AEIC 2018 Fall Meeting Minutes

Portland, Maine

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AEIC Fall 2018 Meeting Minutes

October 10-11, 2018

Portland, Maine

P.L. Hunst, Secretary

The AEIC Fall 2018 Meeting was held in Portland, Maine on October 10-11. EnviroLogix, Inc. hosted the group at the Holiday Inn by the Bay. Bill Welch, President of EnviroLogix, welcomed the group to Portland. He also recognized Dean Layton for his 20 years of service at EnviroLogix and representing the company at AEIC as well as serving as the Treasurer for 18 years.

AEIC BUSINESS MEETING

Approval of 2018 Spring Meeting Minutes: A motion was made, seconded and voted positive to approve the minutes as posted on the AEIC website.

Treasurer Report (D. Layton): The 2018 budget was presented as follows:

Item	Projected ($)	Actual ($)
Balance 1 January 2018	21474	21474
Dues	17000	9900
Reg fees	2500	1785
	2500	2413
TOTAL revenue	**21500**	**17098**
Scientific paper	2000	
DE Franchise Tax	25	25
ANSI/ISO	2900	2900
Board Meeting	800	637
Spr Meeting	5000	5134
Website	3000	2695
Credit Card	600	
Graphic Brochure		
Reprints	3000	
Subscriptions	100	5
Misc	100	6
TOTAL Expenses	21526	17977
Balance	21449	20595

Meeting registration fee and dues fees restructuring have helped the revenue stream to stabilize.
A motion was made, seconded and voted positive to approve the Treasurer report.

Membership Update (D. Layton): The following table depicts the current membership composition of AEIC:

Category	*Number*	*Projected Dues ($)*	*Unpaid Dues (number)*	*Dues Amount unpaid ($)*
Large Companies	10	10000	6	6000
Medium Companies	13	13000	7	3500
Small Companies	8	2000	3	750
Associate Members	2	100	1	50
Individual Members	2	200	1	100
TOTAL	**35**	**18800**	**18**	**10400**

Eurofins indicated that each division pays its own dues to AEIC, therefore, they should be charged as four separate companies.

Suggestion for possible new member companies included Yield10 Bioscience, Hertzstuck, Indiegogo, Calyxt, Nuseed, Intrexon, Pairwise Plants and Tufts University. The Board will follow up. If members have any contacts at these companies, the Board should be advised.

AEIC Board Nominations (R. Shillito): After 18 years, Dean Layton (EnviroLogix) is retiring as AEIC Treasurer. The group thanked him for his service and dedication and presented him with a plaque. Thus, for the first time in 18 years, nominations were invited for Treasurer as well as for AEIC Vice President. Both positions are 3 year terms.

The following nominations were received at the meeting:

Vice President: Zi Lucy Liu (Bayer), Anna Doornink (Eurofins BDI), Nevena Djuranovic (EnviroLogix)
Treasurer: Luke Muschinske (Eurofins Food Integrity & Innovation), Ravi Ramadhar (Thermo-Fisher)

The Secretary will confirm with each nominee their acceptance to be placed on the ballot. Voting will be conducted via email starting the early part of November.

AEIC Website Update (N. Djuranovic): A subgroup (N. Djuranovic, Zi L. Liu, C. Metzler and P. Hunst) held a teleconference to discuss updating the slideset available on the website as well as some content on other pages. The website has gone through an overhaul by the webmaster due to the need to switch to an updated template. The look and feel has changed for the better.

ISO Updates (R. Shillito): Ray gave a quick update on IWA32 which is dealing with testing of cotton fiber and textiles for DNA (GMO). There have been two online discussion sessions to date. TC34/SC16 is working on qualitative methods FDTS, meat speciation (lead by China), sampling (led by Japan) and isothermal methods (led by A. Eads).
Scientific Paper (R. Shillito): The Protein vs PCR Methods paper has been submitted.

Composition Working Group (L. Muschinske, EFII): The working group is looking at composition studies and methods used for regulatory submissions and evaluating their fit for purpose. The group is currently discussing the Kjeldahl and Dumas combustion protein methods and comparing them. The goal is to publish a paper to justify the use of the Dumas combustion method.

Protein Working Group (M. Cheever, BASF): The working group has finalized its mission statement and has now established several topic workstreams. The workstream for validation multiplexed protein analytical methods is working on a set of guidelines and methods to consider. The workstream for the use of mass spectroscopy for protein expression analysis is working on a strategy for acceptance by the EU (EFSA) and looking at holding potential workshops. The workstream did discuss that mass spectroscopy should not replace other methods but be in the toolbox of methods. The workstream for endogenous allergens reviewed the EU EFSA 2017 guidelines and propose to publish a position document prior to September 2019. The Working Group also reviewed and discussed the EU EFSA 2018 explanatory note on protein expression methods.

Upcoming AEIC Meetings (R. Shillito): The Spring 2019 Meeting will be held in New Orleans, LA and will be hosted by Eurofins GeneScan. No dates have been selected yet. The following suggestions were made for topics at the meeting:

- Cotton as the featured crop
- Point of use detectors
- Impact of U.S. tariffs on agricultural trade
- Practical implications of block chain
- Bacterial and viral detection in vegetable seeds
- Talk by a gene editing company
- Probiotics in food
- Presence of DNA in sugar?
- USDA new guidance and FDA GMO labels

Merieux Nutriscience volunteered to host a meeting in the Chicago area in the future.

By-Laws Amendment (P. Hunst): It was indicated that the AEIC By-Laws need to be updated under the "Membership" section to reflect the membership categories for which dues are being collected. There is a category called "Honorary Members" which has no members to date. The Board will discuss this category and make a proposal to the membership. The Secretary will send out the section to be amended following the Board discussion and the proposed language for the amendment to the membership to vote on.

The Business Meeting was adjourned.

BREAKOUT SESSIONS:

a) **AEIC Website:** The sub-group discussed adjustments that are recommended for several pages of the website. The 2004 slide presentation on the website will be updated with a new design template and more recent content. Another suggestion was to pick stock photos for some of the pages which may represent AEIC more. Pictures from AEIC meetings must be high resolution, i.e., native files from camera, in order for the webmaster to use them on the website. Prior to the meeting ending, the adjustments on the web pages had been done by the webmaster. Next meeting location is posted and will be updated as more information becomes available (such as date, venue, hotel, dinner, etc).

b) **Excellence Through Stewardship:** Chris Holdgreve (ETS) gave a short presentation to the AEIC membership on ETS. ETS is a life cycle approach of a biotech product. It is dependent on the robustness of a company's internal quality management systems. ETS challenges include non-compliance; trade flow disruption; product performance and asynchronous approvals. ETS started 10 years ago and now has a set of procedures that go everywhere. ETS is a quality management system that supports regulatory compliance, maintains plant product integrity, assists in preventing trade disruptions, shares best practices, promotes stakeholder engagement and drives continuous improvement. Following Chris' presentation, a sub-group discussed how the agricultural community could benefit further from the ETS program.

Discussion Thread:
Possible future considerations
Include academic researchers as ETS members. How to attract?

- Focus efforts on universities that have collaborations with industry
- Include as part of a continuing education program for lab personnel or training for graduate students
- Utilize vendors (e.g. instrument manufacturers) to offer webinars or training/compliance
- National Science Foundation sponsored meeting in Ames (~week of Oct 17) for academia along with Pioneer to discuss stewardship guidelines
  - Focus is gene editing
  - Pioneer provides genes but has limited IP
- Watch-outs

- Criteria too stringent for academic labs to implement and time/resource limited
- Graduate students are overwhelmed with current demands of school
- Universities have freedom to operate without USDA oversight in gene editing research providing a gene gun is used
  - this may lead to carelessness
  - have access to superior promoters

Offer auditing scope to incorporate research in gene editing

- Interest from industry
- Avoid perception of gene editing as biotechnology, e.g. genetic modification

Other groups that should be considered

- Independent seed producers (e.g. organic producers)
- Use service labs to offer education to seed producers
- Grain traders
- NAEGA and larger organizations

How to increase efficiency and participation in program?

- Combine audits with other organizations/systems that conduct audits
- Replace ISO certification with deeper ETS audit
  - ISO is expensive
  - ISO criteria checked by ETS but not evaluated

- Use case studies of non-compliance to emphasize the benefit of adoption
  - Sensitive issue
  - Information kept internal

ETS implementing a stage gate platform on the website (www.ETS.bio) to submit ideas for new programs

INVITED TALKS

Adventitious Presence Testing to Satisfy Domestic and International Shipment of Identity Preserved Grain (D. Ksiazkiewicz, Consolidated Grain & Barge): The challenge in the grain market is managing yet to be approved GM products. There is an effort to work together in a broad-based industry group to improve communication. It is unreasonable to assume markets will stay the same. Stewardship is a goal but it presents a strong challenge to enforce without planning. Testing methods must be quick, easy, cheap, repeatable and reliable. Grain elevator staff are not normally well prepared to deal with complexities of testing. For non-GM trade markets, destination countries have established thresholds and documentation requirements. Commercial suppliers and customers rely on collecting representative samples and internal testing to verify the grower and third party lab test results to verify compliance. CGB has started by helping growers prepare through training and agreements to detail expectations. CGB has more experience with Japan as the domestic non-GM markets are still evolving. Importers must assure compliance with import country's biotech food rules,

i.e., confirm non-GM bulk export shipments are within tolerance threshold. At the destination country, another set of samples and testing by government agencies is done. End-use customers then go through the documentation to show identity preservation. More parties are understanding that the industry cannot be zerio. It is important to understand that having tolerances that some would call generous have enabled grain trade. It is also important to know what are the customer expectations and being able to plan far enough in advance to influence decisions and actions. Protein tests are a useful screen to catch contaminated loads. PCR testing is more expensive and is not available for deciding if a truckload is ok. The precision of accumulated scores from multiple protein lateral flow strip tests is a bit fuzzy. Strip reader scores still correlate close enough to PCR to be useful as an inbound screen. Domestic companies such as Ben & Jerry's, Whole Foods, Chipotle have been pushing consumer packaging companies for organic foods. GenZ people have the greatest purchasing power now and are driving the desire for all natural foods. The non-GM supply takes time and luck to project the market needs, seed availability. It also requires that buyers and users need to commit to each other.

Non-GMO Standards Overview (S. Taormina, NSF International): NSF was originally the abbreviation for the National Sanitation Foundation. The foundation now goes by just NSF. The company is based in Michigan, however, the foods division is located in Boulder, CO. NSF is an independent, science-based organization. It does not take a position on GMOs but provides a service to non-GMO providers to make truthful label claims based on standards. NSF is not the non-GMO project—it is a technical administrator for it. The non-GMO Project is based in Bellingham, WA and was started in 2007 by two retailers. The first "butterfly" label appeared in 2010. Approximately 43000 products have been verified with 3000 brands participating. There is an estimated $19 billion in sales. A fee of $70/product/year is charged for the product verification program (PVP). NSF is one of four administrators for the non-GMO Project. NSF evaluates ingredients by risk level and classification. Formulas are calculated by percent of ingredients by weight, excluding sale and water. Processing aids are exempted if not present in the finished food product (<0.5%) and not on the food label. Ingredients are classified as major (>5%), minor (<5%) and micro (<0.5%). Risk levels are high, low (monitored) and non-GMO. A non-risk ingredient would be something like salt which has no DNA. Low risk ingredient is an input derived from organisms that are not monitored or considered high risk. Monitored ingredients are those in research/development which have been developed but no widely commercially available or for which known GMO organism contamination has occurred. High risk ingredients are those which GMO versions are widely commercially available such as corn, canola, sugar beets, alfalfa, cotton, soybean, papaya, squash and zucchini. Derivatives such as high fructose corn syrup, amino acids, aspartame, vitamins, xanthan gum are considered high risk as well as animal derived inputs such milk from cows fed GMO feed, honey from bees who have fed on GMO plants, enzymes such as chymosin, etc. Exempt ingredients include enzymes, processing aids, microbial growth media, mined minerals, vitamins, seeds, crops, inputs not available in GMO form, certified organic ingredients. The sub-ingredient information is the most difficult to track down. Organic crops are automatically accepted without documentation.

Block Chain Principles (S. Joseph, Block Chain Consulting): A block chain can be defined as a distributed ledger on a peer to peer basis. Another definition is a distributed databse in which entries are stored or a distributed transaction record which creates a database and audit trail. IBM, Microsoft and Amazon are all creating centers. A block chain can be depicted as follows:

Transaction is created → Sent to computers with unique mark → Validation of the transaction is based on an algorithm → confirmation of the transaction is broadcast to the rest of the network → block is then added to the ledger → network replicates record of verified transactions.

The validation of the transaction is a consensus piece and involves cryptography. A block chain can be changed by appending over another answer, however, this may involve going back to original block which is usually prohibitive since it involves quantum computing (capability is coming though). The characteristics of a block chain are: shared ledger, smart contracts, immutability, consensus (most critical) and cryptography. Currently, block chains cannot be un-automated. Immutability refers to the distributed ledger with a consensus algorithm which supports identical updates to the ledger. Smart contracts are automated business logic which enables shared business processes. Peer to peer is an enabling structure to provide secure interaction between network participants. Cryptography provides data encryption to establish the correctness verification and detection of unjustified changes. Simplicity is provided by a shared ledger which holds transaction by permission and is accepted as authoritative. Data quality means the transaction is recorded once. Public block chains permit anyone to download a node (computer) and participate such as bitcoin. Security is achieved in a public block chain through consensus by the network. Private block chains are closed networks which are accessed by invitation only. Private block chains are used by industry and the security is achieved through internal control and known identities.

Block Chain – Application to the Supply Chain (S. Joseph, Block Chain Consulting): IBM has a GTD Platform block chain which is a food safety platform with modules. It is digital, with immutable certificate and traceability data storage provided for 2 years. It has rule-base compliance engine for more efficient compliance management focusing on cerificates initially. The block chain must always be cognizant of anti-trust since smaller parties in chain could be out-priced by larger parties.

Adventitiou Presence Testing for Movement of Seed & Grain – Semi-Quantitative Method (A. Doornink, Eurofins BDI): Appropriate tests need to be selected for the desired goal. Isozyme and SNPs are used for genetic purity; herbicide bioassay is used for tolerance testing; lateral flow strips are used for protein expression and PCR is used for gene testing. Generally, there are no phenotypic characteristics for seedlot detection. Adventitious presence (AP) is the unintended presence of unwanted biotech traits in seed. DNA-based AP methods are qualitative PCR, quantitative PCR and semi-quantitative PCR. Semi-quantitative PCR is suitable for allowable level of GM

contamination since there can be a flexible pool size and number of individual seed in a pool.Statistical analyses can be done on the number of + or – results of each sub-sample to estimate the AP. It is the most reliable method to detect GM contamination in a seedlot and the method is accepted by industry for AP. Appropriate seed samplers must be used to draw samples from a lot. A representative number of incremental samples is taken based on the lot size and crop type. Samples need to be properly labeled and sealed. For testing, pools are created and the sub-samples are ground. A test portion of the ground sample is placed into labeled plates. PCR detection can be done by assessing the presence of multiple promoters and terminators or by usng an event specific or gene specific method. The PCR reaction mix is placed in the plate wells and the data is gathered by the use of a fluorescent microplate reader which produces qualitative results. Positive pools are tested for target of interest. Statistical analysis is 95% confidence interval with upper bound of true % purity (max % AP in seedlot from 95% confidence interval). Good quality practices need to be in place at all times.

AP Testing for Movement of Seed and Grain – Quantitative Method (P. Smith, Eurofins GeneScan): The assumption when testing bulk grain is that everything is positive since grain is co-mingled. Using small pools of seed will not – large pools with standards need to be used. Standards are then plotted to make a standard curve and the pool value is determined by extrapolation. Each pool is normally tested twice. %DNA is determined as follows:

$$\frac{\text{Biotech DNA}}{\text{Species DNA}} \times 100 = \%\text{Biotech DNA}$$

Shortcuts can be used such as the use of markers such as the 35S promoter. Processed food products present a challenge since there is no seed to grind and thus, no clear number of seeds/sample. This makes it difficult to determine the %DNA.

Know GMO (N. Saik, Know Ideas Media): Know Ideas Media does corporate videos for agriculture companies. Goal is to tell the story of agriculture to help people understand. Nick is a storyteller and film maker who grew up around farming. Know Ideas Media distributes films on the internet via media sites. Science literacy is needed and should be a top priority in all geographies. Twenty-five percent of the people who view Know Ideas films on Facebook leave with a shift in thoughts about agriculture. Independent voices are necessary to tell the story of agriculture and discuss issues pragmatically. Scientists struggle with "dumbing" things down for the public to understand and Know Ideas Media would like to help. It is a for profit company and works with advertisers.
Know GMO webpage: www.knowgmo.ca

Soybean Trait Pipeline from CropLife International (R. Shillito, BASF): First soybean oil was crushed in Elizabeth City, NC in 1915. In the U.S., 94% of the soybean acres are planted to GM varieties. In addition to 11 single event soybean trait products, there are currently 4 stack trait product including one with 3 events and one with 4 events.

Companies are working and launching products with third generation weed control. These have multiple modes of herbicide tolerance such as HPPDi +Glufosinate tolerance, 2,4-D and glufosinate tolerance, 2,4-D + glyphosate + glufosinate tolerance. There are also products being developed which will have disease and fungal resistance, increased oil content and improved meal characteristics, increased yield, etc.

Soybean Breeding and the Future (W. Parrot, University of Georgia): Soybeans were first planted in the U.S. in 1765 by Harry Yonge in Georgia. For soybean growers, yield is the priority. Currently there are 90 million acres of soybeans in the U.S. which have an average yield of 52 bushels/acre. World needs more protein which is the incentive to increase yield. Soybean breeding is based on forward breeding and backcross breeding. Forward breeding begins with crossing pairs of plants to derive a F1, then F2, then F3, F4, F5, F6. At this point, the plants are placed in rows for breeding and increase and then into yield trials and finally into advanced trials. A winter nursery is used in Puerto Rico which allows for 2 cycles of breeding/year. Marker assisted selection is used for conventional traits. Advanced yield trials generally consist of two locations with 2 row plots initially and then progress to additional locations over the upcoming years. Modern cultivars are designed for agronomic traits, quality traits (oil, protein), herbicide tolerance and pest resistance. Frogeye leafspot resistance was found in wild soybean and crossed with conventional varieties to introgress the trait. The result was the swapping of a section of chromosome between wild parent and conventional parent. Some of the challenges for soybean breeders in North America is phytophthora, cyst nematode and Chinese aphid. In South America, the challenges are root-knot nematode, caterpillars and Asian rust. Generally, the more genes that need to be introgressed, the more plants are needed. If introgressing 3 genes, this would require 8000 plants. Herbicide tolerance is the main sought after trait. EPSPS genes (for glyphosate tolerance) are common in nature. These genes can be taken from nature and paired with soybean promoter and terminator. This trait would not be regulated by any U.S. agency. Gene editing is also being worked with to develop soybean herbicide tolerance. Gene editing is rapidly evolving and could provide increased precision and flexibility in soybean breeding by knocking out genes and doing site-directed insertions. This could be a 1-year process rather than years of backcrossing. Gene editing will also allow stacking traits by putting them in the same spot in the genome to simplify the breeding process rather than crossing to obtain 2-,3-, 4-way stacks with single events. High oleic soybean oil is better than olive oil ("gold" standard for oil). Soybeans in North America have declined in protein content—down from 37% to 34% which is not good for animal feed. China exports from the U.S. have been declining since 2014 due to the declining protein content. Aquaculture is a new area for soybean. Most fish will be raised in aquaculture rather than wild caught. Farm-raised fish have nutritional differences from marine fish, i.e., they need more fat in food. High fat soybeans are being developed to fill this need. Also, farm-raised fish are not exposed to the marine algae which give the coloration consumers are used to (such as the pink salmon). Work is progressing on soybeans that can make carotenoids (8 genes) and then coupling this with high fat content for the fish. Another area where beta-caroteine is needed is the yolk of hen eggs. The yolks are naturally white but

consumers do not like this. Some poultry farms add marigolds to diet so eggs have yellow/orange yolks. Pigment in yolks is one-fourth of the cost of an egg so the idea is to have soybeans make beta-carotene. When chickens eat soybean meal, the yolks will then be orange.

Meeting Production Trait Requirements: A Licensee Perspective (T. Garner, BASF):
Documentation, in the form of agreements and processes, is the first step. Provider agreements provide the trait and variety information, trait approvals and pending approvals and specific production practices that must be followed. Communication is necessary to make it clear on what the product is. Production practices and processes agreements are done with producers and suppliers and also provide varietal information. If stewardship is needed for a trait, then supplemental language is needed for the producers. Stewardship may entail required training for suppliers and growers, enhanced storage and distribution requirements and expanded audits and assessments. Grower selection and field selection are important to address production requirements. Planters allow growers to manage planting patterns, seed populations and planting depth. All planters have seed delivery mechanisms that need to be cleaned out which can raise costs. All seed stock is teste prior to planting to understand seed quality, germination and traits present. Field inspections are generally done prior to harvest to assess plant health, flower color, row spacing, and confirmation of field acreage. Harvest generally occurs at 11-13% moisture. The critical control points at harvest are grain segregation, harvester cleaning, truck inspection, cleaning, grain bin and conveyor checks. Seeds are cleaned by air screen cleaner to remove extra-large seed, pods, stems, small seed and dust. The seed color sorter uses lights and cameras to remove identified contaminants. Gravity sorting uses aeration, motion and seed density to separate heavy seed from lighter seed. Seed is packaged in 5.6M containers or paper bags. These are labeled with the variety and brand name, state of origin, lot, PVP status, seeds/lb, germination rate and bag weight (generally 140000 seeds/bag). Bags or containers are shipped to customers. Seeds need to have same basic appearance within the bag/container as well as the desired traits.

Meeting Production Requirements: A Laboratory Perspective (B. Johnson, Eurofins BDI):
The challenge is that there are numerous technologies for determining genetic and trait purity and each gives somewhat different information. There are also a number of platforms to select from. Endpoint PCR can be used on many platforms. Trait requirements also vary from provider to provider. There is considerable cross-licensing occurring between companies with no consistency in requirements. Access to requirements are typically provided to licensees only and usually go to legal rather than the person responsible for quality. Not all customers have the same testing needs. Seed producers, contract growers, seed brokers, retail sellers all have varying requests. However, all want cheap, fast, accurate, reliable tests. It is recommended that trait providers proactively communicate expectations to testing labs. Also they need to ensure individuals reviewing data have access to licensing agreements and understand them. Trait providers need to allow for a range of technologies and platforms and build consistent requirements and proficiency testing programs. Testing labs need to

develop relationships with trait providers and chemistry, technology and platform vendors. Labs also need to be persistent in continual improvement of processes.

High Throughput Genotyping by Targeted NGS for Seed Purity (R. Ramadhar, Thermo-Fisher): A variety of applications (molecular breeding, genetic studies, production QA/QC, legal) are using DNA markers. Targeted genotyping by sequencing can be done by RAD-sequencing which is the traditional way. This is great for discovery but not reproducible. AgriSeq is an amplicon-based sequencing and is reproducible. The user defines the markers. It has >95% consistency of markers called between samples. NexGen sequencing (NGS) starts with a library construction and creation of amplicons from samples and markers. The sequence is then run and the data analyzed. Up to 768 samples per run are done with automated accurate genotype calls. The workflow is 2-3 days and is achievable with one person. It is scaleable with automation to help reduce hands-on time. Seed QC flow is as follows: 100 seeds → DNA extraction → pool panels. The cost is approximately $10-13 per sample.

Innovation Through Integration (S. Hanson, Cargill): Cargill is not a seed company but it does have seed within the company. Cargill has 155000 employees in 70 countries who speak 65 languages. Cargill is 150 years old and is still privately-owned. Innovation: research turning money into knowledge, and innovation turning knowledge back into money. The value chain starts with R&D and progresses through sales. It becomes more expensive as a product progresses in the value chain so failures are more palatable earlier in the value chain. An integrated value chain is one that is connected. It starts at the end-user and builds back towards R&D, resulting in a long-range vision. This allows the end-user to be closer to R&D and affords the opportunity to work in new markets with new partners. Integrated value chain allows the company to know what the end user wants and provides an early confirmation of the value proposition.

MEETING ADJOURNED

Tour of EnviroLogix, Inc.

Meeting Attendees:

Name	Company
Balvin, Kevin	SGS North America, Inc
Bednarcik, Mark	Syngenta
Black-Fendley, Ann	BASF
Brune, Phil	Syngenta
Cheever, Matt	BASF
Chen, Jingwen	Syngenta
Djuranovic, Nevena	EnviroLogix
Doornink, Anna	Eurofins BDI
Figueiredo, Debora Torres Alves	BASF
Gadola, Mary	Neogen
Garner, Terry	BASF
Ghoshal, Durba	BASF
Gillikin, Nancy	BASF
Gillikin, Jeff	NC State University
Goddard, Terry	EnviroLogix
Haudenshield, James	Merieux NutriSciences
Hanson, Steven	Cargill
Houchins, Donna	Romer Labs
Hudson, Joe	BASF
Hunst, Penny	BASF
Johnson, Brenda	Eurofins BDI
Kouba, Kristen	Corteva Agriscience
Layton, Dean	EnviroLogix
Levin, David	Eurofins Food Integrity
Liu, Kai	Eurofins Nutrition Analysis
Liu, Lucy	Bayer
Messmer, Valerie	Syngenta
Miller, Anthony	AOCS
Muschinske, Luke	Eurofins Food Integrity
Onisk, Ann	Romer Labs
Parker, Breck	EnviroLogix
Persons, Keith	Eurofins Nutrition Analysis
Ravindra, Ramadhar	Thermo Fisher
Rice, Anna	EnviroLogix
Schuld, Brian	Eurofins Nutrition Analysis
Shillito, Ray	BASF
Shippar, Jeff	Eurofins Food Integrity
Silkowski, Eric	BASF
Singsit, Chong	OMIC

Smith, Pearce	Eurofins GeneScan
Srinivas, Chadaram	Thermo Fisher
Tapley, Susan	EnviroLogix
Trombley, Arthur	EnviroLogix
Umthun, Angela	Stine
Weigel, Scott	AgriPlex Genomics
Welch, Jamie	EnviroLogix
Whipkey, Ryan	EnviroLogix
Zhao, Qiang	BASF

SPEAKERS

Holdgreve, Chris	Excellence Through Stewardship
Joseph, Susan	Diversity in Blockchain, Inc
Ksiazkiewicz, David	Consolidated Grain & Barge
Parrott, Wayne	U. of Georgia
Saik, Nick	Know Ideas Media
Taormina, Steve	NSF International