Can Biofuels Fill the Void?

Researchers Explore Alternatives to Fossil Fuels
As the current political and environmental climate makes clear, reliance on fossil fuel is a risky business at best. Supplies are unpredictable and ultimately finite, and the burning of fossil fuel has been blamed for human health issues and global warming.

That’s why the United States and other countries are actively investigating alternative biofuels such as ethanol. And as you will discover in this issue of *Momentum*, faculty at the College of Agriculture and Natural Resources are actively involved in this investigation. Some are exploring such novel and diverse biofuel “feedstocks” as barley, hybrid poplars, and algae, while others examine economic implications and strategies for improving production.

As important as such hi-tech innovative research is, the human element is equally important to the college’s mission, as two other *Momentum* stories reveal. One profiles two students whose dedication to agriculture has resulted in honorary titles, academic scholarships, and an opportunity to educate others about the state’s number-one industry. The other article highlights our exciting work through the Engaged University, work designed to improve the quality of life and future opportunities for children in communities surrounding the University of Maryland. By reaching out to these children before they reach high school, we are helping to instill the self-esteem and love of learning necessary for them to achieve success as adults.

So...welcome again to this written window into the College of Agriculture and Natural Resources. I hope you enjoy and appreciate what you see.
Are You Looking for More?

Overall, college has allowed me to develop into the individual I want to become and to identify where I want to go and how I’m going to get there.

Julie Townsend

Are you a high school student looking for more?
Are you ready to transfer to the University of Maryland?
We have what you are looking for in the College of Agriculture and Natural Resources.

WE HAVE MORE!
- Agricultural and Resource Economics
- Animal and Avian Sciences
- Environmental Science and Technology
- Nutrition and Food Science
- Plant Science and Landscape Architecture
- Institute of Applied Agriculture
- Virginia-Maryland Regional College of Veterinary Medicine
# Table of Contents

14 **Taking Down Fences:** Engaged University Bridges the Gap Between the University and Its Neighbors

18 Pageant Princesses Promote Agriculture

6 Can Biofuels Fill the Void?

---

## Departments

<table>
<thead>
<tr>
<th>Department</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>College Kernels</td>
<td>2</td>
</tr>
<tr>
<td>Faculty Highlights</td>
<td>3</td>
</tr>
<tr>
<td>Alumni Update</td>
<td>20</td>
</tr>
<tr>
<td>Student Highlights</td>
<td>23</td>
</tr>
</tbody>
</table>
Strengthening International Connections

While on a trip to Asia with University of Maryland (UM) President Dan Mote, Dr. Cheng-i Wei, dean of the College of Agriculture and Natural Resources (AGNR), celebrated the university’s 150th anniversary at an alumni meeting in Taiwan. He and Dr. Mote then joined AGNR faculty Drs. Richard Weismiller, Prabhakar Tamboli, Jose Costa, and Raymond J. Miller for a visit to Haryana Agricultural University (HAU), one of the leading agricultural universities in India. During this visit, participants signed a memorandum of understanding with Haryana Agricultural University and agreed to:

- Submit a joint UM/HAU research proposal for vaccine development to the Indian/World Bank program;
- Consider a joint research program in wheat biotechnology;
- Hold video conferences on curricula modernization once HAU has adequate video conferencing capability; and
- Establish an undergraduate student exchange program, beginning with the participation of two HAU students in the UM Veterinary Medicine senior internship and two UM students in HAU programs this spring.

Bay Programs Get New Home

Chesapeake Bay Agricultural Programs have been transferred from Maryland Cooperative Extension to the Department of Environmental Science and Technology. These programs will integrate well into the department’s four focus areas: soil and watershed sciences, ecosystem science and management, ecological design and technology, and environmental health. Chesapeake Bay Agricultural Programs coordinator Dr. Tom Simpson and his employees have moved to offices in the Animal Science/Agricultural Engineering Building. Their phone numbers and email addresses remain the same.

New Center Focuses on Food Systems Security and Safety

The U.S. food supply depends on a complex system of interactions among government agencies, domestic and international farmers and processors, retailers, transportation companies... and ultimately consumers. Threats of contamination of foods with biological, chemical, or radiological agents may have major economic implications for everyone.

The University of Maryland has established a Center for Food Systems Security and Safety (CFS3) in the College of Agriculture and Natural Resources to address this emerging threat. CFS3 will provide world-class research, education, and outreach on issues related to food and water defense, safety, and protection. It will also be a leader in the area of disaster response related to food and water issues and a repository of knowledge and service in the food safety area.

Dr. Michael J. Raupp, an Extension specialist and entomology professor, has assumed the responsibilities of acting associate dean and acting associate director of Maryland Cooperative Extension (MCE), following the resignation of Dr. James Hanson.

Raupp received his doctorate in entomology at the University of Maryland in 1982 and has been an Extension specialist and faculty member since then. He holds a three-way split appointment in Extension, research, and instruction. His major Extension responsibilities have been to develop, implement, and evaluate urban Integrated Pest Management (IMP) programs. His basic and applied research programs involve studying interactions among plants, pests, beneficial insects, and the environment in which they live. As an instructor, Raupp teaches a graduate and undergraduate course ranging in enrollment from 6 to 300.

Raupp is no stranger to administrative positions. During his tenure at Maryland, he has served as IPM coordinator for urban programs, acting chair and chair of the Department of Entomology, and acting dean of the College of Life Sciences. He says he appreciates the opportunity he has been given to serve the College of Agriculture and Natural Resources in the role of acting associate dean and associate director of Maryland Cooperative Extension.

To learn more about Raupp and the activities in his laboratory, check out his website at http://www.raupplab.umd.edu/.
Maryland Faculty Receive Five of Nine Regional ESP Awards

Call it a home-court advantage… well, maybe not, since the decision-making process ended long before Epsilon Sigma Phi (ESP) members from around the country convened in Annapolis for the national conference of Extension’s honorary fraternity in November. Still, it was doubly enjoyable for the following Maryland Cooperative Extension faculty to receive five of nine regional awards presented “at home”:

• Distinguished Service: Debra L. Bowman
• Diversity Individual: Dianne Müller
• Early Career: Caragh Fitzgerald
• International Service: Stanley W. Fultz
• Visionary Leadership: James C. Hanson

Engineer Receives National Distinguished Service Award

The National Association of County Agricultural Agents (NACAA) presented Dr. David Ross, professor and horticultural engineering specialist in the Department of Environmental Science and Technology, with a National Distinguished Service Award at its 91st Annual Meeting and Professional Improvement Conference last July. The award is presented to the top 2 percent of county agents from each state with more than ten years of service in the nation’s Cooperative Extension System. This year, 67 individuals from throughout the United States were recognized.

The NACAA awards program included the following citation about Ross: An Extension agricultural engineer, he covers horticultural engineering for nursery, greenhouse, vegetable and fruit crops, greenhouse structures, environmental control and energy conservation, trickle irrigation, equipment, vegetable post harvest handling, and, recently, container crop water and nutrient management, including two grower-oriented web-based courses. He provides national leadership in several professional organizations, including Epsilon Sigma Phi, and has over 780 publications. David does water quality research and conducts safety and 4-H youth programs.

Publication Tells Chesapeake Fields Story

In the 1990s, citizens of Kent County, Maryland became increasingly concerned about the spread of development and the amount of farmland it consumed. With a strong desire to preserve the sense of place enjoyed on Delmarva, one of the few remaining agriculture areas on the East Coast, producers and businesses pooled their land, labor, capitol, and entrepreneurial skills to organize a new venture. Founded to find new, workable ways to help farmers become more profitable, Chesapeake Fields is made up of three separate but connected entities: Chesapeake Fields Institute, the research and development arm; Chesapeake Fields Farmers, LLC, which produces and markets a line of Chesapeake Fields Identity Preserved (IP) artisan breads, soy snacks and gourmet popcorn; and the Chesapeake Fields Farmers’ Cooperative, whose members produce and market high quality Identity Preserved (IP) specialty grains and oil seeds for local, national, and international customers.

One of the forces behind the establishment and continued success of Chesapeake Fields is John Hall, senior agent and Extension director in Kent County.
Believing the experience he and others have had to be useful to agricultural producers in other areas, he has written *Chesapeake Fields: A Case Study in Creating Sustainable Agriculture*. The publication is now available from Maryland Cooperative Extension at [www.agnr.umd.edu/mce/publications/pdfs/eb369.pdf](http://www.agnr.umd.edu/mce/publications/pdfs/eb369.pdf). To learn more about Chesapeake Fields, check out [http://chesapeakefields.com/](http://chesapeakefields.com/).

**USAID-Higher Education Development Program**

The USAID-Higher Education Development Program has awarded a grant to the college’s International Programs in Agriculture and Natural Resources Office and Stavropol State Agrarian University (SSAU), Russia’s top agricultural university. Prepared by Dr. Bob Hill, professor of environmental science and technology; Dale Johnson, regional farm management specialist; Dr. Ray Miller, director of International Programs in Agriculture and Natural Resources; and Dr. Mark Varner, professor of dairy sciences; the proposal was one of only 10 submissions selected. It received strong support from both the U.S. embassy in Moscow and from ACDI-VOCA, the leading NGO working in Russian agriculture.

The grant will be used to develop a regional distance-learning center for southern Russia, expand the Internet-based veterinarian continuing education program, and establish a certificate program for management of small agricultural businesses. The distance-learning center will be an expansion of the distance-learning workshops in Russia developed by Hill and Varner, with SSAU serving as the lead institution along with four smaller agriculture universities in southern Russia. The agri-business certificate training is based on a highly successful program developed by Johnson and conducted in Uzbekistan and Kazakhstan.

**Food Scientist Blows Up on NPR**

Dr. Tom Castonguay, professor of nutrition and food science, appeared on National Public Radio’s “All Things Considered” on December 30 to…of all things…blow up food. More specifically, he demonstrated bomb calorimetry—the practice of blowing up food to calculate calories. Using a bomb calorimeter, a device that determines the change in heat in a closed container, Castonguay produced a miniature food explosion and measured the heat produced.

**CFNAP Scientist Quoted on Cloned Meat**

Dr. Gary Weaver, director of the Program on Agriculture and Animal Health Policy at the Center for Food, Nutrition, and Agriculture Policy (CFNAP), was quoted in the National Geographic News website on January 3, following an announcement by the U.S. Food and Drug Administration (FDA) that products from cloned animals are safe to eat. “When I buy steaks it’s always a gamble,” Weaver said. “You can have two that look the same, [but] one is tender and the other is shoe leather.” With cloning “in ten years we might all be eating prime beef for a reasonable price.”

A report with the U.S. government’s final say on the controversial issue is expected by the end of this year. According to Weaver, if the government does approve cloned meat for sale, such products wouldn’t hit supermarket shelves for at least five years.

**Weismiller Receives Romanian Honorary Doctorate**

Dr. Richard Weismiller, professor in the Department of Environmental Science and Technology and associate director of the college’s International Programs in Agriculture and Natural Resources Office, was presented with title of Doctor Honoris Causa by Rector Liviu Marghitas of the University of Agricultural Sciences and Veterinary Medicine (USAMV) in Cluj-Napoca, Romania. Weismiller (at left in photo above) and Dr. Josef Stockemer, rector at the University of Bremerhaven, Germany, were recognized at the most recent of five annual international symposia hosted by USAMV.

AGNR has a memorandum of understanding (MOU) with USAMV to promote
mutual interests in teaching, research, and extension. Under the auspices of this MOU, the University of Maryland has hosted visits by faculty members from USAMV, and USAMV has hosted one AGNR undergraduate student as a summer intern in 2006. AGNR faculty have also helped USAMV implement a digital landscape architecture program.

Weismiller has given several lectures to students and faculty at USAMV and has presented plenary papers at the third and fifth international symposia. Since 2004, he has also served as a consulting scientist on USAMV’s board for Agricultura: Review of Science of Practical Agriculture.

**MOU to Reduce Phosphorus in Fertilizers**

Do-it-yourself lawn care is a multi-billion dollar business in the United States. But excess phosphorus and nitrogen from fertilizer can leach out of the soil and pollute groundwater. These two nutrients can also wash off landscapes and pollute surface waters and, eventually, the Chesapeake Bay.

**Drs. Gary Felton** and **Tom Simpson** recently joined with Scotts Miracle-Gro Company and Lebanon-Seaboard to sign a memorandum of understanding to reduce phosphorus (P) levels in commercial fertilizer. Scotts, with its hold on half the U.S. do-it-yourself (DIY) market, pledged last month to reduce P in their products by 50 percent over the next 2 years. They’ve also agreed to retool their entire DIY fertilizer line by 2008. After that, they’ll address nitrogen levels.

Felton, a bioenvironmental engineering and water quality specialist in the Department of Environmental Science and Technology, worked closely with Scotts and Maryland’s Department of Natural Resources to hammer out the agreement. Simpson, coordinator of Chesapeake Bay Agricultural Programs, worked with all the bay organizations to obtain an agreement everyone could live with.

**New Year Brings New Accolades for Animal Scientist**

The new year brought good news for **Dr. Brian Bequette**, assistant professor in the Department of Animal and Avian Sciences. First, the National Academy of Science’s Board on Agriculture released Nutrient Requirements of Small Ruminants; Bequette was a major contributor to the 362-page publication that completely revises 20-year-old nutrient requirements for sheep and goats and addresses for the first time nutrient requirements of cervids (deer, elk, etc.) and camels (camels, alpaca, llama, etc.).

Second, the University of Maryland’s Office of Technology Commercialization has issued a new U.S. Patent listing Bequette as the inventor. U.S. Patent No. 7,157, 497 entitled “Method of enhancing an ornithine-urea cycle in ruminant gut tissues to detoxify ammonia and increase local urea recycling to the rumen for microbial protein synthesis” was issued on January 2, 2007.

**4-H Educator Tapped to Lead National Team**

**Manami Brown**, 4-H educator and Extension director in Baltimore City, has been selected to serve as co-leader of “Expanding Outreach to New and Underserved Audiences,” one of five National 4-H Learning Priorities recently announced by National 4-H Headquarters. During her three-year commitment, Brown will work with co-leader Beverly Hobbs, 4-H youth development specialist at Oregon State University, to provide leadership for efforts designed to ensure that a wide variety of high-quality learning materials and delivery options are available to 4-H educators, 4-H military program staff, and 4-H after-school providers throughout the national system. Together they will work with team members to review existing resources for broad use and/or develop new resources that are responsive to the diverse nature of 4-H educators; secure alternative funding or in-kind resources as needed for the development and delivery of the learning solutions or to support participation on the learning team; and consider possible integration of the educational content with an eXtension Youth Development Community of Practice.
If you’ve ever sat in a bumper-to-bumper Beltway backup, it will come as no surprise that our society runs on fossil fuel and that consumption is increasing almost as fast as the population. But as you sit and fume about being late for your next meeting, you may not think about the long-term implications of this situation.

So here are the facts: Fossil fuel is a finite, non-renewable resource. Our reliance on it has driven global politics and created economic uncertainties. Burning of fossil fuel contributes to human health problems and global warming. And someday, the supply will be gone.

But what, you ask, can be done? The reality is that simply cutting fuel consumption won’t be enough, given the world’s growing population. So new, alternative fuel sources must be discovered and developed.

Researchers in the United States and elsewhere are focusing their attention on biofuels—alcohols and other chemicals derived from cellulose-based biomass. Perhaps the most familiar biofuel is ethanol. And while most experts agree that ethanol is not the long-term solution to all our fuel needs, they see it as an important tool in the energy policy toolbox.

Here’s why: Ethanol is a renewable resource; feedstocks (the plants from which ethanol is produced) can be grown, harvested, and grown again. Also, ethanol doesn’t pollute the environment as much as gasoline. According to economist Dr. Erik Lichtenberg, gasoline is responsible for a significant share of carbon release, which contributes to global warming and other pollution-related problems.

Although ethanol currently is more expensive than gas, Lichtenberg believes that situation will change. “As the world’s population grows and demand for petroleum products in the United States and especially in developing countries increases, gasoline prices also will increase, making ethanol more competitive,” he says.

Most ethanol in the United States currently comes from corn, with about 20 percent of the nation’s corn crop being used to produce ethanol. But we can’t replace all gasoline consumption with corn ethanol. For one thing, corn is an energy-intensive crop to produce. Lichtenberg explains: “There are energy costs involved in tilling the field, planting, fertilizing, harvesting, and drying the corn. What this means is that the corn/ethanol production system yields only 20 percent more energy than it requires to run.”

The United States currently uses 140 billion gallons of gasoline each year. Because ethanol doesn’t
have as high an energy value, producing the same amount of energy would require 190 billion gallons of ethanol. Each bushel of corn yields 2.7 gallons of ethanol which means that 70 billion bushels of corn—six times what is produced in the entire country today—would be needed to replace gasoline. And the land for that just isn’t there.

Crops like switchgrass (see Fall 2006 *Momentum*) or hybrid poplar are much more promising than corn because their energy yield is much higher. “Still, even with switchgrass, the land constraint is major,” says Lichtenberg, adding that one way around it is through breeding and production improvements to increase yields. “If we could double yields of switchgrass and similar feedstock crops, we’d have enough land to produce the ethanol we need,” he says, adding that such a goal is feasible. “We have a history of success in crop breeding,” he says. “Over the last 50 years, production of corn, wheat, and sorghum has tripled, and that of soybeans, cotton, and rice has doubled. Much of this increase—80 percent in the case of corn—can be attributed to genetic improvement. Basically, we need to increase the plants’ genetic potential and improve production methods to allow for the realization of that potential.”
Growing Fields of Fuel

And that’s what plant scientists like Drs. Jose Costa and Bob Kratochvil are doing—with hulless barley.

Development of a high-yield, hulless barley has both scientists and grain producers excited about its possibilities as a biofuel. While corn has been the “standard” for ethanol production, barley offers great possibilities.

Building a fuel ethanol plant using barley grain as the primary feedstock has been a goal of the Maryland Grain Producers Utilization Board for several years. Although there are more than 100 ethanol plants in the Midwest, an ethanol plant on the East Coast would dramatically reduce truck and rail transport costs. Barley production had declined in Maryland, but the importance of barley as a potential biofuel has spurred plans to build a processing facility in Maryland capable of producing 50 million gallons a year. Such a plant would then necessitate production of 100,000 to 200,000 additional acres of barley.

An analysis of hulled barley done by the U.S. Department of Agriculture (USDA) concluded that hulled barley would not produce enough ethanol to make it an economically feasible biofuel. But research done at Virginia Tech on hulless barley shows great promise. Less hull means proportionately more starch and the higher the starch, the better the grain for making ethanol.

Costa is currently working with Virginia Tech colleagues on the
breeding and selection of hulless barley. “It takes 10 to 11 years to develop new grain varieties,” he explains. The breeding selection program at the University of Maryland is only about 3 years old, but testing of new hulless barley varieties in Maryland is under way. “Growing conditions here are similar to those in Virginia, except for Western Maryland, which has a longer growing season compared to the Eastern Shore and Virginia,” says Costa. “Research from both programs will eventually help increase hulless barley yields in Virginia and Maryland.”

Hulless barley may prove to be a lucrative alternative crop for Maryland grain producers—not only as a biofuel, but as a valuable winter cover crop. A grant from USDA to encourage farmers to grow barley has enabled the Maryland Grain Producers to offer a monetary incentive to Maryland Cover Crop Program participants. Barley can be planted following corn harvests as a winter cover crop, protecting farmland from nutrient runoff.

“New opportunities are rare. This is the most exciting time in grain production in my 20 years,” says Kratochvil. “If there is enough demand for the hulless barley, we’ve created a new price floor—about a dollar a bushel more than it has been.” As production advisor to farmers participating in the cover crop program, Kratochvil identifies production problems and helps farmers gain experience producing the hulless barley, which requires slightly different management tactics than hulled barley. He hopes with a new outlet for barley as a biofuel, its cover crop advantage, and sales to the dairy industry as a feedstock, it will become a viable alternative crop in Maryland. The dairy industry would be the most likely outlet for marketing the major by-product—Distillers Dried Grains with Solubles (DDGS)—derived when ethanol is produced from any grain.

### From Byproduct to Biofuel

While genetic crop improvements are a critical component in meeting the biofuel challenge, a lot of agricultural land—including land currently used for food production—would still be needed to satisfy America’s fuel needs. That’s why some researchers are looking at alternative biofuel sources, such as switchgrass and hybrid poplars, that can be grown on marginal, non-agricultural lands.

Take Dr. Gary Felton, for example. For several years, Felton, a biological resources engineer, and Jonathan Kays, a natural resources Extension specialist, have collaborated with the Washington Suburban Sanitary Commission, the Maryland Department of the Environment, and a private firm, ERCO, Inc., on a project involving the growth of hybrid poplars in non-productive fields filled with biosolids from the Blue Plains Wastewater Treatment Plant. The...
goal: to develop an efficient, economical, environmentally sound system for disposing of waste material by using it to produce a useful product.

Hybrid poplars are perfect for this process because they can remove large amounts of nitrogen and phosphorus from biosolids. Currently, the trees are harvested for use as landscaping mulch, but according to Felton, there's no reason they couldn't be used to produce biofuels.

He points to the trees' potential advantages: First, they require fewer resources, such as pesticides and commercial fertilizers, while providing a use for a ubiquitous waste product. And they can be grown on land unsuitable for almost anything else, such as old sand, gravel, or coal mine spoils. “This not only leaves the agricultural base intact,” says Felton, “but actually improves the denuded soil so that it can once again sustain vegetation and provide habitat.”

Hybrid poplar biomass can be used in several ways. It can be converted to ethanol or used directly for heat in wood-burning boilers, which eliminates the necessary energy inputs for processing and avoids inefficiencies associated with ethanol's lower energy content. At the same time, the energy used from direct biomass heat generation is also a fossil fuel saving.

So while hybrid poplars are certainly not the be all and end all of biofuel production, Felton believes that waste management systems that utilize forest products offer a valuable option that can be customized to regional needs, resources, and constraints.

The Advantages of Algae

While extraordinarily useful from a waste disposal and land reclamation standpoint, hybrid poplars require a long time—6 years on average—before they can be harvested. Algae, on the other hand, can be harvested once a week under optimum conditions. That's why ecologist Dr. Patrick Kangas is so enthusiastic about this renewable resource.

Kangas is working with researchers at the U.S. Department of Agriculture’s Beltsville Agricultural Research Center (USDA/BARC) to explore attached algae (as opposed to floating or planktonic algae) as a biofuel feedstock. He describes the system as “an ecologically engineered artificial system” because its design, developed by Smithsonian researcher Walter Adey, is based on coral reefs. “These reefs are elegantly designed systems based on millions of years of evolution. As a result of the combination of sunlight and turbulence caused by waves, tufts of algae growing on the crest of reefs demonstrate the highest plant growth rate in nature,” says Kangas.

Like the hybrid poplar system, the algal system was designed originally to clean wastewater, with biomass being merely a byproduct. The system at BARC, for example, filters wastewater from dairy oper-
Tufts of algae growing on the crest of reefs demonstrate the highest plant growth rate in nature.

A thin film of dairy wastewater passes through 100-foot-long, 4-foot-wide troughs lined with algae-covered screens. As it grows, the algae removes nutrients from the water.

Kangas operates a small-scale laboratory version of the system, which, like the larger version, is based on optimum levels of flow and turbulence. “Just like the reef tops on which it was based, the system causes the strands of algae to move in such a way that they capture more light, and therefore photosynthesize more and grow more quickly,” he explains. Harvesting biomass from these systems is as simple as scraping—or better yet, vacuuming—the hair-like strands of algae off the screen to which they are attached. Enough plant matter remains to restart the growth process.

Algal biomass has the potential to yield several different energy products, including methane that could be used to produce electricity, and such fuels as ethanol and biodiesel. Kangas and his colleagues hope to identify which energy products and which production systems offer the most promise for specific situations. “We think algae have the potential to produce more biomass by far than any other system,” says Kangas. “What we don’t know is which system will be the best to meet specific needs in specific environments.”
Converting Fiber into Fuel

And of course biomass production is just the first step. Processing is required to break down cellulose into starch and then into ethanol. And it’s this processing that is the focus of animal nutrition management expert Dr. Richard Kohn.

Kohn is interested in how an animal model—specifically, the rumen—can teach us how to more efficiently convert the energy stored in crops into a more convenient fuel, such as ethanol or biodiesel. “Microorganisms found in the rumen can break down fibrous matter and convert it into ethanol more efficiently and effectively than do the mechanical processes we currently use,” he says. “By better understanding how this conversion in the rumen occurs, we can improve such processes.”

The organisms required to convert starch or fiber into glucose and, ultimately, ethanol must be able to survive the high flow-through rate involved in the process. Microorganisms in the rumen have adapted to such rates, digesting feed quickly. “In fact,” says Kohn, “the rumen contains the fastest anaerobic organisms known. They can do what we want to do to create fuel. There’s even one microorganism in the rumen that converts fiber directly into ethanol.”

But rumen organisms also produce a lot of methane—which some scientists have blamed for contributing to increased lower-level ozone and global warming. So researchers are exploring ways to alter chemical pathways to reduce methane production where it is not desired—an achievable goal, according to Kohn. He and his colleagues have demonstrated that reactions in the rumen occur in near equilibrium with each other.
and that these reactions are two directional. Shifting production of one end product shifts all of them.

“Basically,” explains Kohn, “activity in the rumen follows the laws of thermodynamics, which say that states of being—including gases—go from higher and/or hotter to lower and/or colder. By changing certain reactions, other reactions respond, and we can produce products we want.”

Because the rumen has evolved over centuries to best ensure the cow’s health and well being, it doesn’t lend itself directly to human research needs. So scientists like Kohn plan to use microorganisms found in the rumen (or similar organisms from other sources) in an external system modeled on the organ. Their goal: to identify how to control the fermentation process to produce the product they want...in this case, ethanol.

“Up to 20 percent of gasoline at the pump can be replaced with ethanol without the need for engine modifications.”

The Bottom Line

No matter what the feedstock, ethanol is unlikely to solve all our energy problems. And conversion to an economy based more on ethanol than on petroleum products is unlikely to happen quickly. “Up to 20 percent of gasoline at the pump can be replaced with ethanol without the need for engine modifications,” explains Lichtenberg. “Anything more than that would require major structural changes in engine design. And since the average life of a car is 16 years, turning over the nation’s entire fleet of cars would take quite a while.” Also, because of its viscosity, ethanol must be blended with gasoline at the pump. That currently involves extra transportation costs and may require fuel companies to redesign their distribution systems.

Still, Lichtenberg, who teaches a course called “Natural Resources and Public Policy,” which covers the economics of exhaustible resources like petroleum, believes that given both the direct and indirect costs associated with gasoline, people are becoming increasingly receptive to alternatives. He also thinks that substituting renewable fuels for ethanol won’t suffice; we’ll also need to rethink our transportation system, which in turn means rethinking our entire land-use system and the policies behind it. But that’s a subject for another time.
Taking Down Fences

Engaged University Bridges the Gap Between the University and Its Neighbors

by Marika Carley
“Mr. B.” stands in front of John Malter’s fourth-grade class at Langley Park-McCormick Elementary School holding a butternut squash. The children listen with rapt attention as he discusses different varieties of squash and how the vegetable grows. “Who knows what vitamins are in squash?,” asks Vinnie Bevivino, aka Mr. B. The students enthusiastically raise their hands to answer. From the sea of hands, one boy is chosen. “Vitamin A,” he answers correctly, sounding slightly surprised at himself.

Later, Bevivino instructs the students to remove the pulp from the squash in order to count the seeds for a messy math lesson. The kids are given spoons to scoop out the guts but when that proves difficult for some, Bevivino suggests using their hands. Four girls at one table squeal in disgust.

A 2003 University of Maryland environmental science and policy graduate, Bevivino is an instructor with the Engaged University, a University of Maryland initiative that works to improve the quality of life in the diverse inner-Beltway communities that surround the College Park campus. The Engaged University was founded four years ago as part of the Democracy Collaborative, a University of Maryland think tank on democracy, to bridge the divide between the university and nearby communities by creating partnerships with key organizations and area residents. In July 2006, the university’s provost, the vice president of university relations, and Dr. Cheng-i Wei, dean of the College of Agriculture and Natural Resources, supported the Engaged University’s transfer to Maryland Cooperative Extension as a step toward building community-university partnerships.

The activities of the Engaged University address needs identified through three years of com-
munity-based research and action. As a result, most of its recent projects have been enrichment programs targeting students at elementary, middle, and high schools in the lower-income, largely black and Latino neighborhoods encircling the university. “In less than a decade, the number of Latinos and other new immigrants from Africa, Asia, and the Caribbean in this area has increased 204 percent and now constitutes more than half of the area population,” explains Margaret Morgan-Hubbard, community resident and director of the Engaged University. “Strengthening the ability of public schools to serve as a center of community life is extremely important.”

The framework for the Engaged University’s activities is the university-assisted community school, an approach that unites the most important influences in young people’s lives—school, family, and community—to create a web of support that nurtures positive youth development. University faculty, staff, and students work with community members to carry out needed programs.

“Our tutoring, mentoring, and enrichment activities engage a host of university units to offer youth positive activities that demonstrate that involvement and learning trump fighting and violence,” says assistant director Genevieve Villamora. “We organize academic, social, and cultural programs that are designed to increase school attendance and grade point averages, provide needed support services, bolster involvement in constructive extracurricular activities, decrease negative contact with law enforcement, and encourage participation in community-based civic engagement projects.”

Another goal of the Engaged University is to demonstrate to youth that higher education is a possible goal for them. In fact, the school year began with all entering students from Riverdale’s William Wirt Middle School spending a day touring the University of Maryland.

This past summer, the Engaged University held a summer-enrichment program titled “Do It Yourself!” at Nicholas Orem Middle School in Hyattsville. Classes taught at the program included spoken word and photography, mural painting, graffiti art, Afro-Cuban dance and drumming, gardening and nutrition, and bicycle repair. Oneal Olaseni, a local high school freshman who opened his own bike fix-it shop, helped to teach other kids repair skills.

At the program’s closing celebration in July, where students showcased their work and new skills to other participants and their parents, one youngster in the bike repair class named Freddy said, “I really like this program because it actually teaches us how to repair bikes and we worked together as a group.”

Homeroom teacher John Malter appreciates the program being offered to his students. “The Engaged University follows and supports our curriculum very closely,” he says. “The activities engage students and they remember what they learned later.”

University of Maryland Provost William Destler recently announced that the Engaged University will be responsible for administering the Community Partners Program, a new “seed” grant program to encourage and fund university and community partnerships. Destler says that by awarding the grants the university hopes to “cultivate a shared sense of place, belonging, safety, trust, cooperation, understanding, and hope between community residents and the university.” There’s no doubt that the work already being done by the Engaged University has started to build the bridge between neighbors on campus and beyond, making the College Park area a better place for everyone.
A Family Affair

In addition to being a resource for students, the Engaged University reaches out to parents, too. For two consecutive years they conducted an eight-week parent leadership training workshop in Spanish and offered financial literacy classes for parents and high-school students who wanted to save for college or a business. Eventually the Engaged University hopes to create a community-based credit union so that immigrant families who are distrustful of banks or who because of citizenship status are unable to open accounts at traditional banks will be able to better manage their finances.
Pageant Princesses Promote Ag Awareness

By Pamela Townsend

Buckingham Palace, it’s not. But the University of Maryland campus is currently home to two members of agricultural “royalty.” Jessica Hernandez is the reigning Maryland State Dairy Princess and Kimberly Lechlider holds the title of Miss Maryland Agriculture. Both young women are using their positions to educate and inform the general public about Maryland agriculture while pursuing degrees in the College of Agriculture and Natural Resources (AGNR).

Lechlider has agriculture in her blood and believes deeply in its value and importance as both an industry and a way of life. “Agriculture has given my family an identity and defined my morals and values,” says the 19-year-old sophomore from Laytonsville, Maryland. “Both sides of my family are deeply seeded in farming, and they have educated me on the importance of keeping agriculture viable. As Miss Maryland Agriculture, I feel that I should be a strong advocate of agriculture, helping to raise awareness of its importance.”

Since being chosen for her ambassadorial role, Lechlider has had many opportunities to accomplish that goal. She has attended—and participated in—numerous activities, including the Governor’s Luncheon at the Maryland State Fair, various county farm bureau banquets, the Maryland Agricultural Education Foundation dinner, the Maryland Agricultural Fair Association dinner, and the Maryland Farm Bureau State Convention.

While educating others about agriculture at such events, Lechlider admits to learning a thing or two, herself. “My family raises beef cattle, pigs, and grain crops, so I’ve really enjoyed experiencing different types of agriculture,” explains the agri-business major. “At the Maryland Million Horse Race, for example, I was able to talk with many horse owners and learn a lot about the horse industry. And
at a cider festival, I was able to see—and actually help with—the process of cider making.”

Like Lechlider, Jessica Hernandez credits agriculture—and the dairy industry in particular—with helping shape who she is today. The 20-year-old junior from Pasadena, Maryland, joined the Anne Arundel County 4-H Dairy Leasing Club in 1997 and leased her first Holstein dairy heifer from the Naval Academy Dairy Farm. When the academy sold its herd the following year, she bought her first cow—the last heifer born on the academy farm. While in 4-H, Hernandez also participated in events like dairy bowl, dairy judging, public speaking, and demonstrations related to dairy animals.

Although too old to be a member of the Dairy Leasing Club, the agriculture and science major stays involved, helping new families get used to working with their animals. She also owns four dairy cows, which she houses at Highland Heights Farm in Harford County because there are no milking facilities in Anne Arundel County.

Given such dedicated involvement in dairy activities, it’s not surprising that Hernandez was chosen to be Maryland State Dairy Princess. In this role, she actively promotes Maryland’s dairy industry and dairy products to consumers of all ages. Since July she has traveled around the state, assisting with dairy shows, handing out milk at AGNR open house events, and promoting dairy products at the Maryland Zoo. She was particularly pleased by the opportunity to help with a Race for the Cure in Rockville, Maryland. “It was a really touching event,” she recalls. “The participants were so encouraging of one another and so determined to find a cure.”

Of Scholarships, Schedules, and Success

Both Hernandez and Lechlider face the daily challenge of juggling academics and other activities with their “royal” schedules.

“Being a full-time student, working part time, serving as dairy princess, and being involved in many other different things has forced me to learn to manage my time better,” says Hernandez. “Fortunately, I’m the type of person who likes to stay busy.”

“You have to be organized,” agrees Lechlider. “I’ve learned to plan ahead for the week so I’m aware of all that I need to get done. It helps limit stress.”

The students also agree that the scholarships they receive from the College of Agriculture and Natural Resources have helped them successfully balance the many aspects of their lives.

“Scholarship support has been really beneficial,” says Hernandez, who plans on a career in dairy-related public relations. “I attended community college my first two years because I couldn’t afford the price of a four-year institution. Now with the help of scholarships, I can decrease my hours at work and focus more on my academic studies and other responsibilities.”

Adds Lechlider: “Not only does my scholarship help pay tuition, but it’s also a motivator. Earning a scholarship reminds me every day that I am capable of graduating college and continuing on to follow my dreams.” Those dreams currently include owning a flower shop someday, although she admits to keeping her options open “in case I discover something a little more intriguing.”

Given their determination and accomplishments so far, we’re sure both Lechlider and Hernandez will be successful at whatever they do.
Dairy Expo Woman of the Year

**Janet Shank Stiles ’77** was named 2006 World Dairy Expo Woman of the Year in October 2006 at the World Dairy Expo in Madison, Wisconsin. Stiles and her late husband, Tracy, operated Shenandoah Jerseys outside Boonsboro, Maryland, with their children Bobby and Jessica. Following her husband’s death from cancer in 2000, Stiles devoted herself to continuing the 126-acre, 125-head dairy operation. Shenandoah Jerseys has continued to breed high-producing cows and traditionally ranks among the highest producing herds in the country. Over the years Stiles has served on many dairy- and agriculturally related boards, including the Maryland and Virginia Milk Producers Cooperative Association, Maryland Dairy Industry Association, and the newly formed Maryland Agricultural and Resource Based Industry Development Corporation (MARBIDCO).

Botanical Garden Administrator

**James Spencer Miller ’75 & ’78** has been named dean and vice president for science at The New York Botanical Garden, effective February 1, 2007. He will hold an endowed chair—the Rupert C. Barneby Curatorship—and lead strategic positioning, planning, and administration for all areas of science at a facility unique among museums and public places in the United States. After receiving B.S. and M.S. degrees in horticulture at Maryland, Miller earned his Ph.D. in biology from St. Louis University, Missouri. As the William L. Brown Curator of Economic Botany at the Missouri Botanical Garden, he successfully built the William L. Brown Center for Plant Genetic Resources into a world-class research operation dedicated to the study and conservation of useful plants.

In accepting his new appointment, Miller noted, “I am very excited about joining the staff of The New York Botanical Garden and the opportunity to work with a group of scientists who are conducting research that is so critical for understanding and preserving the natural resources upon which humans depend for our quality of life.”

In Memoriam

**John W. “Jack” Wysong,** a retired faculty member of the Agricultural and Resource Economics Department, died in April 2006 from injuries resulting from an automobile accident.

Wysong joined the faculty as an assistant professor in agricultural economics in 1956. In 1967 he was named full professor and retired June 30, 1997. His research and Extension activities focused on improvement of profitability and technical and financial resource productivity, primarily on dairy farms, commercial agriculture, and part-time farming systems. He made major contributions in the areas of farm management, labor efficiency, milk marketing, and policy.

Wysong pursued post-doctoral studies and research programs at several institutions in foreign countries and published in a variety of journals and other professional literature. He contributed extensively to *Agriculture Economics and Maryland Economic News Notes*; was a member of Phi Kappa Phi, Gamma Sigma Delta, the American Agricultural Economics Association, Atlantic Economic Society, and North East Agricultural Council; and was listed in *American Men and Women of Science.*


Twigg earned all three of his degrees from the University of Maryland, joined the Horticulture Department faculty as an instructor in 1954 and then as assistant professor in 1959. He became a full professor in 1969 and served as department chair from 1973 to his retirement in 1983.

Twigg was a food science professor and Extension specialist in the area of canning and food processing. He was instrumental in developing many of the hybrid tomatoes on the market today, including the famed Maryland tomato. His work also included quality and temperature control, waste water disposal, apple processing, mechanical tomato harvesting, and sweet potato utilization. Twigg was author or co-author of more than 95 publications, including *Fundamentals of Quality Control for the Food Industry.*

During his retirement, Twigg traveled extensively while consulting with General Foods Corporation, Asgrow Seed Company, and others in the food industry. He also served as scientific adviser to the World Food Logistics Organization.

**Samuel Rankin Bacon ’24** died on September 9, 2006, at the age of 106.

Born in Baltimore County, Bacon attended the University of Maryland and after a brief period of employment with the Maryland Agricultural Experiment Station, he moved to North Carolina and
worked for the Agricultural Experiment Station there for 3 years. In 1928 he started working as a soil surveyor for the U.S. Department of Agriculture (USDA) and continued until his retirement in 1963. While a part of USDA’s Soil Conservation Service, Bacon mapped the types of soils available, wrote numerous bulletins for farmers, and served as the primary soil scientist for homesteads established by Mrs. Eleanor Roosevelt in the Cumberland Plateau near Crossland, Tennessee.

Bacon and his late wife, Reba, settled in Cookeville, Tennessee, where they were benefactors of the Cumberland Art Society, which Reba founded. Bacon was a member of the First United Methodist Church and was recognized for his community service as a Meals on Wheels volunteer for 17 years.

**Neri Clark ’59**, professor emeritus in the Agronomy Department, died August 21, 2006, at the age of 88.

Following service in the U.S. Navy during WWII, Clark earned a B.S. in agricultural education and a Ph.D. in agronomy from the University of Maryland and joined the faculty of the Agronomy Department, with responsibility for teaching, research, and advising. His research interests focused on forage crop management, and he initiated a new course on world agriculture based on his extensive travels to third-world countries.

One of Clark’s major responsibilities was managing the Agronomy Department’s research program at the nearly 1,000-acre agronomy-dairy forage research farm. Upon his retirement in 1978, and in honor of his many years of outstanding service, he was presented a plaque dedicating the Clark Oak, a champion 260-year-old white oak tree on the farm property.

**Wallace “Turp” Garrett ’65 & ’72**, of Snow Hill, Maryland, died on September 27, 2006, after a brief battle with cancer. He was 66 years old.

Born November 25, 1939, in Bethel, Delaware, Garrett was a son of the late Clarence Turpin and Marguerite Hastings Garrett. He received a B.S. degree from the University of Delaware, and M.S. and Ph.D. degrees from the University of Maryland.

In 1973 Garrett and his wife, Dorothy, moved to Easton and he became a partner in Wye Tree Experts. He became an Extension agriculture agent in 1980 in Anne Arundel County, transferred to Worcester County in 1988, and retired after 30 years of state service in January 2001. He was active in several civic and professional organizations, including the Easton Lions Club, Nassawango Ruritan Club, Worcester County and Maryland State Farm Bureau, Maryland and National Associations of County Agriculture Agents, and Epsilon Sigma Phi. He received several professional service awards during his career in Extension.

Garrett was an Eagle Scout and enjoyed all outdoor activities, especially softball, golf, fishing, and hunting. As a member of All Hallows Episcopal Church he served as a vestry member and acolyte trainer.

**Gregory Gary Waeber ’73** died September 28, 2006, after a lengthy battle with cancer.

Following graduation, Waeber entered the U.S. Air Force and retired as a Lt. Col. in December 2001 after 28 years of service. He was predeceased by his wife, Gail Remsberg Waeber ’75, who died in 1997.

**Homecoming 2006 Reflections**

**Judy ’67 and Charles Iager ’65** take a moment to visit with Gail Yeiser, assistant to the dean for alumni and external relations, at Homecoming, October 21. The Iagers brought some of their extensive Maryland dairy- and ice cream-related memorabilia to celebrate the university’s 150th anniversary.

**A Move for Marlin’s Barn**

**Robert L. Jones ’50**, retired Extension director in Carroll County, is serving as chairman of the Marlin K. Hoff Memorial Barn Committee, which is working to move an 18th-century barn to a permanent home at the Carroll County Farm Museum. The barn, currently located on the property of the late **Marlin Hoff ’67**, in New Windsor, Maryland, is known for its period craftsmanship and architectural integrity. The Maryland Historical Trust has described the barn as “one of the most significant farm buildings in Carroll County.”
Hoff often marveled at the ingenuity of the farmers who built the barn and was in the process of finding it a permanent home when he passed away in 2004. Jones and others on the committee also appreciate the strength of the barn’s hand-hewn log beams and its V-notch corners, where the logs are joined without nails or other attachment. They have broken ground at the Carroll County Farm Museum and during the next two years plan to have the barn dismantled, piece by piece, and then re-built as a permanent museum structure.

At least $300,000 in private funds will be needed to complete the project. Jones and his committee are accepting contributions ranging from cash to consignments in sales and in-kind donations to make this project a reality and a lasting memorial to Hoff.

**Fear the Turtle Auction Benefits AGNR Scholarships**

AGNR Alumni Board members and friends were in the thick of the bidding for the Fear the Turtle sculpture “Outstanding in His Field,” which was sponsored by the AGNR Alumni Chapter and crafted by AGNR Alum John Nickerson ’85. In the end, Eric Francis from Short Hills, New Jersey, was the winning bidder and directed his bid to benefit AGNR scholarships. Total AGNR scholarship donations of $14,500 resulted from the sale of “Outstanding in His Field” and “Mosaic of Maryland,” created by Samantha Baker’s ’97 Germantown Elementary School art students. Baker’s husband Rob ’96 is a graduate of the Institute of Applied Agriculture. An aunt of one of the students teamed up with Baker’s business, MidAtlantic AG Consulting, to purchase Mosaic in the silent portion of the Fear the Turtle auction.
Maryland Team Wins National Dairy Judging Contest

The Maryland 4-H Dairy Judging Team, coached by Dr. Lee Majeskie (center in photo above), won the National Dairy Judging Contest, on October 2. Team members Katie Albaugh, Jarrett Remsberg, Curtis Rhoderick, and Hannah Thompson outperformed thirty teams to win the competition with 2,035 of a possible 2,250 points. They placed fifth in Holsteins, second in oral reasons, fifth in Brown Swiss, sixth in Ayrshires, and seventh in Guernseys.

In individual competition, Rhoderick finished second in Ayrshires and, with consistent placings and reasons, placed second overall in the contest. Albaugh finished second in Holsteins, ninth in Jerseys, and fifth in oral reasons, ending up in tenth place overall. One spot behind in eleventh place was Thompson, who was high individual in Holsteins and seventh in oral reasons. Remsberg finished fifth in Holsteins and placed in the All-American group (top 25 individuals in the contest) at twenty-second.

Thanks to their win, the Maryland 4-H Dairy Judging Team is one of just three invited to participate in international competition at the Royal Highland Exposition in Edinburgh, Scotland, in June.

Team Demonstrates Engineering Know-How

The nine-member Maryland 4-H Engineering Team placed an impressive second in the Engineering Bowl at the 56th National 4-H Engineering, Science and Leadership Event last September. Several individual team members also finished second in individual events: Phillip Thomas in computer, Jordan Skipper in lawn tractor, and Lance Guyton in welding.

Other competitors also did well: Kevin Ridinger placed third in small engines, Deborah Overstreet finished fourth in bicycle safety, Jacob Gnegy placed fifth in electric/energy, and Brian Rasche finished fifth in safe tractor operation. In the aerospace event, Michelle Schepis and Andrew Dobos placed sixth and eighth, respectively.

Dr. David Ross, an Extension agricultural engineer in the Department of Environmental Science and Technology, served as group coordinator and chaired the National Bicycle Safety Event. Retired Extension agricultural engineer Dr. Lee Grant served as chair of the Lawn Tractor Event.

Landscape Architecture Students Named Volunteers of the Year

On November 9, twelve landscape architecture students and their professor were named “Volunteers of the Year” by the Neighborhood Design Center, a 30-year-old non-profit community design agency dedicated to providing lower-income communities with access to professional community design services. The students—Mila Antova, T.J. Hinkle, Tim Horner, Ronald Lee, Christopher Long, Brett Manvilla, Andie Murtha, Shivaneep Padilla, John Palmer, James Palmer, Molline Smith, and Peter Staley—are recent graduates of the university’s Landscape Architecture Program. They were chosen for their semester-long study and design solutions for the Port Towns of the Anacostia River in Prince George’s County. Brian P. Kane, ASLA, instructed the Community Design Studio—the final in a succession of design studios in the students’ four-year design education—and directed the students’ collective and individual design solutions for these towns, which include Colmar Manor, Bladensburg, Edmonston, and Cottage City.

“This award is due to the deep level of investigation and thoughtful design solutions by our students,” says Kane (at right, with students in photo below). “They dug deep, got to know the terrain and the community, and their design solutions reflect a commitment to the health of the Anacostia River, as well as to the towns themselves.”
For more information on Academic Programs, contact:

Elizabeth Weiss
Assistant to the Dean
for Admissions and Recruitment
0112 Symons Hall
College Park, Maryland 20742
301-314-7222
eweiss@umd.edu

Visit Our Website
http://www.agnr.umd.edu/