

New Selectable Marker Systems from Kentucky and Tennessee

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PIPRA, The Public Intellectual Property Resource for Agriculture, is an organization committed to the strategic management of intellectual property owned by universities and not-for-profit research institutions, encouraging the broadest applications of existing and emerging agricultural technologies for the development of subsistence crops for developing countries and specialty crops in developed countries.

www.pipra.org

Two breakthroughs by public-sector research teams in plant genetic markers may help tilt the controversy over genetically modified (GM) plants toward increased public acceptance of agricultural biotechnologies.

Research teams at the **University of Kentucky** and the **University of Tennessee** have each discovered distinct plant genes that can be used as selectable markers for the process of making transgenic plants.

One of the most common and effective markers used both in research and commercial crops is the bacterial gene neomycin phosphotransferase II (*nptII*) which grants resistance to the antibiotic kanamycin. However, consumers have long expressed concern over the issues of non-plant genes in transgenic crops, even though the bacterial-*nptII* selection gene is deemed safe by numerous regulatory agencies world-wide.

The team of researchers at the University of Kentucky, led by **Robert Houtz**, discovered

plant genes, AtDEF1 and AtDEF2, that encode the enzyme peptide deformylase (PD). These candidates may provide molecular targets to develop a selection system based on broad spectrum herbicides. *(Continued on page 2.)*



High-throughput screening using microtiter plates of tobacco plants engineered for resistance to PD inhibitors. Under selective pressure only plants engineered with the selection gene survive. Photo courtesy of Robert Houtz, University of Kentucky.

PIPRA Membership Reaches 30 Institutions

PIPRA welcomes the University of Saskatchewan, Ohio State University, and Parco Technologico Padano

The growth of PIPRA continues, both in the U.S. and globally. With institutions signing the PIPRA Memorandum of Understanding they mark their commitment to manage IP to advance agricultural science and its applications in subsistence and specialty crops worldwide.

The **University of Saskatchewan** marks its role as a leader in the life sciences in Canada by becoming the first Canadian institution to join PIPRA.

The new **Parco Technologico Padano**, in Lodi, Italy, is affiliated with the **University of Milan** and aims to be a center of excellence in the research and commercialization of agricultural biotechnology in Europe. PTP is the first European member of PIPRA. Other European public sector agricultural research institutions are

already engaged in an effort by **Alain Weil** and **Bernard Teyssendier de la Serve** to organize a European analog to PIPRA.

The Ohio State University has been committed to PIPRA from the outset, with OSU President Kathryn Holbrook signing the July 2003 Policy Forum piece on PIPRA published in **Science**.

PIPRA welcomes the participation of universities, research institutes, and non-profit organizations that endorse PIPRA's mission. Please contact the PIPRA staff to inquire about membership information and how to participate in PIPRA.

New Selectable Markers (cont.)

This marker tool presents new opportunities to facilitate high-throughput screening in ag-research and to develop a new class of herbicides for agricultural markets. "Currently we have a preliminary crystal structure for the plant peptide deformylase and are moving towards rationale design of more potent and specific inhibitors," Houtz said.

In the September issue of *Nature Biotechnology*, University of Tennessee plant scientists **Mentewab Ayalew** and **Neal Stewart** report the first application of an endogenous plant gene, *Atubc19*, that encodes an ABC transporter. When over-expressed in plants it provides kanamycin resistance levels comparable to the bacterial-*ntII* gene.

In contrast to the bacterial gene, which pro-

vides tolerance to a broader range of antibiotics, the plant enzyme appears to provide tolerance only to kanamycin. The scientists note that this may be of bio-safety importance. Stewart says, "Because our marker originates from a plant, it is highly unlikely any horizontal gene transfer would result in antibiotic-resistant bacteria".

These novel selectable marker technologies are promising alternatives to the conventional bacterial-derived selection systems with the added benefit that they may be more accepted by consumers, as they rely on plant-derived genes. Houtz and Stewart are committed to providing access to their respective technologies. In addition, PIPRA is supportive of enabling access to all-plant based technologies, such as these selectable marker break-

throughs, that offer significant potential to expedite the public acceptance of agricultural biotechnology.

Mentewab Ayalew, University of Tennessee, monitors the selective growth of plant tissues.

Photo courtesy of Neal Stewart, University of Tennessee



PIPRA Collaborating with the Specialty Crop Regulatory Initiative (SCRI)

While PIPRA focuses on IP hurdles faced in the development of specialty and subsistence crops, IP is by no means the only, or even the greatest, hurdle. Other hurdles include regulatory requirements as well as market acceptance issues. While field specific expertise is required to assist researchers with IP, regulatory, and market issues, it makes sense for the teams involved in each to coordinate efforts whenever possible. For this reason, PIPRA is working with the Specialty Crop Regulatory Initiative (SCRI).

The SCRI is a program to assist developers of biotech specialty crops in meeting regulatory requirements for commercialization. Modeled on the IR-4

program that assists registrations for agricultural chemicals to smaller market crops, the SCRI would serve a similar role for biotech crops.

PIPRA staff will be participating at a meeting to be held in Washington, D.C. on November 21-22, 2005 to solicit stakeholder input in developing a specific plan for advancing the SCRI program.

Anyone with interest in this program is invited to participate. Contact Lynne Cochran, Cooperative Extension, UC Riverside (951)827-4430, lynnec@ucr.edu, for an agenda and registration information.

"We would have needed an additional 1.8 billion hectares of land... had the global cereal harvest of 1950 prevailed in 1999, using the same conventional farming methods."

-Norman Borlaug

PIPRA in the Literature

Two new academic publications discuss the role that PIPRA plays in the world of agricultural research and development.

Deborah Delmer, Associate Director of the Food Security program at the Rockefeller Foundation and member of the National Academy of Science wrote in her article "Agriculture in the developing world: Connecting innovations in plant research to downstream applications" forthcoming in the *Proceedings of the National Academies of Science*, that "I would urge all scientists to become familiar with the goals of Public Intellectual Property Resource for Agriculture (PIPRA) and to make sure that licensing policy for any patent invention of theirs is

done to keep available rights for the use of that discovery for humanitarian purposes."

Gregory Graff, David Roland-Holst, and David Zilberman, agricultural economists at PIPRA and at UC Berkeley, describe the role of PIPRA as an clearinghouse for IP in their article "Agricultural biotechnology and poverty reduction in low-income countries", forthcoming in *World Development*. PIPRA is working to achieve the potentials they outline to "reduce transaction costs", "increase transparency", and "increase efficiency" of university technology transfer in agriculture and thus "expand the universe of accessible technologies."



PIPRA-BiOS license

PIPRA is developing plant transformation vectors, as part of the pPIPRA project, to be delivered using *Agrobacterium* as well as *Transbacter*™ as gene delivery vehicles. *Transbacter*™, an *Agrobacterium* alternative, was presented at the January 2005 PIPRA Membership Meeting, described in the February 2005 issue of *Nature*, and is now available from CAMBIA under an “open source” license through their new BiOS program.

BiOS (Biological Innovation for Open Society) is pioneering a novel legal mechanism, modeled on the open source paradigm in software, to create a widely accessible protected commons of enabling technologies. The BiOS open source license contains both IP and non-IP provisions. The full text of the license can be found online at the [BiOS website](#). In the process of negotiating PIPRA's use of *Transbacter*™, PIPRA staff are working with the University of California's system-wide technology transfer office to explore issues of open source patent licensing that may be of interest to the wider U.S. university community.

BiOS maintains its protected commons by requiring that improvements to their enabling technologies be managed under the same BiOS licensing terms. If, for instance, a faculty member using

Transbacter™ invents an improvement, BiOS has the right to license that improvement to other BiOS licensees, for free, non-exclusively. While some US faculty members have already signed the BiOS license, they may not be in a position to commit to these types of licensing terms for not-yet-invented IP. The University technology transfer office is in a better position to enter into such an agreement with BiOS. However, there may still remain issues regarding competing claims to potential improvements through sponsored research agreements, Bayh-Dole obligations, and the requirement in the BiOS license that regulatory data relating to the enabling technologies or improvements must be shared among all BiOS licensees.

Our initial analysis indicates that none of these issues will prevent the University of California from signing the BiOS license on behalf of PIPRA. But the issues must be addressed, and an exemption to University policy will likely be required.

PIPRA anticipates that other universities may be interested in this evaluation process and we encourage you to phone Sara Boettiger to discuss the issue in more detail. (*See Contacts, page 4.*)

New Applications and Patents by PIPRA Members

New patent applications published:

Cornell University, US 2005/0183165, August 18, 2005, Grapevine leafroll virus (type 2) proteins and their uses

Iowa State University, US 2005/0204425, September 15, 2005, Isolation of SU1, a starch debranching enzyme, the product of the maize gene SUGARY1

Michigan State University, US 2005/0198704, September 8, 2005, Chloroplast transgenesis of monocots: bioconfined genetically engineered monocot crops that will eliminate transgene flow

Rutgers, US 2005/0183162, August 18, 2005, Transgenic plants producing a PAP II protein

Noble Foundation, US 2005/0172354, August 4, 2005, Plant isoflavonoid hydroxylases and methods of use thereof

University of Florida, US 2005/0188432, August 25, 2005, Bi-directional dual promoter complex with enhanced promoter activity for transgene expression in eukaryotes

New patents granted:

Arizona State University, US 6,936,708, August 30, 2005, Expression of Alfin1 and methods for producing transgenic plants having increased root growth and root specific gene activation

Cornell University, US 6,927,322, August 9, 2005, Cabbage proteinase inhibitor gene confers resistance against plant pests

Iowa State University, US 6,942,994, September 13, 2005, Materials and methods for the alteration of enzyme and acetyl CoA levels in plants

University of Kentucky, US 6,930,182, August 16, 2005, Composition and methods of using the *Mirabilis mosaic caulimovirus* sub-genomic transcript (Sgt) promoter for plant genetic engineering

2006 PIPRA Membership Meeting

Orlando, Florida
March 1st 2006

This annual gathering is a forum for representatives from member and affiliate institutions to discuss PIPRA's governance and activities, assess its progress, set future priorities, and explore new opportunities to fulfill the organization's mission.

Co-Hosted by PIPRA and the **University of Florida**, the 2006 meeting will be held on **Wednesday March 1st** at the **Disney's Yacht & Beach Club Resort** in Orlando, Florida.

This meeting has been conveniently scheduled to coincide with the **2006 AUTM Annual Meetings** held at the same location on March 2-4, 2006. [See details on the AUTM website.](#)

For those attending just the PIPRA meeting, rooms are available at the [Disney Board Walk Inn](#), next door.

For those who will also be attending the AUTM meetings, arrangements have been made to allow you to extend your stay at the Disney Yacht & Beach Club under AUTM's hotel arrangements, which should be booked directly through [Disney Yacht & Beach Club Resort](#).



Disney's Yacht and Beach
Club Resort

Current PIPRA Member Institutions

1. Arizona State University, Arizona Technology Enterprises LLC
2. Boyce Thompson Institute
3. CIMMYT, The International Maize and Wheat Improvement Center, Mexico
4. Cornell University
5. Donald Danforth Plant Science Center
6. Fundación Chile, Chile
7. Iowa State University
8. IRRI, International Rice Research Institute, Philippines
9. Kansas State University
10. Michigan State University
11. North Carolina State University
12. Ohio State University
13. Parco Tecnologico Padano, Italy
14. Purdue University
15. Salk Institute
16. The Samuel Roberts Noble Foundation
17. The State University of New Jersey, Rutgers
18. University of Arizona
19. University of Arkansas, Division of Agriculture
20. University of California-Berkeley
21. University of California-Davis
22. University of Florida
23. University of Georgia Research Foundation
24. University of Idaho
25. University of Kentucky
26. University of Missouri-Columbia
27. University of Saskatchewan, Canada
28. University of Wisconsin, Wisconsin Alumni Research Foundation
29. Virginia Tech, College of Agriculture and Life Sciences
30. Washington State University

PIPRA's 2005-6 Executive Committee

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