

# NABC NEWS

Spring 2014 No. 47

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



NABC'S PRINCIPAL OBJECTIVES ARE TO:

- *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....*

In keeping with tradition, it is now for me an honor, as chair of NABC, to write a few words for this newsletter.

NABC joins the agricultural world community in remembering and celebrating the 100th birthday anniversary of Norman Borlaug, Nobel Peace Laureate, founder of the World Food Prize and the Siehl Prize for Excellence in Agriculture. The work of Dr. Borlaug was paramount in alleviating world hunger in the past century. He is credited with saving one billion people from hunger and is recognized as the “Father of the Green Revolution.” He was also a tireless advocate for the application of all available biotechnology to agriculture.

For the agriculturalists of today, the challenge of food security is most probably more complex and daunting than in the past century. We have now a world of seven billion people and it is estimated that one billion are undernourished and another one billion over-nourished. This lack of food for some and excess of food for others create serious human-health issues and dominate the agricultural agenda, constituting a global grand challenge. This situation is exacerbated by the fact that the world population is expected to grow to nine billion by 2050 and, according to United Nations estimates, will require 35% more food, 40% more water and 50% more energy. All of these will need to be achieved in a relatively short period of time, with about the same amount of agricultural acreage as currently exists and in a world facing climatic changes that will affect availability of water for agriculture and human consumption, among other challenges. Clearly the future demands better coordination and collaboration across nations,



**Abel Ponce de León**  
NABC Chair 2013–2014

better distribution of food resources and sustainable intensification of agricultural production across the globe.

In the last four years, NABC has placed on its agenda topics addressing world food-security challenges. It has published important white papers—*Agricultural Water Security* and *Agriculture and the Changing Climate*—that summarize technological achievements and also suggest increased public- and private-sector research investments in genetics, chemistry, agronomy, agroecology and engineering to help provide the 40% increase in water needed by the growing worldwide human population. Similarly, I invite you to read *NABC Report 23* and *24* summarizing the 2011 and 2012 conferences, organized by the University of Minnesota and the University of Arkansas, which addressed the themes of “food security” and “water sustainability in agriculture,” respectively. Both conferences addressed the multiple challenges that will need to be tackled to successfully feed a world of nine billion people by 2050. The general vision is to “increase federal-government and private investment in agricultural research, with the creation of a network of public-private multidisciplinary innovation institutes.”

*continued on page 6*

**NABC 26—Mark Your Calendars**

***New DNA-Editing Approaches:  
Methods, Applications and Policy for Agriculture***

**October 8–9, 2014**

**Ithaca, New York**

**Hosted by Cornell University and Boyce Thompson Institute**

**Margaret Smith and Karen Kindle**

While production of transgenic crops and livestock continue to generate both promise and controversy, a whole new set of genetic engineering methods has been developed that relies on precision DNA editing. This technology has advanced quickly, and products are now poised to enter the marketplace. Crop varieties and animal breeds improved through DNA editing may generate less controversy than those developed using transgenic approaches because modifications are very specific and generally do not involve cross-species transfer of genetic material. Whether these genetic modifications are actually less controversial remains to be seen. Currently, the methods themselves are new, their applications have yet to be commercialized, and the policy and regulatory environment in which they could be deployed are largely undefined.

NABC's twenty-sixth conference will bring together leaders in the field to discuss the latest in DNA-editing methods and applications. Guest speakers will address technologies such as CRISPRs, TALENs, and other DNA-editing approaches and will describe near-term applications for crops, livestock, and even insects in both the public and private sectors. Sessions focused on regulatory aspects of

these technologies will feature governmental representatives from Canada, the European Union, and the United States. Other speakers will present perspectives on topics ranging from economics to consumer concerns to public research issues. Q&A sessions will provide audience members with opportunities to contribute directly to the discussion.

The conference will be held in the Biotechnology Building on the Cornell campus. Travel options include flights directly into the Ithaca airport or into nearby airports in Syracuse or Elmira. The conference dates in early October will allow visiting the beautiful Finger Lakes region at the height of fall colors—a great time to enjoy the scenery and the award-winning products of the many local wineries. We hope you will be able to join us for NABC 26!

Please direct questions, comments, or suggestions regarding NABC 26 to:

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**Visit us online at**

***<http://nabc.cals.cornell.edu/NABC26/index.html>***

**for information or to register**

## Overview of NABC 25:

# *Biotechnology and North American Specialty Crops: Linking Research, Regulation, and Stakeholders*

Specialty crops—fruits, vegetables, nuts—are an important part of the human diet. In 2007, such crops represented approximately 40 percent of the \$140 billion in total agricultural receipts, despite being cultivated on just 4 percent of the total cropped area. Only six genetically engineered (GE) specialty crops are commercially available in the United States, whereas, in contrast, GE commodity crops—corn, soybean, cotton, canola, sugar beet—now dominate the markets in countries where they have been released. Possible reasons for this disparity are lack of research on specialty crops and/or a dearth of beneficial traits for crop improvement through genetic engineering. Alternatively, progression through the regulatory process may have failed.

NABC 25 was hosted by Bill McCutchen and colleagues at Texas A&M University, June 4–6, 2013. The conference—at the George Bush Presidential Library in College Station—brought together government officials, academic researchers and industry leaders, with the objective of encouraging the improvement and subsequent commercialization of specialty crops. A unique aspect of NABC 25 was the objective to formulate strategies to encourage progression to commercialization of GE specialty crops by public-sector researchers.

The presentations at NABC 25 were grouped in five areas:

- Opportunities and Challenges for Specialty Crops
- Genetic Engineering and Specialty-Crop Improvement
- Case Studies
- The Regulatory Process and Technology Access
- Perspectives from Relevant Groups

There follows a selection of “Major Issues” that emerged from the presentations and from the Q&A sessions. A more comprehensive listing of considerations underpinning the state-of-the-art as it relates to GE specialty crops, the paucity of commercialization of GE specialty crops and how this situation may be improved will be provided in the proceedings volume—*NABC Report 25—Biotechnology and North American Specialty Crops: Linking Research, Regulation and Stakeholders*—which is expected to be published by the end of April, 2014.

### MAJOR ISSUES

*The Dearth of GE Specialty Crops Commercially Available in the United States*

- Virus-resistant papaya
- Virus-resistant squash
- Insect resistant sweet corn
- Virus-resistant plum
- Herbicide-tolerant sugar beet
- Violet carnation

*Only a Few GE Specialty Crops Are Within the US Regulatory Process<sup>1</sup>*

- Innate™ potato with reduced black-spot bruising and reduced asparagine content
- Orange resistant to citrus-greening bacterial disease
- Non-browning Arctic apple

*Barriers to Commercialization of GE Specialty Crops*

- Current, time-consuming, costly, federal regulatory strictures
- Uncertainty over the cost of achieving commercialization.
  - One report indicated that the cost of discovery, development and authorization of a new GE trait introduced to a commodity crop by a large company between 2008 and 2012 was \$136 million, of which achieving deregulation cost 26 percent (\$35.1 million)
- Lack of access to essential technologies
- Lack of interest on the part of major companies
- Declining entrepreneurial spirit on the part of public-sector scientists
- Declining funding for public-sector research
- Need to invigorate public interest in new specialty crops advantageous to producers, to processors and to consumers

*Key Recommendations for Achieving Timely Deregulation and Market Acceptance*

- Communicate with the appropriate federal agency/agencies early and often
- Invest in the services of consultants to help negotiate the regulatory process
- Non-GE identification of products, e.g. Innate™ potatoes and Arctic apples
- Use social media to elucidate advantages gained from GE crops

<sup>1</sup> Not necessarily exhaustive.

## The Student Voice at NABC 25

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The following are issues and concerns that emerged from NABC 25 that we, the Student Voice representatives, deemed important. A fuller report will be included in the proceedings volume, *NABC Report 25—Biotechnology and North American Specialty Crops: Linking Research, Regulation, and Stakeholders*.

Our concerns for the future fall into three general categories: Communication, Education and Funding.

### Communication

- There is a lack of interdisciplinary collaboration and communication outside of the life sciences. Life scientists do not consistently collaborate with sociologists, economists, or marketing experts, whereas, in industry, such collaboration is standard. Increasing interdisciplinary cooperation could lead to improved public perception of genetically modified organisms (GMOs).
- Also important is communication between scientists and the general public. There is a preference on the part of the public to be informed by arbitrary events and opinions of celebrities—frequently disseminated as “tweets”—rather than by scientifically substantiated discoveries.
- Many groups are fighting to have GM foods labeled, but we have yet to see one fighting to label all cultivar-development methods, or—for example—water-usage rate per acre. If mandatory labeling will go beyond specific nutrient composition, there must be guidelines for what information beyond nutrient composition must be included, and they must be applied to all foods and at the same time. We propose a change to mandatory labeling of foods to include information on how the crop was produced and what, if any, modifications were made.

### Education

In the United States, there has been a decrease in science- and math-test scores over the last few years. This trend applies to students when tested from fourth to twelfth grades. Furthermore, many students have little understanding of where food comes from or what it takes to grow crops and produce meat. This problem may be solved as follows:

- The first way is for scientific and mathematical organizations to come together and advocate to national, state/provincial, and local governments to stop decreasing spending on STEM<sup>1</sup> education; potentially, this is a role that NABC can be a part of.
- The second way is for universities and scientific organizations to promote STEM and agricultural experiences for primary and secondary students, to educate on how food is grown and to show STEM in action. NABC-member institutions could promote such programs in their respective areas and increase exposure of students to science.
- A third way that NABC could help to improve STEM education is to bring students to visit GMO trials so that they can see for themselves what these crops can do. By increasing the quality of STEM education and having an outreach to the public, we can begin to reverse the negative public perception of GMOs.

### Funding

The state of STEM funding in North America is discouraging. Due to budget cuts, funding for fundamental research has been drastically decreased in the United States. As emerging scientists, we feel that this trend will negatively impact both innovation and advancement. If the US government had not funded the \$3.6 billion<sup>2</sup> Human Genome Project in 1988, we would not be seeing the renaissance in genetics and the related “-omic” branches that have led to \$1 trillion worth of biotechnology companies. Given that there is a high return on research-funding investment (at least a 30% return and up to 100%), we are not only short-changing ourselves but also future generations. The NABC must stand with other scientific organizations, and concerned citizens, to stop the slashing of research funding currently occurring in Washington.

<sup>1</sup> Science, technology, engineering and mathematics.

<sup>2</sup> \$5.7 billion with adjustment for inflation.

## NABC Will Participate in BIO's Eleventh Annual World Congress on Industrial Biotechnology and Bioprocessing

Philadelphia, May 12–15, 2014

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, which represent major market opportunities for agriculture (see *NABC Reports 12, 19 and 20*).

NABC will have “supporting organization” status at the eleventh World Congress in Philadelphia and will have a table in the exhibition area offering our reports, white papers, *etc.*, to the expected >1,000 attendees.

Five plenary sessions will highlight progress in next-generation biorefineries, renewable chemicals, biofuels, and building a sustainable biobased industry:

- Biorefinery Commercialization
- Novel Sugar and Oil Platforms for the Modern Biobased Economy
- New Markets and Opportunities for Biofuels Investment
- Rethinking Chemistry—Driving Innovation with

- Renewable Chemical Platforms
- Consumer Demand Trends for Biobased Products

And the breakout program will comprise eight tracks, many of which are relevant to agriculture:

- Advanced Biofuels and Biorefinery Platforms
- Algae, Specialty Crops and Biomass Supply
- Renewable Chemical Platforms and Biobased Materials
- Specialty Chemicals, Pharma Intermediates and Food Ingredients
- Synthetic Biology and Genomics Research
- Growing Global Markets
- Research Presentations
- Technical Presentations

Each track will have six workshops over two days.

More information on the program, and registration and lodging details, *etc.*, are available at <http://www.bio.org/events/conferences/world-congress>. Questions may be directed to [worldcongress@bio.org](mailto:worldcongress@bio.org).



### **The Student Voice at NABC**

**TRAVEL STIPEND AND FREE REGISTRATION TO ATTEND NABC 26  
FOR ONE GRADUATE STUDENT FROM EACH NABC MEMBER INSTITUTION**

<http://nabc.cals.cornell.edu/StudentVoice.html>

*Continued from page 1: Letter...*

Hence, this is a challenge to all—and time is running out. Widespread application of already available technologies also requires investments in education through agricultural extension programs coupled with adequate public policies and economic incentives to motivate their use.

NABC 26, scheduled for October 7–9, 2014, in Ithaca, NY, will be dedicated to New DNA-Editing Approaches: Methods, Applications and Policy and co-hosted by Cornell University and Boyce Thompson Institute. Relatively new editing DNA technologies, like zinc-finger nucleases, TALENs and CRISPR/Cas9, are allowing very precise and specific gene modifications in DNA at the nucleotide level, significantly shortening the time to generate animals and plants carrying gene modifications. These technologies will have profound consequences for disease

treatments and for producing plant germplasm with genotypes adapted to drought tolerance, fungal and insect resistance, to name a few of the possible applications. Once again NABC is at the forefront, bringing together, scientists, students, industry stakeholders, policymakers and personnel from regulatory agencies to engage in a conversation about the science of these technologies and the pros and cons of their applications to agriculture for the benefit of mankind.



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***New DNA-Editing Approaches:  
Methods, Applications and Policy for Agriculture***

**October 8–9, 2014**

**Hosted by Cornell University and Boyce Thompson Institute in Ithaca, New York**

***<http://nabc.cals.cornell.edu/NABC26/Index.html>***

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**NABC**

