

NABC NEWS

Spring 2011 No. 42

*Providing an open forum
for exploring issues in
agricultural biotechnology*



NABC'S PRINCIPAL OBJECTIVES ARE TO:

- provide an open forum for persons with different interests and concerns to come together to speak, to listen, to learn, and to participate in meaningful dialogue and evaluation of the potential impacts of agricultural biotechnology
- define issues and public policy options related to biotechnology in the food, agricultural, biobased industrial product, and environmental areas
- promote increased understanding of the scientific, economic, legislative, and social issues associated with agricultural biotechnology by compiling and disseminating information to interested people
- facilitate active communication among researchers, administrators, policymakers, practitioners, and other concerned people to ensure that all viewpoints contribute to the safe, efficacious and equitable development of biotechnology for the benefit of society
- sponsor meetings and workshops and publish and distribute reports that provide a foundation for addressing issues.

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Letter from the Chair....

The potential role of public, government and private institutions is to facilitate the deployment and acceptance of genetically-modified crops in a second Green Revolution.

In the NABC fall 2010 newsletter, I spoke of the role that genomic and related sciences must play in order to realize a second Green Revolution for improving agriculture and helping to feed and clothe the world. This new revolution will include discoveries that advance our understanding of the relationship between variation in gene sequences and variation in each organism's form and function. Our ability to measure phenotypes in a reproducible manner will be paramount to our success, and will rely on our ability to translate phenotypes to a description at the molecular level. Moreover, the discovery and implementation of transgenic traits for traditional row crops, specialty crops and even animals will continue to be the other significant factor in leading the way to a second Green Revolution.

Currently, event deregulation of genetically-modified (GM) crops in the United States requires food, feed and environmental assessments for regulatory approval that may require consultation of three agencies: EPA, FDA and/or USDA. Because event deregulation and regulatory approval commonly require 7 or more years, the timeframe for a GM crop to enter the marketplace can be as long as 10 to 15 years, which limits the number of companies willing to invest. Because the regulatory process, following the inception of new ideas and proof of concept, is so expensive and arduous, the vast majority of public institutions do not consider further development for commercial utility, even when the crop possesses traits that could vastly advance agriculture systems and improve human health. Often transgenic events are "shelved" in universities and other public institutions due to the insurmountable task of gaining regulatory approval, which includes having access to appropriate regulatory expertise, infrastructure and cash resources. Many transgenic traits that could vastly improve



BILL F. MCCUTCHEM
NABC CHAIR 2010-2011

yield and nutritional value are simply not pursued or are significantly delayed, including GM crops that could provide essential vitamins and increased protein availability for mankind.

The R&D and regulatory process involves several primary events. Immediately following proof of concept of the technology in the laboratory and/or greenhouse, it is prudent for the scientists and the institution to conduct an initial evaluation for the novelty of the transgenic approach. Such an assessment usually includes evaluation of intellectual property rights and potential obstructions. The ultimate goal is the development of a viable path forward that allows freedom to operate through implementation and/or commercialization. Concurrently, early safety evaluations of candidate transgenes and genetically-engineered crops are performed. Some of these evaluations and tests, required for regulatory approval, include, but are not limited to: gene sources; protein(s) characteristics such as mode of action, homology, toxicity, and allergenicity potential; assessment of non-target organisms; insertion and copy events, and the like. After the transgenic event is submitted to governmental agencies for deregulation, plant breeders, agronomists and other scientists spend the next several years and countless dollars evaluating different GM crop events for

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FOOD SECURITY: The Intersection of Sustainability, Safety and Defense

23rd Annual National Agricultural Biotechnology Council Conference

University of Minnesota

June 15–17, 2011

F. Abel Ponce de León and Jessica Weaver

As host for the twenty-third annual NABC conference, the College of Food, Agricultural and Natural Resource Sciences (CFANS) at the University of Minnesota is pleased to continue NABC's tradition of engaging with the pressing issues and central questions of agricultural biotechnology, through a timely discussion of global food security. This year's conference, *Food Security: The Intersection of Sustainability, Safety and Defense*, is an attempt to address the realities of a food-insecure world in the 21st century and the possibilities and potential pitfalls involved in the use of agricultural biotechnology for future generations.

Under the weight of changing climate, soaring food prices, emerging pathogens, and concerns over environmental integrity and food safety, agriculture faces a period of transition as it is challenged to respond rapidly at the local, regional, and global levels to the complex dimensions of food security. Agricultural biotechnology, as a promising way forward, looks to play a key role in the development of technologies that will help feed an ever-increasing population, yet substantial debate remains on how to best capitalize on its benefits while mitigating its risks.

To foster discussion on these issues, NABC 23 will be organized around four broad topic areas: *Sustainability and Needs of 2050 Agriculture*; *Systems-Based Approaches to Food Protection and Safety*; *Emerging Biotechnologies to Promote Safety, Enable Defense, and Discourage Fraud*; and *Preparing for Emerging and Unknown Threats*. An impressive list of speakers will offer their expertise on various aspects of each topic, as follows:

Session I: *Sustainability and Needs of 2050 Agriculture*

- Sustainability and Climate Change – Jonathan Foley, University of Minnesota
- Water Resources and Sustainability – Deborah Swackhamer, University of Minnesota
- Developed and Developing World Sustainability Perspectives – TBD

Session II: *Systems-Based Approaches to Food Protection and Security*

- Risk and Vulnerability – David Andow, University of Minnesota
- Detection and Fraud – Martin Duplessis, Health Canada
- Risk Transference – Detlof von Winterfeldt, University of Southern California

Session III: *Emerging Biotechnologies to Promote Safety, Enable Defense, and Discourage Fraud*

- Safety – Art Liang, Centers for Disease Control and Prevention
- Defense – Shaun Kennedy, University of Minnesota
- Fraud – TBD

Session IV: *Preparing for Emerging and Unknown Threats*

- Crops – Jacqueline Fletcher, Oklahoma State University
- Animals – Jeff Bender, University of Minnesota
- Public Health – TBD

At the conclusion of each session, the featured speakers will convene for a panel question-and-answer session, to reflect on the issues raised and take comments and questions from the audience. As is traditional at NABC meetings, attendees will have additional opportunities for further discussion during workshop sessions when they meet in breakout groups on Thursday, June 16 and Friday, June 17, and when they gather for the welcome reception on Wednesday, June 15.

To add to the discussion, Gene Hugoson, the most recent past commissioner of the Minnesota Department of Agriculture, will offer his perspectives as a veteran of agricultural public policy in the state of Minnesota at the luncheon session on Thursday, June 16. In addition, June Medford, Colorado State University, and Daniel Gustafson, FAO liaison officer for North America, will anchor the presentations with plenary addresses on Wednesday, June 15, and Thursday, June 16.

The conference will convene at 1:00 p.m. on Wednesday, June 15 at the Hilton Minneapolis/St. Paul Airport – Mall of America Hotel in Bloomington, MN, and will close immediately after lunch on Friday, June 17.

Registration

Interested participants are encouraged to register for NABC 23 online via the conference website (<http://nabc23.umn.edu/>) by May 6, 2011, to take advantage of the special early-bird rate of \$350. After May 6, the full registration fee of \$425 will go into effect. Students will enjoy reduced rates of \$175 by May 6 and \$210 after May 6.

The registration fee will cover the welcome reception on June 15, refreshment breaks June 15–17, breakfast, lunch June 16–17, and the dinner banquet on June 16 as well as all conference materials and a copy of the proceedings volume. Faxed and mailed registration forms will also be accepted. In-person registration will take place on Wednesday, June 15 from noon to 4:00 PM; space is not guaranteed.

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Speakers



David Andow has been the Distinguished McKnight University Professor in insect ecology at the University of Minnesota since 2005. He has a BS from Brown University (1977) and PhD from Cornell University (1982) in ecology.

Dr. Andow's awards include fellowships from the Japanese Society for the Promotion of Science (1991, 2004), consultancies to EMBRAPA, Brazil (2004, 2009, 2010), and appointment as the international delegate to the Brazilian Entomological Society (2008). He teaches courses in insect ecology, population dynamics, and ecological risk assessment. ■



Jeff Bender is an associate professor in the University of Minnesota's College of Veterinary Medicine and has an adjunct-professor appointment in the School of Public Health. From 1995 through 2000, he served in the Acute Disease Epidemiology Section of the Minnesota Department of Health, as an infectious-disease epidemiologist.

Dr. Bender's primary teaching and research interests include emerging zoonotic diseases, disease surveillance, food safety and antimicrobial resistance. He has served as the chair for the National Association of State Public Health Veterinarians Compendium, examining measures to prevent diseases associated with animals in public settings, and as the division head of Veterinary Public Health at the College of Veterinary Medicine. Currently, he is principle investigator on a CDC-funded Cooperative Agreement on Zoonotic Influenza Infections and is director of the Center for Animal Health and Food Safety at the University of Minnesota. ■



Martin Duplessis is the Emergency Preparedness and Response Coordinator for the Bureau of Microbial Hazards, Food Directorate, in the Health Products and Food Branch of Health Canada. He is responsible for policy areas on a wide range of issues related to food safety, food defence, and chemical, biological, radiological and nuclear (CBRN) emergency preparedness and response. Additionally, he is a scientific advisor on several research projects involving CBRN-agent detection.

Prior to assuming his current position, he was a scientific advisor responsible for research-development strategies and intellectual property management in universities for the government of Quebec.

He holds a PhD in food microbiology from the University of Laval, Quebec City. ■



Jacqueline Fletcher has a BS in biology from Emory University, Atlanta, an MS in botany from the University of Montana, and a PhD in plant pathology from Texas A&M. She joined Oklahoma State University in 1984, where she was appointed Sarkeys distinguished professor in 2001 and regents professor of plant pathology in 2008. She was named a fellow of the American Phytopathological Society (APS) in 2005 and a fellow of AAAS in 2007.

Dr. Fletcher is director of the National Institute for Microbial Forensics and Food and Agricultural Biosecurity (NIMFFAB), a multidisciplinary OSU initiative that addresses high-priority national issues in research, teaching/education and outreach, with emphases in microbial forensics applications in plant pathology and produce safety. The NIMFFAB serves as a spoke laboratory for the DHS-affiliated National Bioforensic Analysis Center in the area of plant pathogen forensics.

She served on the APS council for ten years, including the four-year presidential sequence. In the months following September 11, 2001, she led APS responses and input to new national biosecurity initiatives. Her research focuses on mechanisms of virulence and insect transmission of plant pathogenic bacteria, the relationships between human pathogens and plants, and on the emerging disciplines of microbial forensics and agricultural biosecurity. ■



The Student Voice at NABC

TRAVEL STIPEND AND FREE REGISTRATION TO ATTEND NABC 23
FOR ONE GRADUATE STUDENT FROM EACH NABC MEMBER INSTITUTION

[HTTP://NABC.CALS.CORNELL.EDU/STUDENTVOICE/INDEX.CFM](http://nabc.cals.cornell.edu/studentvoice/index.cfm)



Jonathan Foley is the director of the Institute on the Environment (IonE) at the University of the Minnesota, where he is a professor and McKnight Presidential Chair in the Department of Ecology, Evolution and Behavior. He also leads the IonE's Global Landscapes Initiative.

Dr. Foley's work focuses on complex global environmental systems and their interactions with human societies. He and his students have contributed to our understanding of global-scale ecological processes, global patterns of land use, the behavior of the planet's climate and water cycles, and the sustainability of our biosphere. As a result of this work he is an advisor to large corporations, NGOs and governments.

Foley joined the University of Minnesota in 2008 after 15 years at the University of Wisconsin, where he founded the Center for Sustainability and the Global Environment. He has (co)authored over 100 articles in the scientific literature, and written many popular articles and essays.

He has won numerous awards and honors, including the National Science Foundation's Faculty Early Career Development Award; the J.S. McDonnell Foundation's 21st Century Science Award; an Aldo Leopold Leadership Fellowship; and the Sustainability Science Award from the Ecological Society of America. In 1997, President Clinton awarded him the Presidential Early Career Award for Scientists and Engineers. ■



Daniel Gustafson has been the director of the FAO Liaison Office for North America since 2008. He has served with FAO since 1994, first in Mozambique as an advisor within the Ministry of Agriculture and then as head of FAO's country offices in Nairobi, Kenya, and New Delhi, India. He has BS and MS degrees from the University of Wisconsin and a PhD from the University of Maryland.

Prior to joining FAO, Dr. Gustafson was the program director for Agriculture and Natural Resources at the University of Maryland's International Development Management Center, and from 1977 to 1988 he worked in Brazil for the Inter-American Institute for Cooperation on Agriculture. ■



Gene Hugoson recently joined the Global Initiative for Food Systems Leadership as a senior fellow. Previously he served as commissioner of agriculture for Minnesota for over 15 years under three governors; his focus was on food security and value-added production as well as marketing of agricultural products domestically and internationally.

Mr. Hugoson was elected five times to the state legislature. He is actively involved in his corn and soybean farm located in south-central Minnesota. ■



Shaun Kennedy is director of the National Center for Food Protection and Defense, a department of the Homeland Security Center of Excellence. He is also the director of Partnerships and External Relations of the University of Minnesota's College of Veterinary Medicine and an assistant professor in the Department of Veterinary Population Medicine. In recognition of his leadership in research and graduate-education programs on animal health, food safety, and food-system defense, Mr. Kennedy received the Commissioner of the Food and Drug Agency Citation for advancing food defense. He provided the inaugural lecture in the FDA's Chief Scientist Lecture series and served on several European Commission projects on food-system protection, among others.

Prior to joining the University of Minnesota, Kennedy held executive positions in Procter & Gamble and Ecolab. At Ecolab, he was vice president of global food and beverage research and development, leading his organization in developing a wide range of animal-health and food-safety technologies. These included novel sanitizers, FDA-approved process additives, new sanitation technologies, and animal health products. Prior to this, he was director of strategic and emerging technologies at Ecolab, guiding internal and outsourced technology programs. At Procter & Gamble his positions included assignments in Japan and China, leading research and development teams and global programs. ■



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Arthur Liang has an MD from the University of Maryland and is the director of the Food Safety Office at the Centers for Diseases Control and Prevention National Center for Emerging and Zoonotic Infectious Diseases. He previously served as the associate director for Public Health Practice, Division of Applied Public Health Training, Epidemiology Program Office, where he directed CDC's Preventative Medicine Residency. He is a former CDC epidemic intelligence service officer and a member of the EIS class of 1980.

Dr. Liang is the former chief of the Communicable Disease Division, Hawaii Department of Health. He currently serves on the executive committee of the National Advisory Committee on Microbiological Criteria for Foods and is the CDC advisor to the board of directors of the Association of Food and Drug Officials. He is also a member of the preventive medicine residency advisory committee for the Walter Reed Army Institute of

Research, and is a fellow of the American College of Preventive Medicine. ■



June Medford, a professor of biology at Colorado State University, is a leader in the field of plant synthetic biology. She received her BS in botany from the University of Maryland and a PhD in biology from Yale, followed by postdoctoral training with the Plant Molecular Biology group at Monsanto.

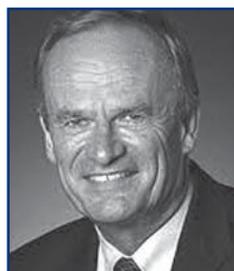
Dr. Medford's research focus is on plant synthetic biology, the forward engineering of plants for specific purposes, both basic and applied. She has developed a synthetic signal-transduction system based on conserved histidine kinase components and a field-level synthetic readout system. By linking these synthetic systems together with computationally re-designed receptors, the Medford lab has produced the first sentinels to allow plants to serve as inexpensive and highly specific detectors of substances such as explosives, environmental pollutants and chemical agents. Detection levels are approximately 10- to 100-fold better than the detection

abilities of dogs. Work is in progress to add ultra-sensitivity and memory for specific application (e.g. transportation hubs) and expand the detection platform to biological agents. Furthermore, the synthetic system is a biological input-output system and, hence, is being used to control biofuel and agronomic traits. ■



Deborah Swackhamer is professor and Charles M. Denny Jr. Chair in science, technology, and public policy in the Hubert H. Humphrey Institute of Public Affairs at the University of Minnesota, and co-director of the Water Resources Center. She also is professor in environmental health sciences in the School of Public Health. She received a BA in chemistry from Grinnell College, Iowa, and MS and PhD degrees from the University of Wisconsin-Madison in water chemistry and limnology & oceanography, respectively. After two years post-doctoral research in chemistry and public and environmental affairs at Indiana University, she joined the Minnesota faculty in 1987. She has studied the processes affecting the behavior of, and exposures to, toxic chemicals in the environment.

Dr. Swackhamer serves as chair of the science advisory board of the Environmental Protection Agency, and on the science advisory board of the International Joint Commission of the United States and Canada. She was appointed by Governor Pawlenty to serve on the Minnesota Clean Water Council, is a member of the editorial advisory board for the journal *Environmental Science & Technology*, and she chairs the Editorial Advisory Board of the *Journal of Environmental Monitoring*. She is the 2010 recipient of the University of Minnesota's Ada Comstock Award. ■



Detlof von Winterfeldt is the director of the International Institute for Applied Systems Analysis in Laxenburg, Austria. He is on leave from the University of Southern California (USC), where he is a professor of industrial and systems engineering and a professor of public policy and management. Concurrently he is also visiting the London School of Economics and Political Science as a centennial professor in the Operational Research Group of the School of Management.

In 2003, Dr. Winterfeldt co-founded the National Center for Risk and Economic Analysis of Terrorism Events (CREATE) at USC, the first university-based center of excellence funded by the US Department of Homeland Security; he served as CREATE's director until 2008.

For the past thirty years, he has been active in teaching, research, university administration, and consulting. He has taught courses in statistics, decision analysis, risk analysis, systems analysis, research design, and behavioral decision research. His research interests are in the foundation and practice of decision and risk analysis as applied to the areas of technology development, environmental risks, natural hazards and terrorism. He is the co-author of two books, two edited volumes, and (co)author of over a hundred journal articles and book chapters on these topics. ■

continued from page2: "Food Security..."

Please see the conference Website for our cancellation and confirmation policies.

The Student Voice

As is customary, graduate students at each of the NABC-member institutions are urged to apply for *Student Voice* grants in order to help defray the cost of attending the conference. One student from each member institution will receive up to \$750 (US) from NABC for travel and lodging costs as well as complimentary registration. *Student Voice* grantees will be expected to attend all sessions, including plenary and breakout sessions, and meet to discuss the issues and themes that have emerged at the conference. They will summarize their findings at lunch on Friday, June 17. Application forms will be available online in the coming weeks.

Accommodations

CFANS is pleased to have the Hilton Minneapolis/St. Paul Airport – Mall of America Hotel as the venue for this year's conference. A block of rooms has been reserved through May 18, 2011. Attendees are urged to make their reservations early to secure a room in the block and enjoy a reduced room rate of \$115 plus tax. Complimentary shuttle service to and from the Minneapolis-St. Paul Airport is provided by the hotel. Additional transportation information can be found online at the conference Website.

Sponsorship

With conference registration underway, CFANS is now offering a select number of sponsorship and exhibitor opportunities for interested organizations to help support this year's conference and receive attendee recognition. General sponsorship

opportunities are available at the \$1,500, \$3,000, and \$4,500 levels, each with associated benefits, as are exclusive sponsorship packages at the \$5,000 and \$10,000 levels. Those organizations looking to increase their visibility and benefit from face-to-face interaction with our diverse group of attendees are encouraged to consider reserving one of our exhibit booths for \$1,300. Registration forms and detailed information are available online.

Questions, comments and suggestions may be directed to:

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NABC Will Participate in BIO's *World Congress on Industrial Biotechnology and Bioprocessing* Toronto, ON, May 8–11

The *World Congress*—initiated in 2004 by the Biotechnology Industry Organization (BIO), the American Chemical Society and NABC—has become the world's largest conference on industrial biotechnology and the leading event for business leaders and policymakers in biofuels, biobased products, and renewable chemicals.

NABC will have "supporting organization" status at the eighth *World Congress*, which will convene at the Metro Toronto Convention Center, within walking distance of the waterfront, fine shopping, restaurants and other attractions, and only a 20-minute drive from Pearson International Airport.

The 2011 plenary program will include leaders from industry, academia and government with emphasis on driving commercialization and innovation in biobased industrial products and processes, including developments in the United States, Europe, South America, and Canada. The plenary presentations and breakout sessions will comprise a variety of categories, most of which are relevant to agriculture:

- Algae and Feedstock Crops
- Advanced Biofuel Technologies
- Renewable Chemical Platforms and Biobased Materials
- Specialty Chemicals, Pharma Intermediates, Food Ingredients
- Public Policy, Infrastructure and Business Development
- Synthetic Biology and Metabolic Engineering

Registration and other information are available at <http://www.bio.org/worldcongress>. ■

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commercial viability while collecting data for global deregulation of the potential product. Once all analyses are performed and a transgenic event is considered to meet all commercial hurdles and regulatory parameters, a prospective product is developed for marketing and sales. At this stage the primary focus is on GM-crop development, where transgene and trait introgression is stringently evaluated for background interactions in elite inbreds and/or hybrids. For most crops, the germplasm and breeding components are found only in the private sector (e.g. corn, cotton, and soybean). This entire process can cost \$100 million or more.

One of the most widely recognized examples whereby regulatory and cost hurdles have stifled GM-crop advancements is that of the Golden Rice project¹, in which the deployment of genetically-bio-fortified rice to malnourished, rice-dependent populations in developing countries has been delayed for up to a decade. The experience of the team and institutes trying to deploy the genetically-engineered rice refer to three major hurdles and bottlenecks through the development process: 1) intellectual property rights; 2) lack of financial support from the public domain; and 3) the regulatory approval process. In fact, these obstacles are ubiquitous across all attempts of public institutions to transfer and deploy potentially valuable GM technology for producers, consumers and mankind.

As another example, Texas A&M AgriLife and Cotton Incorporated have recently developed a transgenic approach, which significantly lowers the levels of gossypol, but only in the cotton seed². Gossypol is a well known and characterized terpenoid of cotton that has advantageous insect, microbial and rodent properties, but it has adverse and

¹ Potrykus, I. 2010. Lessons from the Humanitarian Golden Rice project: Regulation prevents development of public good GE-products. *New Biotechnology* 27(5): 466-472.

² Sunilkumar, G. 2006. Engineering cottonseed for use in human nutrition by tissue-specific reduction of toxic gossypol. *PNAS* 103(48):18054–18059. ³ Tom Wedegaertner, Cotton Incorporated, *personal communication*.

deleterious effects on animals and humans when consumed at high levels. Currently, the levels of gossypol in cottonseed hinder the full utility of this protein-rich source, significantly curtailing the overall benefits of cottonseed for meeting human and livestock nutritional needs. It is estimated that with only a 20 percent adaptation of this GM cotton, an additional 1 million tons of protein would be available for human and animal consumption on the world-wide scene³. However, for these types of humanitarian and commercial applications, public institutions do not routinely have the needed expertise, infrastructure and monetary resources to pursue deregulation; likewise, the private sector has little financial incentive for investment or for assuming any liabilities associated with these endeavors. These types of impasses result in the inability of private and public entities to develop new products for consumer-driven markets and corresponding creation of jobs.

These issues and dilemmas routinely lead to an inability to transfer and implement potentially valuable GM-technology platforms to producers, consumers and humankind. While the hurdles described above can ultimately be addressed via public-private partnerships, the obstacles and delays can be primarily attributed to the costs and exposure associated with the deployment of GM crops—regulation requirements that are currently insurmountable for public entities, especially academic institutions. In the current regulatory regime, the most effective solution to advance GM technology for the development of commercial markets and public goods is public-private partnerships. These types of relationships allow continued public training of graduate students as plant breeders, geneticists, agronomists and in other sciences while transferring technological breakthroughs to producers, consumers and mankind. It is hoped that, in the future, the current regulatory practices covering transgenic traits and GM crops will be refined based on good scientific practices. The continued advancement of public-private partnerships will, undoubtedly, deliver new markets while contributing to the public good. Refinement

and attenuation of regulatory requirements with a continued emphasis on public safety would provide an immediate impact on yields for increased productivity and availability of food, feed and fiber as well as dramatic reductions in pesticide usage, conservation of water and the like.

Moving forward, it is incumbent that we facilitate and grow relationships amongst private, government and public institutes. Currently, public research institutions are unable to support the entire process from R&D through regulatory requirements and product development of GM crops and animals. Such partnerships will, undoubtedly, facilitate and expedite the assurance of safety in the implementation of transgenic traits and GM technology that will significantly assist in agricultural production and human health. As stated by Norman Borlaug in his Nobel Peace Prize acceptance speech, “The first essential component of social justice is adequate food for all mankind.” The age of facilitating technology development—such as marker-assisted breeding and GM crops—is clearly upon us, and these components will likely be the most important factors leading to a second Green Revolution for feeding the world.

* * *

Food security is an increasingly important challenge. This timely issue will be discussed in open forum at NABC’s twenty-third annual conference, *Food Security: The Intersection of Sustainability, Safety and Defense*, which will be hosted by the University of Minnesota (June 15–17, see page 2). I urge you to attend. ■



Bill F. McCutchen
Executive Associate Director
Texas AgriLife Research
Texas A&M University System

Mark Your Calendars

NABC 23

Food-Security: The Intersection of Sustainability, Safety and Defense

June 15–17, 2011

Hosted by the University of Minnesota, St. Paul, MN

<http://nabc23.umn.edu/>

