STARKVILLE, Miss. — A man known as the “Sodfather,” a Mississippi State plant and soil science researcher and a university technology transfer specialist have partnered on a product that might just be called “freedom” from foreign energy.

Phillip Jennings, a Georgia turf grass expert and entrepreneur, learned about the potential of a high-energy yielding biofuel while at Mississippi State learning about other grass research. Dozens of phone calls and many visits later, Jennings, along with MSU researcher Brian Baldwin and university technology transfer specialist Chase Kasper, have built a relationship that led to an agreement pairing MSU research with Jennings’ entrepreneurship, leading his company to grow giant miscanthus in large-scale production in Georgia for next year.

The three men have what they anticipate can move the Southeastern United States closer to energy independence from foreign oil and an environmentally sound way to grow new jobs in rural areas.

Baldwin has spent over ten years developing a product they call “Freedom,” a tall grass that can be transformed into biofuel to power automobiles and other gasoline-powered vehicles.

Baldwin (left) and Jennings
Upcoming Events

From Lab to Market: THE INVENTOR’S COMMERCIALIZATION TOOLKIT

SPEAKER: CHUCK RIVENBURGH, DIRECTOR

February 23, 2010
2:30 P.M.

Fowlkes Auditorium, Colvard Student Union

Upgraded bio-oil is potential source for transportation fuel

A breakthrough in catalyst synthesis has resulted in a 100 percent hydrocarbon mix with no detectable oxygen from bio-oil produced from biomass.

This breakthrough was made possible by the support of the Sustainable Energy Research Center (SERC) for the research performed by department of forest products Ph.D. student Sanjeev Gajjela. Gajjela works under the direction of Dr. Philip Steele, professor and SERC Bio-Oil Research Group Leader.

Bio-oil is a product produced by thermal decomposition of biomass by rapid heating in the absence of air. The new technology produces the hydrocarbons by catalytic hydropyrolysis and is the first announced zero-oxygen liquid hydrocarbon produced from bio-oil.

Bio-oils fall into a class of chemical compounds known as oxygenates, meaning that they contain high levels of oxygenated chemicals. High levels of oxygenates result in low energy values and bio-oil provides less than one-half of the energy per unit weight as does petroleum hydrocarbons. Oxygen removal is important to upgrade bio-oil to a viable transportation fuel. In addition, refineries are not able to process crude products when oxygen is present, as it inactivates the refinery catalysts. Therefore, bio-oil cannot be refined in petroleum refineries until it is upgraded so that the oxygen content is significantly reduced.

MSU’s deoxygenated bio-oil hydrocarbon mixture may be refined in current petroleum refineries without modification of the refinery infrastructure. MSU researchers also believe that simple distillation will allow fractionation of the hydrocarbon mix to diesel, gasoline and jet fuel products that can be blended with current petroleum fuels without refining processing. As a fuel, raw bio-oil has environmental advantages when compared to fossil fuels because it produces less toxic NOx and negligible quantities of SOX when compared to petroleum fuels. As a fuel derived from a renewable resource, bio-oil is considered to be CO2 neutral.

Steele observed of his joint effort with Gajjela that, “We have been focused on this result for the last two years, but are a bit surprised that we have apparently surpassed our colleagues in conversion of bio-oil to a transportation fuel with this leap forward. Sanjeev is to be congratulated for attaining a goal that many outstanding researchers have unsuccessfully pursued for nearly two decades.”

The Office of Technology Commercialization has been working with Steele to file patent applications and identify partners to further develop and commercialize his technology. This will likely involve at least four patents for various aspects of the bio-oil research thrust and negotiations are under way with several companies for commercialization rights.

Letter From the Director

MSU’s sustainable energy technology is showing great promise in the marketplace with the recent license of the giant miscanthus described in our lead article. In addition, two companies are planning to scale-up pyrolysis technology developed by Dr. Phil Steele and his team for converting biomass to bio-oil and other useful products.

These recent successes are examples of projects that have moved beyond the basic research/proof-of-concept phase to the point where companies are willing to invest money in further development and commercialization. These technologies fill a real need in a large and growing market with proprietary technology that is not easily duplicated—factors that make the technology highly marketable.

Unfortunately, moving discoveries past the basic research stage is often difficult because funding for advanced development is not supported by many agencies. As an alternative funding mechanism, the Thad Cochran Endowment for Entrepreneurship introduced the Technology Gap Fund last year to help move projects down the pipeline towards commercialization.

This fall, two grants were awarded for this purpose. Congratulations to Dr. David Wise on his award for the project, “Oral Delivery of an Attenuated E. ictaluri Vaccine to Prevent Enteric Septicemia in Catfish.” Also, congratulations to Dr. Radhakrishna Niaistran on his award for the project, “Pneumatic (Air) Conveying of Animal Feeds in Elusive Processes.”

The funding provided by the TCEES program will help to make these technologies commercially viable by providing part of the development effort needed to attract commercial partners. It’s not too early to consider submiting a proposal for the next round of funding. Please check our Web page at www.otc.msstate.edu for details.

Charles “Chuck” Rivenburgh
Director, Office of Technology Commercialization

Kasper named new OTC assistant director

Chase C. Kasper is the new assistant director of Mississippi State’s Office of Technology Commercialization. Kasper has served since 2006 as a licensing associate in the office, which is responsible for identifying, protecting, marketing, and licensing intellectual properties developed at the university, among other duties.

He is a 1989 MSU management graduate who also completed a master’s degree in business administration in 1994.

“Chase has successfully licensed several university inventions and developed marketing strategies that are still in the early stages of commercialization,” said office director Charles Rivenburgh.

“He works well with the inventors and has been a real asset to our program,” Rivenburgh added. “In this new role, he will take a leadership position in moving our patented agricultural-related technologies into the marketplace.”

Most recently, Kasper successfully negotiated license agreements for “Delta Jazz” grape myrtle tree and “Freedom” giant miscanthus grass. In addition, he continues to oversee the turfgrass licensing program that accounts for more than 60 percent of the office’s annual royalty income.

Kasper was a key player in work done with MSU startup company, Spatial Information Solutions, a geographic information system-software business and the first such venture to be awarded $100,000 from the Mississippi Seed Fund. This year, SIS successfully launched its first product, Accuracy Analyst™.

After working several years in the private sector, Kasper managed the MSU Research and Technology Corp., upon his return to campus in 2003. Kasper is a member of the Association of University Technology Managers’ central region planning board and the Licensing Executives Society Inc.
Upcoming Events

Looking Out

From Lab to Market: THE INVENTOR’S COMMERCIALIZATION TOOLKIT

SPEAKER: Chuck Rivenburgh, Director

January 26, 2010
2:30 P.M.
Fowlkes Auditorium, Colvard Student Union

Documenting Your Technology

SPEAKERS: Chase Kasper, Assistant Director
Donna Collier, Technology Licensing Coordinator
February 23, 2010
2:30 P.M.
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Kasper named new OTC assistant director

Three of the most common agreements in technology transfer are non-disclosure agreements, material transfer agreements and license agreements. A comparison of the three is listed in the table below. MSU templates for these and other agreements can be found on the MSU Office of Technology Commercialization Web site, www.otc.msstate.edu.

<table>
<thead>
<tr>
<th>Type of Agreement</th>
<th>What it does</th>
<th>Why it’s necessary</th>
<th>Key elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Disclosure Agreement (NDA)</td>
<td>Protects confidential and proprietary information or trade secrets. Permits the parties to discuss confidential information without compromising ownership rights to their technology.</td>
<td>Used when thinking about establishing a relationship and the parties need to understand their respective technologies to evaluate the potential relationship.</td>
<td>• Definition of what is confidential • Terms for maintaining confidentiality • Terms for the exchange of confidential information</td>
</tr>
<tr>
<td>Material Transfer Agreement (MTA)</td>
<td>Governs the transfer of tangible research materials between two organizations for research purposes. Permits the exchange of materials without compromising the respective ownership rights in the materials.</td>
<td>Often required when receiving or sending biological materials, but can be used for other materials as well.</td>
<td>• Definition of material • Definition of progeny, derivatives, etc. • Definition of each party’s ownership rights in the above</td>
</tr>
<tr>
<td>License Agreement</td>
<td>Grants intellectual property rights and privileges to a third party (i.e. right to make, use and sell).</td>
<td>License agreements typically reflect that: consideration is being given in exchange for the right(s) to use the intellectual property.</td>
<td>• Exclusive/non-exclusive grant • Rights to use • Royalties and fees • Deportment and records • Infringement</td>
</tr>
</tbody>
</table>
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Baldwin has spent over ten years developing a product they call “Freedom,” a tall grass that can be transformed into biofuel to power automobiles and other gasoline-powered vehicles. Jennings has licensed the giant miscanthus, while MSU continues to own the materials and future intended rights.

Major farming equipment companies, including John Deere, have already inquired with Jennings about partnering to harvest, transport and plant the giant miscanthus, a grass that has never been developed in commercial markets.

“We’re certainly attracting a lot of interest,” Jennings said. “Word is beginning to leak out that we have something exciting.”

Baldwin’s new product excites Jennings for many reasons. First, Jennings’ research shows a strong market for commercial biofuel with high energy rates to be viable as a business without government subsidies. Second, he wants to see the United States less dependent on foreign resources. “The quickest way to allow the U.S. to recover from the recession is to have a good energy policy,” Jennings said. “I’m certainly interested in a country that’s energy independent.”

Baldwin, one of many MSU researchers associated with the university’s Sustainable Energy Research Center, said one key factor that distinguishes giant miscanthus from other grasses is its seed-sterile nature, meaning the grass doesn’t spread seeds and lead to aggravating weed issues.

“Regardless of the price of oil, you have to do something about the carbon dioxide in the air,” Baldwin said of the need to produce “greener” fuels.

The process of finding the right high-yield grass and turning it into a product ready for sale takes planning and time. During 2010, Jennings plans to sublicense about 200 additional growers of giant miscanthus throughout the Southeast, a total of about 1,500 acres.

“We feel that we can get a harvest at the end of the first year,” Jennings said. In late 2009, the grass will be sold in limited quantities to small nurseries, while Jennings’ company will produce the bulk of the grass. Next, the company will sell the grass to refineries, where it will be turned into “tank ready” fuels, used for diesel and gasoline.

While Jennings has worked with companies and researchers in other parts of the country on many projects, he gives special praise to MSU.

“I’ve never worked with a group of people more willing to try to help and work with you to promote a product as much as Brian Baldwin and Chase Kasper,” Jennings said.

Baldwin (left) and Jennings