlington Community.



Band members playing amongst the apple crates, and there's talk of adding clogging to the festivities next year.

Watching our students take on these worthy endeavors, alongside a full course load, with the time, energy and sheer labor they lavish on them is inspirational.

They ended the season with a harvest festival on September 27th co-hosted with the Horticulture Club, Alpha Zeta, and CALS student representatives, which was extremely successful. Apples were picked, cider was pressed, we enjoyed the sounds of a local bluegrass band, and everyone celebrated a successful and happy seasons' end. So now it's time to pull up the irrigation tape, plant garlic, and take a well needed rest.

Better Understanding Pasture Mixtures

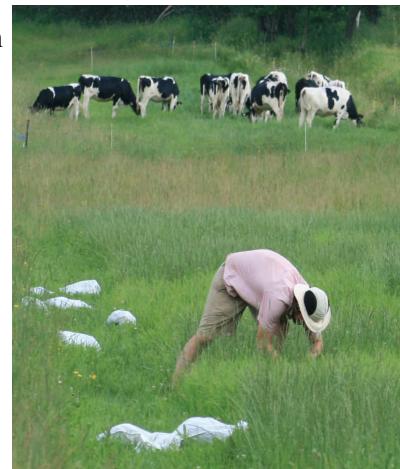


Sid Bosworth is explaining the Pasture Mixture trial at a field meeting held in October of 2007.

Many seed companies sell pasture mixtures to farmers but there is little information about their performance and persistence when grown in New England. As part of a recently funded USDA-SARE (Sustainable Agriculture Research and Education) grant, Dr. Sid Bosworth, UVM Extension Forage Agronomist and PSS faculty member, is collaborating with Dr. Rachel Gilker of the UVM Center for Sustainable Agriculture and colleagues from the University of Massachusetts and Pennsylvania State

University to evaluate several commercial pasture mixtures. The aim is to gain insight on the productivity and adaptability of many newly released grass and legume cultivars when grown in complex and binary mixtures.

Field trials were established in Vermont, Massachusetts and central Pennsylvania in 2007 and evaluations began in 2008. The field trial in Vermont is located in a pasture at the Vermont Tech Dairy farm and is subjected to rotational grazing by dairy heifers so the plots are exposed to real grazing conditions. In addition, seven cooperating farms in Vermont have planted half-acre strips of some of the same mixtures to compare performance under different farm and soil conditions. Data will be collected through 2009.



Peter Merritt, a recent graduate of the Ecological Agriculture program in PSS, collects pasture samples just prior to grazing.

Growing Organic Wheat in Vermont



Susan Monahan, graduate student in PSS, at her organic wheat trial at the UVM Horticultural Research Farm.

The growing interest and demand for sourcing local foods has caught the attention of people throughout Vermont. Two articles appeared recently in the Boston Globe and the New York Times highlighting Vermont grain growers and the growing interest in buying local flour. A current research study conducted at the UVM Horticultural Farm has been focusing on growing organic wheat. Master's student

Susan Monahan, supervised by professor Sid Bosworth, is studying the effects of variety and fertility amendments on wheat production and bread quality. Fertility amendments include manures, compost, and legume cover crops. Susan has also managed a second location for the research at the Cornell Willsboro Research Farm as part of their long-term organic hay and small grain rotation project. This research will provide information to local farmers about various fertility treatments for producing high quality grain for human consumption.



Harvesting wheat with a small plot combine.

Staff Award.... Colleen Armstrong



If you ask Colleen Armstrong what she does for a living she always answers, "I have the best job on campus." As the facilities coordinator for the UVM greenhouses, she spends her days in the brightly lit, warm interiors of the greenhouse complex. To those of us who visit the greenhouses, they are a restful refuge, complete with Mozart and trickling water features. To Armstrong, they represent a daily, 365 day a year challenge and responsibility. At UVM since 1992, she earned her Masters degree in 2000 and teaches PSS 127 Greenhouse Operations and Management. We are glad the college has recognized our wonderful colleague with the staff award for 2008, and congratulate her with a green thumbs up!

The College of Agriculture and Life Sciences Award for Excellence in Staff Support is the most prestigious staff support award in the CALS. It recognizes outstanding effort and achievement in the support of the mission of the College. The recipient of this annual award has his/her name engraved on a commemorative plaque, receives a personal cash award of \$750, as well as an additional amount to enhance or replace equipment in their office. The award is presented and the recipient is recognized formally at the CALS Honors Day held each year in mid-April.

Greenhouse Updates



David Heleba, Greenhouse Research Technician

During the last two spring seasons, the UVM Greenhouse Facilities has been happy to provide a limited amount of bench space to the UVM community for vegetable and bedding plant production for their home gardens. This past spring we had fourteen people participate along with the UVM Campus Children's Center (an employee-based early education and care program for children 6 weeks to 5 years of age). Every week, we would be blessed with a group of children eager to plant seeds, transplant seedlings, or just observe how their little plants were growing. Our adult participants were just as keen to sow and transplant as the children. Everyone who grew their own plants had a great time and all have said that they will be back next year.

In 2009, we hope to upgrade the water feature in the main conservatory. Since the facility opened in 1991 we have had a "Rubbermaid" water garden that consisted of 6 large (100+ gallon) tubs. The water feature contains many aquatic plants common to "living machine" waste water treatment facilities. Recently water movement and a fountain were added to enhance the appearance and create a more soothing environment for our visitors. However, the whole water garden is in need of an overhaul and redesign. If anyone is interested in participating in the new water feature redesign, please contact Colleen Armstrong at 802-656-0465 or e-mail greenhouses@uvm.edu. We are looking for creative ideas as well as funding for this project.



Tom Doubleday, Greenhouse Research Technician

We are excited that we will have a new neighbor to the campus greenhouse facilities. The new Jeffords Plant Science building is under construction. When completed in 2010, this new facility will be connected to the greenhouse complex via a glass corridor between the greenhouse and Stafford Hall. We anticipate that faculty, staff, and students will all enjoy the closer physical connection between their lab and classroom spaces and the greenhouse structure. Check out the greenhouse facilities at <http://www.uvm.edu/~grnhouse/>.

New Faculty Members



Yolanda Chen, Insect Agroecology Assistant Professor. Dr. Chen comes to us after spending 4 years overseas in the Philippines working as an entomologist at the International Rice Research Institute. Prior to going overseas, she received her graduate and postdoctoral training at the University of California at Berkeley.



Josef Görres, Ecological Soil Management Assistant Professor. Dr. Görres comes from the University of Rhode Island. His interest is in combining soil physics with soil ecology, the interaction among invasive earthworms and invasive plants in sugar bush, and in revisiting the USDA soil quality parameters.

Current Faculty

- * John Aleong - Applied Statistics
- * Lorraine Berkett - Plant Pathology
- * Sidney Bosworth - Field & Forage Crops
- * Yolanda Chen - Insect Agroecology
- * Scott Costa - Entomology
- * Aleksandra Drizo - Constructed Wetlands
- * Josep Görres - Ecological Soil Mgmt.
- * Vladimir Gouli - Insect Pathology
- * John Hayden - Ecological Agriculture
- * Ann Hazelrigg - Plant Pathology
- * Sarah Taylor Lovell - Landscape Design
- * Ernesto Mendez - Agricultural Systems
- * Deborah Neher - Soil Ecology
- * Bruce Parker - Entomology
- * Leonard Perry - Ornamental Horticulture
- * Donald Ross - Soil Chemistry
- * Margaret Skinner - Entomology
- * Mark Starrett - Horticulture/Landscape
- * Jon Turmel - Entomology
- * Stacey Waterman - Agroecology
- * Eric Young - Soil Fertility

In the Spotlight - Deb Neher International

Deborah Neher joined the Department of Plant and Soil Science in August of 2004. She moved with her husband and lab manager, Tom Weicht, and research group in soil ecology from University of Toledo, Ohio. Over the past 4 years, Deb has served as Department Chair and been promoted to the rank of Professor, and all the students who journeyed to UVM have earned their graduate degrees. Behind the scenes of the department office, she travels around the globe in search of soil nematodes, microarthropods, and protozoa. The National Science Foundation



Caren Dorsner

funds her work in the tropical rainforests of Costa Rica to discover new species of nematodes in above-ground habitats that multiply estimates of biodiversity for the tropics. In June 2007, NSF invited Neher to be part of a North America team of ecologists and engineers to Bahia Blanca, Argentina to envision a continental-scale environmental monitoring program. The Department of Energy provided six years of funding to investigate effects of climate change on the ecology of soil biological crusts in the arid lands of southwestern US (The View story, <http://www.uvm.edu/theview/article.php?id=2752>). Her group focuses on the soil food web, targeting the protozoa, nematodes, and microarthropods. Recent funding helps keep her closer to home. She is involved in a SARE grant to co-instruct a series of workshops on plant-parasitic nematodes in vegetable crops in the Northeast. This summer, her group initiated a survey of plant-parasitic nematodes in soils with vegetables spanning 36 farms in Vermont. She collaborates with Sarah Lovell on a Department of Transportation grant to examine the effects of road particulate matter on plant and soil communities in forested landscapes. Through support from National Resource Conservation Service, she is collaborating with Lini Wollenberg, Rachel Gilker and Jennifer Colby of the Center for Sustainable Agriculture on implementation of winter pasture and bedded pack management for Vermont dairy farms.

She is equally comfortable in the classroom. She developed an upper division course in Soil Ecology that runs every other spring (2007, 2009), and professional development courses for incoming graduate students (fall) and upper division undergraduate (spring) students.

When not hard at work as a researcher or Chair, Deb enjoys hiking, gardening, cooking and photography. More information at www.uvm.edu/~dneher



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PSS Degrees Awarded at the 2008 Commencement

BACHELOR OF SCIENCE

Ecological Agriculture

Benjamin O. Brown

Peter E. Merritt

Evan S. Reiss

Travis J. Streeter

Derek J. Williams

Robert S. Young

Plant and Soil Science

Benjamin M. Robert

Sustainable Landscape Horticulture

Michelle A. Blow

Cole R. Downing

Richard E. Kaknes

Stephen G. Torosian

MASTER OF SCIENCE

Stacie Grassano – M.S. – Whey-Based Fungal Microfactories for *In Situ* Production of Entomopathogenic Fungi

Panagiotis Lekkas – M.S. – Formulations of Entomopathogenic Fungi and Application Methods for Tarnished Plant Bug Management

DOCTOR OF PHILOSOPHY

José A. P. Marcelino – Ph.D. – Epizootiology and Phylogenetics of Entomopathogenic Fungi Associated with *Fiorinia externa* Ferris (Hemiptera: Diaspididae) in Northeastern USA

Abdon L. Schmitt – Ph.D. – Alternative Paddock Management to Improve Dairy Herd Grazing Behavior