January/February 2016

RESOURCE

engineering and technology for a sustainable world

Inside: *VisualChallenge5* • AE50 Awards • Ethics Essay Winner

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Partnership Matters!

I had the privilege of participating in a variety of events during fall 2015 as a representative of ASABE. All events included enthusiastic people dedicated to the work they are doing, exciting ideas, and opportunities for **partnering** to further common agendas. Several events celebrated the past as a strong foundation on which to build the future. A few events are highlighted in the following.

The 2015 ASABE/Irrigation Association (IA) Symposium, "Emerging Technologies for Sustainable Irrigation," held in November 2015, was a tribute to the career of Terry A. Howell, Sr., a long-time ASABE member and Fellow, whose many achievements have been recognized by multiple ASABE awards. Terry's presentation about his career was special, recognizing his mentors. Over the next two days, a variety of people, from those just starting their careers to those further along, talked about what Terry's mentoring has meant to them. It was inspiring to see the effect that one man has had on so many, and also to see younger people recognizing the value of the past and learning from it as they address the challenges of today and tomorrow. ASABE's **partnership** with the IA includes significant work on standards and collaboration on symposia.

ASABE was well-represented at The First International Congress on Postharvest Loss Prevention held in Rome, Italy, in October 2015. The Congress was organized by the ADM Institute for the Prevention of Postharvest Loss at the University of Illinois at Urbana-Champaign. ASABE members served in leadership roles for the Congress. You can see videos of the presentations on the Institute's YouTube channel (www.youtube.com/user/PHLInstitute) and many photos from the Congress at www.flickr.com/photos/phlinstitute/. One outcome of the Congress is that the Institute will be a **partner** in ASABE's Global Initiative Conference, "Engineering and Technology Innovation for Global Food Security," in October 2016 in Stellenbosch, South Africa. I am excited about this **partnership** and note that ASABE would welcome the opportunity to **partner** with additional organizations that share our goals toward achieving food, energy, and water security. Please watch for such **partnership** opportunities and let me know about them.

Two Biological and Agricultural Engineering Departments celebrated centennials in 2015: the University of California, Davis, and Texas A&M University. Congratulations to both on outstanding accomplishments to date and best wishes for continued productivity!

With this issue of *Resource*, we celebrate the 30th anniversary of the AE50 Awards program. This year's winners join over 1,000 products from a range of companies recognized for their outstanding innovation in advancing technology and technology applications in agricultural, food, and biological systems. Congratulations to all the winners, past, present, and yet to come!

This issue also includes the Visual Challenge, sponsored by *Resource* for the past five years. Through these photos, we see ABEs' work in many different settings and the continuing and increasingly important global engagement of ABEs, improving the quality of life for many people. Let's keep up the good work! And please let me know new ideas for how ASABE can help.

I look forward to hearing from you,

Mary Leigh Wolfe
mlwolfe@vt.edu
@ASABEpresident

events calendar

ASABE CONFERENCES AND INTERNATIONAL MEETINGS
To receive more information about ASABE conferences and meetings, call ASABE at (800) 371-2723 or e-mail mtgs@asabe.org.

2016

Feb. 8-10	**2016 Agricultural Equipment Technology Conference.** Louisville, Ky., USA.
April 8-9	**Young Professional Development Workshop.** Lexington, Ky., USA.
July 17-20	**ASABE Annual International Meeting.** Orlando, Fla., USA.
Oct. 24-27	**Engineering and Technology Innovation for Global Food Security.** Cape Town Stellenbosch, South Africa.

2017

July 16-19	**ASABE Annual International Meeting.** Spokane, Wash., USA.

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ON THE COVER

WEEDING AND FEEDING ON A TREE FARM. *Visual Challenge photo by* **ASABE member Nabil Mohamed,** *Water and Energy Resource Engineer, Boardman Tree Farm, Hermiston, Ore., USA.* 4,000 sheep happily graze under 10,000,000 Pacific Albus trees at the 10,000 ha GreenWood Resources Boardman Tree Farm. Watch the sheep that produce wool for the famous Pendleton Woolen Mills and organic mutton for gourmet restaurants in California at www.youtube.com/watch?v=8UGcnZCKnKY.

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Bravo! AE50 Winners

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30 Years of BRAVO!

Resource is pleased to sponsor the AE50 Awards program, celebrating companies for their recent developments in agricultural, food, and biological systems. As in previous years, an expert panel has selected approximately 50 products for recognition from the entries submitted at year end 2015. The award-winning products are those ranked highest in innovation, significant engineering advancement, and impact on the market served.

The products featured on the following pages represent the diversity of agricultural and biological engineering, as well as the variety of companies—of all sizes and specializations—that continue to bring advanced technology and exciting innovations to the marketplace. This year's AE50 recipients join the ranks of many who, for three decades, have been honored for their ingenuity in product development—saving producers time, costs, and labor, while improving user safety as well.

In June 1984, *Agricultural Engineering* (now *Resource*) included "A Forum for New Developments" in a special issue on technology. Twenty-five new techniques, inventions, and innovations were showcased. The featured items were drawn from product information solicited by the Society and screened by a panel of experts. From this focus on identifying innovative technology, two years later the AE50 Award was born. Its intent was described as follows: "Acceptance in the marketplace is the highest accolade any new agricultural product can receive. But for innovative developments in the last 12 months, a singular honor is to be named one of the year's *Agricultural Engineering* 50 outstanding innovations." Product nominations poured in. A panel of engineers was enlisted to review the entries, and in 1986 the first AE50 Awards were bestowed.

As *Resource* celebrates our 30th year of AE50 Awards, the interest in new technology and innovative applications of existing technology remains constant. Over the years, many of the featured AE50 products were patented and their names trademarked. Some were further improved as technology advanced, and with time, won another AE50. But the most important yearly constant: all winning entrants strive for excellence, and we are pleased to honor their work with the highest honor in the only awards program of its kind.

Congratulations to this year's honorees! And *Bravo!* to 30 years of winners!

AE50

1870 76-Foot Air Seeding Tool

John Deere Seeding Group
Moline, Illinois USA
www.deere.com

The 76 ft (23 m) wide 1870 Air Seeding Tool increases productivity by seeding more acres per hour. This machine features TruSet™ depth control, dual-acting cylinders on improved tine openers, a heavy-duty frame designed for increased draft and tow loads, a floating hitch for improved ground following, an opener pattern optimized for residue flow, an improved seed blockage detection system, and 36% greater working width compared to previous offerings. The TruSet™ control system allows the operator to adjust opener depth and downforce on the go. Features that minimize transport size include retractable openers that increase ground clearance, as well as height adjustment that temporarily raises and lowers the frame to avoid obstructions. In transport, this machine is less than 23 ft (7 m) wide, with up to 18 in. (45 cm) of ground clearance.

2510H High-Speed Applicator with Dry Nutrient Attachment

John Deere
Moline, Illinois, USA
www.deere.com

The 2510H High-Speed Applicator with Dry Nutrient Attachment increases nutrient placement capability and improves accuracy while reducing field passes. By adding the on-board dry tank attachment, dry nutrients and anhydrous can be applied in a single pass. The 2510H with Dry Nutrient Attachment can apply all three primary nutrients (nitrogen, phosphorous, and potassium) and micronutrients below the soil surface during fall, pre-plant, and side-dress seasons. The subsurface placement greatly reduces runoff and other losses, resulting in more nutrients available to the plant. The 2510H with Dry Nutrient Attachment allows the customer to boost yields, save time, cut costs, and better manage nutrients through application practices adhering to the 4R Nutrient Strategy.

3NV Nozzle System for 3030 Series Center-Pivot Sprinklers

Nelson Irrigation Corporation
Walla Walla, Washington, USA
www.nelsonirrigation.com

At the heart of Nelson's 3030 Series center-pivot sprinklers is the new, multi-function, side-load 3NV nozzle. In tough conditions, growers spend considerable time managing their water application devices. Nozzles can get plugged with debris and have to be removed for cleaning. The 3NV nozzle system allows growers to push and turn the nozzle between on, off, nozzle flush, and line flush positions to remove debris without removing the nozzle. The 3NV nozzle can be part of a dual-nozzle clip (with Hi-Flo, Lo-Flo differentiation) and can also act as an integral shut-off valve, as a more economical and reliable alternative to a ball valve. The 3NV nozzle fits all existing Nelson sprinkler types: Rotator®, Spinner, Accelerator, Sprayhead, Orbitor, and Part Circle.

6R Series Tractor for 2015 (110 to 155 hp)

John Deere
Moline, Illinois, USA
www.deere.com

The John Deere 6R Series tractors include eight models between 110 and 215 engine hp, with the 110 to 155 hp models introduced in 2015. The PowerTech™ PVS 6.8 L and PowerTech™ PSS 4.5 L engines meet Final Tier IV requirements while providing industry-leading fluid efficiency, an additional 5 hp per model, and up to 40 hp Intelligent Power Management (IPM). The ComfortView™ cab incorporates the CommandARM™ featuring an integrated CommandCenter™ display, an electronic reconfigurable joystick, increased seat swivel, and wide-angle mirrors. Other improvements include optional cab LED lights, automatic MFWD and differential lock, relocated rear SCVs with hose disengagement levers, and the new R Series loader with increased lifting capacity and automatic mast latching.

9RX Series Agriculture and Scraper Tractors

John Deere
Moline, Illinois, USA
www.deere.com

John Deere 9RX Series tractors provide the power and torque needed to maximize performance and provide a smooth ride. The cab suspension system features a parallel plane, four-bar linkage to control cab movement, essentially isolating the operator from bumps and vibrations. In addition to a comfortable operator experience, the 9RX Series boasts a taller undercarriage and larger components compared to competitors' machines. This larger undercarriage delivers outstanding traction, which translates into more power to the ground, excellent reliability, and ease of maintenance. In addition, the Camso Duradrive 3500 and 6500 Series tracks feature puncture resistance, solid load carrying ability, and the industry's largest drive lugs.

Active Terrain Adjustment™ for S-Series Combines

John Deere
Moline, Illinois, USA
www.deere.com

The new Active Terrain Adjustment™ feature on John Deere S-Series combines automatically adjusts the cleaning fan speed, chaffer opening, and sieve opening when ascending and descending hills. The Active Terrain Adjustment™ feature improves grain tank samples when descending hills and saves up to $64 per acre in grain loss when ascending hills.

AirPower™2

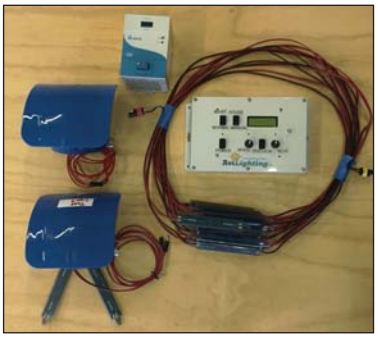
John Deere Seeding Group
Moline, Illinois, USA
www.deere.com

John Deere AirPower™2 increases productivity by allowing wider working widths while maintaining seed and fertilizer application rates with equal or better commodity distribution. The system was designed by John Deere for the 1910 Commodity Cart and is compatible with the John Deere SectionCommand™ option. The system is powered by two large-diameter cast aluminum fans and housings that are driven by efficient hydraulic motors specifically designed for fan applications. Air is blown into a new molded plenum that evenly distributes the airflow to new 3 in. (76 mm) stainless steel primaries and manifolds that interface with the current meters. Also new is the tank pressurization system, which adds user-adjustable valves that determine the amount of air routed to the tanks, as well as a new in-cab pressure monitoring system.

Autofloat™ Sunflower Kit

New Holland Agriculture
Turin, Italy
www.newholland.com

The New Holland Autofloat™ Sunflower Kit eliminates the need to adjust the chopping height while moving through the field. The patented Autofloat™, which can be added to most sunflower headers on the market, maintains a constant chopping height independent of the cutting height, regardless of field conditions or machine orientation. This is achieved by hydraulically lifting the chopper, which is controlled in a closed loop by sensing the ground pressure applied by the chopper. After the operator sets the cutting height and selects the ground pressure for the chopper, the Autofloat™ keeps the cutting height and ground pressure constant without further intervention. The system reacts quickly to bumps or stones to avoid damage to the chopper, allowing the operator to focus on other combine functions.



Avilighting LED Lighting System

I-Lighting LLC
North East, Maryland, USA
phone 443-877-6134

Avilighting is a complete LED lighting system that places the proper amount and intensity of light at the feed and water lines in commercial poultry houses. In addition to energy savings from the use of LEDs, the system provides health benefits for the birds by humanely guiding them to food and water, reducing mortality and allowing the birds to reach their full genetic potential. Innovative features include a controller that allows altering the light intensity from 0% to 100% for both blue and white lights, aluminum plates instead of wire to carry current inside the units, and Easy Plug™ harnesses for linking units together, making installation and maintenance less labor intensive.

Axial-Flow® 140 Series Combines

Case IH
Racine, Wisconsin, USA
www.caseih.com

Extensive upgrades to the Case IH Axial Flow® 140 Series combines improve harvesting capacity and ease of both operation and maintenance. The two-speed electric-shift ground-drive transmission provides increased tractive effort and eliminates the need to manually shift the transmission during harvesting maneuvers. The sidehill-compensating cleaning shoe significantly increases harvesting capacity on sidehills. Operators benefit from improved access to the threshing, separating, and cleaning systems, made possible by lighter and more maneuverable concaves, and better concave access now that the entire drive system and clean grain elevator have been moved. The residue system at the rear of the machine opens on a swiveling hinge, providing access to the cleaning shoe and the spreaders, and the clean-out doors for the clean grain trough have been redesigned.

CDS-John Blue Visagage Orifice Selector

CDS-John Blue Company
Huntsville, Alabama, USA
www.cds-johnblue.com

The CDS-John Blue Visagage Orifice Selector system allows quick changes between four different orifice sizes at each row. This system eliminates disassembly for orifice plate changes, reduces the time needed to make changes because the devices are grouped on top of the Visagages, and greatly reduces the number of loose parts. The Visagage Orifice Selector installs in the outlet of Visagage II columns, which allows for quick orifice adjustments at these grouped sections. Changing between orifice sizes involves rotating a dial on top of the unit, and the four positions are clearly marked. The orifice sizes cover a wide range of applications, and a larger plate is included to cover high-end applicators. An app is available to help with orifice size selection in the field.

Closed System Cleanload

Pentair
New Brighton, Minnesota, USA
www.hypropumps.com

The Closed System Cleanload provides safe and efficient measurement, mixing, and loading of dry or liquid formulations onto a sprayer with minimal exposure to pesticides. Within the sealed enclosure are all the requirements for measuring the chemicals, triple rinsing the containers for disposal, and mixing the formulation into a saturated solution that is then educted onto the sprayer. This closed system separates the product handler from the chemical and allows the product handler to work safely in the heat of the day without the need for heavy, full-body protective clothing.

Command™ 3300 Series Corn Head

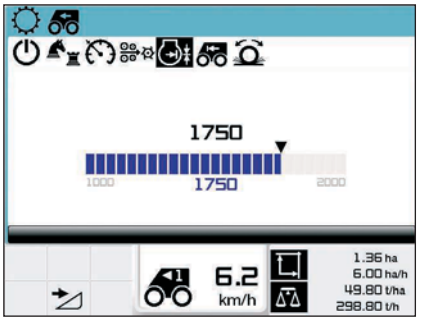
AGCO Corporation
Duluth, Georgia, USA
www.agcocorp.com

AGCO's Command™ 3300 Series corn head represents the latest technology in addressing tougher stalks that support higher yields, with faster harvesting rates and reduced header loss relative to both cobs and kernels. The low-density polyethylene snouts feature a new geometry, allowing smoother feeding without butt-shelling and ear bounce. The re-designed gathering chains and lugs are synchronized to the large 20 in. (51 cm) auger that reaches over the gatherer and row units, providing top performance in down corn. The chopper position and swing diameter minimize fodder intake. The horsepower required to drive the 3300 Series header was optimized to save up to 20% compared to a leading competitor. Available in chopping or non-chopping models, the chopping function can be disengaged.

CRUISE PILOT for JAGUAR 880 Forage Harvester

CLAAS of America
Omaha, Nebraska, USA
www.claas.com

The optional CRUISE PILOT on the JAGUAR 880 forage harvester regulates the output of the machine in three different modes. The first mode regulates the engine for greatest capacity and best fuel use. This mode pushes the JAGUAR 880 to its maximum output. CRUISE PILOT senses the engine load and uses the yield sensor to monitor the incoming crop to predetermine the maximum output of the machine. If the system senses slug feedings, it slows the travel speed to prevent a plug. The second mode regulates ground speed only, and the third mode is for small bunkers or small pack tractors and sets the maximum tons per hour that the machine can harvest. For safe operation in all three modes, the system will not allow the machine to be lugged down below 1550 rpm.



DB60T Planter

John Deere
Moline, Illinois, USA
www.deere.com

The John Deere DB60T is a 72-row 60-foot twin-row planter that contains MaxEmerge5™ twin-row pairs spaced 8 in. (20 cm) apart. Each pair is spaced on 20 in. (51 cm) centers, allowing use of a typical 20 in. corn head during harvest. More uniform seed-to-seed placement is achieved with this spacing, reducing plant-to-plant competition. The DB60T was developed for use with high-population corn varieties. From 23,000 to 80,000 seeds per acre can be achieved for corn, and up to 225,000 seeds per acre are possible for soybeans at 9 mph (14.5 kph). The 60 ft (18 m) wide frame is based on the same structure as the rest of the DB model line. Larger tires reduce soil compaction and increase stability during transport.

DISCO 1100C Mower Conditioner

CLAAS of America
Omaha, Nebraska, USA
www.claas.com

The CLAAS DISCO 1100 C is a triple mower conditioner with a working width of 35 ft 2 in. (10.7 m). Its side-shifting wings and ACTIVE FLOAT system make it unique. Each cutterbar is 12 ft 6 in. (3.8 m) wide, but the side-shift and curtain folding features allow the mower to fold upright to a transport height of less than 13 ft 6 in. (4.1 m). The sliding PTO shafts improve reliability over the standard three-piece shafts used in the industry. The ISOBUS feature allows the operator to assign hydraulic functions to the auxiliary buttons on the tractor joystick regardless of make. The MAX CUT cutterbar ensures cut quality due to its smaller disc design and concave channels that allow soil to flow under the cutterbar and keep it from plugging at the front.

Dual Stream™ Combine Header Attachment

New Holland Agriculture
New Holland, Pennsylvania, USA
www.newholland.com

New Holland's Dual Stream™ combine header attachment mounts to the back of the 760CG Varifeed™ grain header to allow operators to make a higher cut, removing only the top portion of the plant for processing in the combine. The secondary cutterbar on the Dual Stream™ attachment makes a final lower cut, removing the straw to the desired stubble height. The attachment includes a processing roll to work the second-cut straw into the stubble, improving its rate of decomposition. Because the combine only processes the top portion of the plant, operators will see significant improvements in combine capacity, reduced fuel consumption, reduced grain loss, a longer harvesting window, and perfect straw distribution. The Dual Stream™ header is available for the 25-, 30-, 35-, and 41-ft 760CG Varifeed™ grain headers.

DYNAMIC COOLING

CLAAS of America
Omaha, Nebraska, USA
www.claas.com

LEXION 670 DYNAMIC COOLING is a horizontal engine cooling system located on top of the combine, over the engine, to pull in air from where it is coolest and cleanest. The cooling system uses a variable-speed (on-demand) fan that increases in speed as the engine temperature rises. As the engine cools, the fan speed decreases, saving up to 20 hp over constant-speed fans. The incoming air passes through the engine compartment, which helps keep the engine compartment free of debris, and is forced out through vents in the combine's side panels. As the air is forced out, it creates a curtain effect that prevents excess dust and debris from being pulled up into the cooling fan, thus increasing the service interval for greater uptime. The fan's position also allows easier, safer access for inspection and maintenance.

Early Riser® 2150 Front-Fold Planter

Case IH
Racine, Wisconsin, USA
www.caseih.com

The Case IH Early Riser® 2150 Front-Fold Planter is the first planter that can be factory-ordered in configurations ranging from a basic machine to a high-technology customized planter, all within a common model. Available technologies include pneumatic row-unit tillage tools, passive pneumatic or active hydraulic row-unit down pressure (with lift and down force capability as well as individual-row load sensing), wing down force, spring or pneumatic closing systems, electric-drive vacuum seed meters with speed-based vacuum level control, gravity-drop seed tubes or seed delivery conveyors (which allow high-speed operation without sacrificing seed placement), liquid fertilizer delivery system with section control or individual-row shutoffs, and electric-drive granular product delivery system. The operator controls all systems from a single in-cab display.

Exmark Spreader-Sprayer

Exmark Manufacturing Company
Beatrice, Nebraska, USA
http://exmark.com

The Exmark Spreader-Sprayer gives lawncare professionals the ability to apply fertilizer and chemicals with increased speed and precision. The lean-to-steer controls permit one-hand steering and forward/reverse speed control. As a result, the other hand is free to operate the spreader or sprayer controls, or perform spot spraying with the easy-access spray wand. The intuitive control layout allows on-the-fly adjustments of the spreader or sprayer from the operator position. Selectable narrow (5.5 ft) and wide (11 ft) spray nozzles increase the flexibility and accuracy of the spray system. Two in-tank induction nozzles provide agitation to keep materials in suspension, allowing an expanded range of products including wettable powders and flowable solids. The welded stainless steel frame increases durability, and the stainless steel operator platform includes isolation mounts for increased comfort.

FC 3160 TLR Side-Pull Disc Mower Conditioner

Kuhn North America
Brodhead, Wisconsin, USA
www.kuhnnorthamerica.com

The Kuhn FC 3160 TLR side-pull disc mower conditioner is designed to increase productivity and maximize the nutritional value of forage crops. The Diamond Block® roller-style conditioning system allows quick dry down by using a horizontal diamond pattern that gives the crop more points to be crimped as it comes off the disc. The direct drive system has no belts to adjust and includes a shear bolt on the main gearbox to provide protection in adverse conditions. The Optidisc® cutterbar, with differential disc spacing and lubed-for-life reliability, ensures a clean cut and even crop flow. Crop layout can be varied from a 3-ft windrow to 75% of the cutting width. The Constant Float® suspension and Pro-Active Lift® provide quick adaptation to ground contours.

Fendt 500 Vario Tractor

AGCO Corporation
Duluth, Georgia, USA
www.agcocorp.com

The Fendt 500 Vario tractor meets the needs of operators who increasingly demand more with less. Representing award-winning German engineering, the Fendt 500 Vario consolidates the proven innovations and features of Fendt's higher-horsepower offerings into an expanded product line in North America, ranging from 110 to 150 hp (107 to 137 PTO). The Fendt 500 Vario comes equipped with the Varioterminal, which unites all functions for both tractor and implement controls, including the VarioGuide automatic steering system, VarioDoc documentation system, and built-in camera function. The Fendt VisioPlus cab curves up into the roof and offers nearly triple the upward angle of sight, ideally suited for work with the Fendt CargoProfi loader.

FieldNET Pivot Control

Lindsay Corporation
Omaha, Nebraska, USA
www.myfieldnet.com

FieldNET's Pivot Control is designed to retrofit almost any existing center pivot brand to the most efficient irrigation technology. This allows significant labor savings and the convenience of full remote control of pivots and other equipment, such as pumps, injectors, pressure sensors, flowmeters, and rainfall sensors. Many farmers have a variety of older pivots that create the challenge of multiple user interfaces. In addition, farmers need the latest control technology to better manage their labor, water, and chemical resources. Pivot Control provides a universal look and feel at all pivots in the operation for easy in-field control, variable-rate irrigation of up to 360 sectors, and full control and monitoring at a fraction of the cost of a controller upgrade.

Flexi-Coil® P Series Air Carts

New Holland Agriculture
New Holland, Pennsylvania, USA
www.newholland.com

New Holland's Flexi-Coil® P Series Air Carts provide accurate, reliable air-seeding delivery. Each primary run on the IntelliRate™ Modular Metering System (IMMS) operates using independent 24 VDC motors with integrated controls that accurately apply product in either single-shoot or double-shoot applications. This modular system can combine any tank to any primary run. The IMMS system adjusts the rates of individual runs to match the number of ports for each header, maintaining seeding accuracy across the width of the drill. The P Series IntelliRate™ sectional control option can individually control up to 12 sections of the drill to eliminate double applications. With PLM™ (Precision Land Management) auto-guidance, the system turns off sections automatically in areas that have already been covered.

Graham Pro Electric Drive

Graham Electric Planter
Sterling, Colorado, USA
www.grahamelectricplanter.com

The patent-pending Graham Pro Electric Drive is the next generation of our award-winning Graham Electric Drive system. It features brushless 12 VDC motors with RF wireless control boards integrated into each motor end cap. This reduces the cost of row-by-row variable-rate retrofit, further reduces input costs compared to existing retrofit options, and allows one motor to control multiple applications simultaneously for each row. The system response to operator inputs has been reduced from 400 ms to 30 ms, which means further improvement in precision. This system features row-by-row variable-rate seed, liquid, or dry fertilizer application in addition to turn compensation, auto row shut-off, seed monitoring, and prescription mapping.

Harvest Mobile

John Deere Intelligent Solutions Group
Moline, Illinois, USA
www.deere.com

John Deere Harvest Mobile is a mobile app that optimizes machine functions to improve grain harvesting and features data collection and transfer to help operators make timely decisions with a user-friendly interface. Interactive Combine Adjustment™ (ICA) enables combine operators to make quick adjustments when issues arise. The app uses the combine's settings and priorities set by the operator to recommend the best adjustment. Four map layers are available: ground speed, moisture, dry yield, and wet yield. Collected data is available whenever the customer wants to view the harvest map layer. Harvest Mobile also transfers data to the John Deere Operations Center for remote viewing of job progress and metrics via the Job Monitor.

HD Variable-Speed Feederhouse Drive

CLAAS of America
Omaha, Nebraska, USA
www.claas.com

The CLAAS LEXION 700 Series 200 kW (278 hp) heavy-duty variable-speed feederhouse drive uses a heavy-duty planetary gear box (with oil cooler) driven by a variable-speed pulley set to transfer power to extra-large combine headers and their attachments, such as 16-row, 30-in. or 18-row, 20-in. chopping corn heads, at any speed according to need. The 200 kW feederhouse drive provides industry-leading variable-speed drive power, which allows the operator to optimize the speed of the combine's feederhouse and platform header's cutter bar or the corn head's row units according to the condition of the crop.

IntelliAg® *ISO*$_6$™

DICKEY-john Corporation
Auburn, Illinois, USA
www.dickey-john.com

The DICKEY-john IntelliAg® *ISO*$_6$™ is a six-channel, ISOBUS-compatible control and monitor system that allows planters and seeders to apply multiple materials from one module. The *ISO*$_6$™ feature set is highly customizable, which provides solutions on an as-requested basis in order to produce differing levels of functionality that can quickly expand to meet the ever-changing needs of precision agriculture. Additional software features have been implemented to reduce hardware needs by integrating advanced seed monitoring, section control with virtual switches, and implement fold control. *ISO*$_6$™ originated from the reputable IntelliAg® product line and has received a comprehensive upgrade to include precision control technologies and a graphical user interface that is convenient for users of all technical skill levels.

IntelliCruise™ Feed Rate Control System for BigBaler 300 Series Large Square Balers

New Holland Agriculture
New Holland, Pennsylvania, USA
www.newholland.com

The IntelliCruise™ feed rate control system for New Holland's BigBaler 300 Series large square balers matches the tractor speed to the crop load at the baler, reducing operator fatigue while increasing productivity and lowering fuel consumption. A charge sensor in the precompression chamber continually monitors the bale charges or slices delivered to the bale chamber to determine the demand on the baler and adjusts the tractor speed for optimal crop feeding. In charge control mode, the tractor speed is adjusted to achieve the capacity preset by the operator. In slice control mode, the tractor speed is adjusted according to bale slice thickness to achieve a customer-defined preset number of slices in accordance with preset bale length. IntelliCruise™ is available on BigBaler 330 and 340 rotor cutter models with electronic bale length control and requires a New Holland T7 AutoCommand™ tractor with CVT and ISOBUS Class III.

JAGUAR 900 Series Forage Harvester (Type 497)

CLAAS of America
Omaha, Nebraska, USA
www.claas.com

The CLAAS JAGUAR 900 Series forage harvester (Type 497) introduces many improvements on the Type 494 models, including front and rear tire pressure adjustment to reduce soil compaction and save fuel. A new feedroll cabinet with hydraulic down pressure and dampening increases capacity by more than 5% while reducing vibration. The industry-first modular accelerator makes for easier maintenance, and the Type 497 forage harvester reminds the operator to sharpen the knives based on tons through the machine. The DYNAMIC COOLING system features a variable-speed belt drive that reduces fuel consumption when maximum cooling is not needed, and a hydraulically adjustable accelerator gap adjusts the throw from the spout to save fuel when more a aggressive throw is not needed.

John Deere Machine Sync

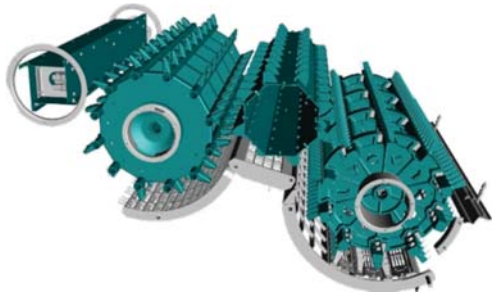
John Deere Intelligent Solutions Group
Moline, Illinois, USA
www.deere.com

Coverage Map and Guidance Line Sharing have been added to John Deere Machine Sync, supplementing Harvest Automation and Harvest Logistics. Coverage Map and Guidance Line Sharing increase the ability to automatically apply inputs while operating multiple machines in the same field. Coverage Map provides the ability to view coverage documented on a second GreenStar™ 3 2630 display, providing the ability to use John Deere Section Control to manage inputs based on the coverage of a second machine. Guidance Line Sharing simplifies the creation and setup of guidance lines by sending straight-track guidance lines created by one vehicle to a second vehicle in near real-time.

Mobile Data Transfer

John Deere Intelligent Solutions Group
Moline, Illinois, USA
www.deere.com

John Deere Mobile Data Transfer (MDT) uses a USB-to-WiFi device to transfer data files between a precision farming display and a user's mobile phone. The data files can then be sent to the cloud (MyJohnDeere.com) for secure storage and sharing with trusted partners. Prescription files can also be sent from MyJohnDeere.com to the precision farming display via MDT, which reduces the need to manually transfer data via USB flash drive, increasing customer uptime, reducing the risk of data loss, and enabling easy data sharing and quicker decision making. MDT also connects operators to their data when using mixed fleet solutions or older John Deere equipment. With MDT, operators can share information with the John Deere Operations Center for most of their fleet, including some competitive displays.



Modular and Configurable Rice Concave for CX Combines

New Holland Agriculture
Turin, Italy
www.newholland.com

The Modular and Configurable Rice Concave for New Holland CX combines lets operators quickly and easily switch between crops as well as configure the concave for the optimal balance of protecting grain quality while reducing the amount of crop left unthreshed. Instead of spending hours exchanging a complete concave, the operator can unbolt and remove sections of the concave to remove or add friction wires to match crop conditions in less than 30 minutes. Broken kernels can be reduced by 50%, while unthreshed grain heads can be reduced to nearly zero. This new rice concave is an option on New Holland CX flagship combine models CX7.80, CX7.90, CX 8.70, CX8.80, CX8.85, and CX8.90.

Morning Farm Report

Agrible, Inc.
Champaign, Illinois, USA
www.agrible.com

Morning Farm Report is a predictive tool for growers and agricultural companies that provides agronomic information and forecasts on rainfall, temperature, growing degree days, fieldwork logistics, yield estimates, and more. Instead of providing data on what has already happened in a grower's fields, Morning Farm Report provides forecasts and fieldwork recommendations for up to two weeks in advance. Morning Farm Report's Yield Engine is a groundbreaking product that predicts corn and soybean yields starting the day of planting, allowing growers to make the best business decisions months in advance. Yearly subscriptions are available for different services, and data is delivered in a daily e-mail at 5:00 a.m. and through the Morning Farm Report website.

Planter Pneumatic Closing Wheel Control

John Deere
Moline, Illinois, USA
www.deere.com

The John Deere planter closing wheel control system improves on the existing ExactEmerge™ and MaxEmerge5™ row units to deliver enhanced control and capability of the seed trench closing system. Proper seed-to-soil interaction is critical for seed germination. As soil conditions change, the closing force may also need to change to achieve optimal closing performance. This system is fully adjustable from the cab and provides a larger range of applied force as well as smaller adjustment increments. Additionally, the operator receives real-time feedback on closing wheel performance via the planter monitoring system. The pneumatic closing wheel control system provides greater ability to achieve optimum closing force as soil conditions change.

PowerFold® System for Front Three-Point Hitch

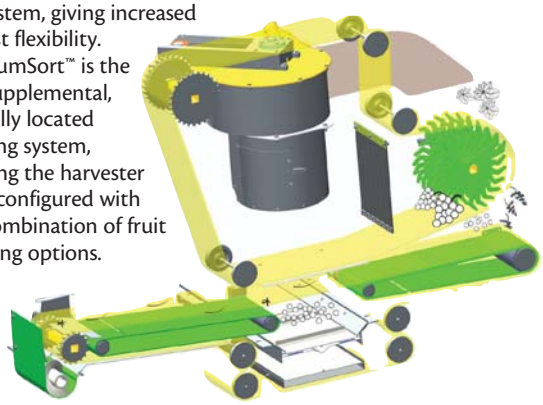
Laforge Systems, Inc.
Concord, California, USA
www.fronthitch.com

PowerFold® is a folding system for a tractor's front three-point hitch that provides pushbutton folding and unfolding from the cab. It's the only design that eliminates the need for the operator to exit the cab to fold up the hitch components. Most front hitches are equipped with lower links that can be folded up. However, because of the cumbersome folding procedure, many hitches are left in the working position at all times. A European study showed that 1/3 of tractors on the road did not have folded front hitches. This can be a traffic hazard because the protruding hitch is largely out of sight for both the tractor operator and other drivers. Safety around the farm is also compromised by leaving the front hitch unfolded.

PremiumSort™ Cleaning System

Oxbo International Corporation
Lynden, Washington, USA
www.oxbocorp.com

PremiumSort™ is an add-on cleaning system for Oxbo's 6120 grape harvester. PremiumSort™ was designed to meet the growing demand for high-quality, mechanically harvested grapes without sacrificing in-field productivity. The system de-stems grapes and removes leaf stalks in the field, tasks traditionally performed in the winery. Cleaning the product onboard the harvester allows the grapes to be delivered straight to the fermentation tank. PremiumSort™ uses a continuous perforated belt to clean the grape load and sorts the fruit using a patent-pending belt agitation mechanism. The operator can also bypass the system, giving increased harvest flexibility. PremiumSort™ is the first supplemental, centrally located cleaning system, allowing the harvester to be configured with any combination of fruit handling options.



ProCut System for 2200 Large Square Balers

AGCO Corporation
Hesston, Kansas, USA
www.hesston.com

The ProCut system for MF 2200 Series large square balers introduces unique clamp-on rotor fingers that allow the rotor finger sections to be replaced easily, saving time and maintaining optimum performance. Two hydraulically selectable knife banks in the magazine allow operators to quickly engage or disengage the knives and change chop lengths from the cab. Both knife banks are fitted with hydraulic protection that allows each knife bank to fold back against the hydraulic pressure to let foreign objects to pass through. The driveline has been strengthened to handle higher capacity, and it now provides 35% higher torque output, while the 650 mm rotor is driven 10% faster to increase baler capacity. The ProCut system is controlled by ISOBUS electronics.

ProStop-E™ Nozzle Control Valve

Pentair
New Brighton, Minnesota, USA
www.hypropumps.com

ProStop-E™ is an intelligent, compact, quarter-turn ball valve that mounts directly onto the nozzle body to provide instantaneous, individual nozzle on/off control across the sprayer boom. Its high flow performance and low power requirement makes ProStop-E an ideal precision control component for product application. The smart circuitry accepts either an analog signal or CAN bus message to individually switch product flow on or off within 180 ms along a simplified, daisy-chain networking system.

QuadraTouch Pro™

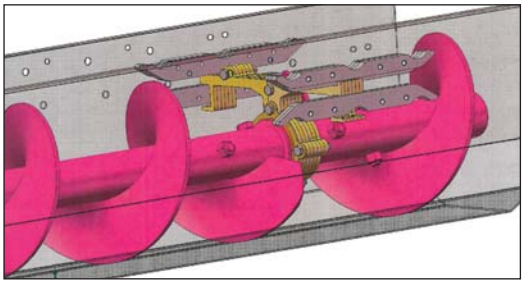
Sukup Manufacturing Co.
Sheffield, Iowa, USA
www.sukup.com

Sukup's QuadraTouch Pro™ grain dryer control console is a much-enhanced version of the 2009 AE50 Award-winning QuadraTouch™ console. The new version has a fully integrated open platform communications (OPC) server that supports multiple devices simultaneously. The console has a larger, higher-resolution display and an 80 GB hard drive that stores the operating software, the entire operating manual, and 17 troubleshooting videos. The console's front-access audio port allows easy plug-in for listening to the videos. QuadraTouch Pro™ includes a fully functional Windows computer with on-screen keyboard and allows remote operation by cellphone. The software can be upgraded online or by flash drive and features an all-in-one format enabling use on Sukup dryers ranging from an 8-ft portable to a 10,000 bph tower dryer.

SeedStar™ Mobile

John Deere Intelligent Solutions Group
Moline, Illinois, USA
www.deere.com

SeedStar™ Mobile is a mobile app that helps operators better understand and optimize the performance of their planter. SeedStar™ Mobile uses an iPad to document and display the row-by-row performance of the planter in the field through numerical dashboards and high-definition maps. This provides the operator a better visualization of the performance of the planter, helping the operator determine when the planter is running properly or when adjustments are needed. SeedStar™ Mobile captures the following planter data attributes: actual population, target population, seed spacing CV, singulation, applied down force, gauge wheel margin, ride quality, ground speed, and variety.



Self-Aligning and Locking U-Trough Auger Hanger Bearing

Sukup Manufacturing Co.
Sheffield, Iowa, USA
www.sukup.com

The Self-Aligning and Locking U-Trough Auger Hanger Bearing is an easy-to-install bearing that helps guide itself into place and is easily locked into position, requiring no special forming of the trough. The bearing is designed with arms that slide along walls of the trough to balance the bearing on top of the auger as it is pushed into the trough, and with tabs that lock the bearing into place on supports inside of the trough. The bearing's design allows the auger to be removed and reinstalled without direct access to the bearing, which is critical in the event of a plugged unload system. Competitors' hanger bearings require a specially formed trough or hands-on access to the bearing for auger installation, removal, or replacement.

Stirring Machine Delay Control System

Sukup Manufacturing Co.
Sheffield, Iowa, USA
www.sukup.com

The Stirring Machine Delay Control System helps keep a grain stirring machine on task by providing more time for removal of obstructions and by notifying the operator if a stoppage lasts more than ten minutes. The device uses a micro-controller that senses if a down auger is hung up in the grain. If the hung-up auger returns to vertical, the controller tells the machine to wait an additional three minutes before resuming travel around the bin. This allows time for the auger to break up an obstruction. If the auger does not return to vertical within ten minutes of the stoppage, the operator is notified by a horn or text message. Currently, operators have to rely on visual observation, which delays the response to problems and thus delays the grain drying and conditioning process.

SMART Loop

Sukup Manufacturing Co.
Sheffield, Iowa, USA
www.sukup.com

Sukup's Simultaneous Monitoring and Reaction Technology, called SMART Loop, is a self-learning control system for operating an automatic grain dryer at optimum speed and temperature levels. SMART Loop uses a newly redesigned moisture sensor that is much more accurate than predecessors and also receives readings on column and discharge grain temperatures, plenum temperature, unload speed, ambient humidity and temperature, and static air pressure. The control system allows the dryer to quickly adjust its operation based on multiple analog inputs without overriding the discharge moisture setpoint. SMART Loop allows further fine-tuning using proportional gain control and deadband area settings. The advanced control loop combines classical drying principals with proportional-integral-derivative (PID) control technology and robust math engines to deliver a superb method of dryer control.

Stone Detection for 8000 Series Self-Propelled Forage Harvester

John Deere
Moline, Illinois, USA
www.deere.com

The John Deere 8000 Series self-propelled forage harvester features a new solution for the detection of stones in the incoming swath. John Deere Stone Detection uses an accelerometer on the upper front feedroll arm to detect rapid movement and a knock sensor in the lower front feedroll to detect impact. Either sensor, individually or together, can stop the feedrolls to prevent ingestion of a stone. This prevents damage to the cutterhead, knives, and other components. This system is completely adjustable from the cab, and the operator can adjust the sensitivity in extremely uneven windrows. This is the first system on the market that can differentiate between stones and lumps in windrows using this combination of sensor technology.

Sunflower 6830 High-Speed Rotary Finisher

AGCO Corporation
Duluth, Georgia, USA
www.agcocorp.com

AGCO's Sunflower 6830 high-speed rotary finisher is specifically designed to provide the high-speed operation and high residue flow unattainable with traditional shank-equipped finishers and cultivators. It produces a consistently smooth, level seedbed, which is not always obtained by vertical tillage tools. The 6830 is devoid of sweeps and instead combines four types of rolling ground-engaging tools in a three-step process: spherical disc blades and reels, wavy coulters, and Sunflower-exclusive Rolling Spider tines. The 6830 can build a perfect seedbed in one pass. The SF 6800 is also the first Sunflower tool to be equipped with Sunflower's maintenance-free disc gang bearings.

Sunflower 9830 NT Series Single-Disc Air Drill

AGCO Corporation
Duluth, Georgia, USA
www.agcocorp.com

AGCO's Sunflower 9830NT Series single-disc air drill is a single-rank, single-disc opener system that provides high-speed seeding performance. The 175-bushel tank consists of two commodity chambers divided in a 60/40 split, providing a seed capacity of 5.83 bushels per foot. The seed is accurately metered through a stainless steel venturi-type metering system with a dedicated meter flute for each row. The ISO task controllers and electric meter drives provide responsive rate change with three-section zone control and seed rate turn compensation. The AgControl™ system controls each meter shaft by section. The Sunflower 9830NT Series has a 30 ft (9.1 m) working width and 11 ft 5 in. (3.5 m) transport width.

SW 4014 Square Bale Wrapper

Kuhn North America
Brodhead, Wisconsin, USA
www.kuhnnorthamerica.com

The SW 4014 Square Bale Wrapper features an AutoLoad function for non-stop automatic wrapping. The laser-guided AutoLoad feature detects approaching bales, scans the length of the bale, and sets the loading arms into preload position, ensuring accurate on-the-go loading and unloading. AutoLoad increases productivity by up to 15%, which reduces the time the bales sit unwrapped in the field and preserves silage quality. The SW 4014 can wrap large square bales up to 6 ft 6 in. (2 m) long or round bales up to 5 ft (1.5 m) wide and 4 ft 8 in. (1.4 m) in diameter. Its solid design makes it extremely stable. Forage growers will notice the increased wrapping capacity, and operator comfort is enhanced with in-cab controls through ISOBUS compatibility.

T7.315 and T7.290 Heavy-Duty Tractors

New Holland Agriculture
New Holland, Pennsylvania, USA
www.newholland.com

The T7 Heavy-Duty Series meets the mixed crop and large livestock producer's need for higher power and productivity from a multitasking medium-frame tractor. A specifically designed NEF 6.75 L engine delivers peak power of 313 hp on the T7.315. The Auto Command transmission delivers infinite speed adjustment, while a four-speed rear PTO and optional two-speed front PTO allow engine speed to be optimized. ISOBUS Class 3 technology allows implements such as New Holland's large balers to control the tractor's speed automatically, increasing output by up to 10%. Available equipment includes a driver's seat with climate control, up to 20 LED work lights, and a tire pressure monitoring system. The T7 tractors can be fitted with group 49 tires, and front dual wheels are available.

TractorPlus

John Deere
Moline, Illinois, USA
www.deere.com

The John Deere TractorPlus mobile app provides easy access to information to help customers be more productive with their 3E, 3R, 4M, and 4R compact utility tractors. The app is intended to serve as a quick reference tool for on-board instructions and diagnostics while offering a variety of features for convenience while working. The app has four main sections: Tractor Setup provides a step-by-step guide for managing Final Tier 4 engines and using hitch assist on applicable models, Icon Glossary allows operators to familiarize themselves with the instrument panel and premium features, Error Code Lookup is a searchable database of diagnostic trouble codes, and Notebook is a place for operators to save notes on the machine's performance for future reference.

TruSet™ Tillage

John Deere
Moline, Illinois, USA
www.deere.com

TruSet™ enables users to independently adjust depth and pressure settings from the cab, on the go, for each operation on the 2730 Combination Ripper. As conditions change throughout the field, operators running the 2730 with TruSet™ can quickly respond to varying soils, compacted areas, heavier residue, and moisture. Customized adjustments in response to changing agronomic factors can help customers maximize yield. With TruSet™, operators can adjust the depth settings of disks, rippers, and closing disks on the 2730 Combination Ripper, along with pressure settings for the active hydraulic rolling baskets. These adjustments are made on the GreenStar™ 3 2630 Display, which also provides real-time data on the tillage settings.

Transport System for MacDon R1 Series / Krone EasyCut TC Pull-Type Disc Mower

MacDon Industries Ltd.
Winnipeg, Manitoba, Canada
www.macdon.com

Krone NA, Inc.
Memphis, Tennessee, USA
www.krone-na.com

The "road friendly" transport system for MacDon's R1 Series and Krone's EasyCut TC 400 & 500 Pull-Type Disc mowers has been designed to convert from field mode to transport mode in 30 seconds without leaving the cab. The transport wheels are stored behind the mower, where they do not interfere with mowing. In deploying the transport system, the transport wheels elevate the mower, creating clearance for the field wheels to move underneath the cutterbar. By coupling the hitch to the transport frame, the hitch and mower simultaneously rotate to the transport position. This self-contained design gives the 16 ft (5 m) and 13 ft (4 m) wide mower a transport width of 9 ft (2.7 m), which allows easier movement on roads and provides access to fields with narrow gateways that exclude wider machines.

Unload on the Go Tank for KMC 3386 Peanut Combine

Kelley Manufacturing Company
Tifton, Georgia, USA
www.kelleymfg.com

The KMC Unload on the Go Tank is a storage tank that mounts on top of a peanut harvesting combine and that unloads the peanuts into a cart or wagon while the combine continues to harvest. The Unload on the Go Tank uses a unique folding conveyor, not seen on previous models, that is 33% wider to unload the peanuts up to 50% faster. Because it folds flat against the side of the tank, transport width has been reduced by 2%, giving the operator better visibility for safer transport. The Unload on the Go Tank also has a larger volume, capable of holding an additional 750 lbs (340 kg) of peanuts, while also featuring a new tilt design that allows the operator to access the threshing cylinders located under the tank.

WR9800 RearSteer System

AGCO Corporation
Hesston, Kansas, USA
www.hesston.com

The WR9800 Series windrower now offers a RearSteer option, providing greater ease of transport, higher speed, and enhanced stability at higher speed. With the RearSteer option, a draper head can be towed at up to 20 mph (32 kph). Using fully active hydraulic cylinders for true rear steering, this top-of-the-line option provides stability and driver comfort at up to 24.5 mph (39 kph) without a header and without the need of additional ballast, cab, or rear axle adjustments. The RearSteer feature can be engaged from the cab.

XERION 4000-5000 Series Tractors

CLAAS of America
Omaha, Nebraska, USA
www.claas.com

The CLAAS XERION 4000-5000 Series 4×4 tractors feature the strength of a rigid frame, a turning radius tighter than that of an articulated tractor, the efficiency of a CVT transmission, and a unique rotating cab. The TRAC VC cab option allows 180° rotation at the touch of a button. All in-cab controls are reoriented based on the direction the cab is facing. The rigid frame eliminates the weak point of an articulated joint while providing greater stability. High-capacity axles and five different steering modes, including standard, crab, synchronous, control lever, and four-wheel, ensure maximum maneuverability. The CVT transmission, unique to tractors of this size, eliminates the constant shifts of a traditional gearbox for precise speed control while maximizing fuel efficiency.

Focus on the Foundation

The Larry W. Turner Young Extension Professional Award

The ASABE Foundation financially supports numerous Society awards, including ones designed to recognize young professionals early in their careers. The Larry W. Turner Young Extension Professional Award is one of the awards for ASABE members under 40 years of age. It recognizes excellence in personal character and outstanding achievement in serving clientele by disseminating, sharing, and applying engineering knowledge; transferring research technology into practical, problem-solving applications; and advancing the profession of agricultural and biological engineering.

"It was very encouraging to be recognized by my peers with the Larry W. Turner Young Extension Professional Award. It reinforced my desire to continue conducting extension work and even expand that work," comments Michael Dukes.

Initially (as established in 1972), the name of the award was the Aerovent Young Extension Man Award. However, in 2012, it was endowed by ASABE colleagues and renamed the Larry W. Turner Young Extension Professional Award. Dr. Turner, a 1993 recipient of this award, died in an airplane crash when leaving for Puerto Rico to participate in a 2006 extension program. Turner was a very successful university extension specialist and administrator at the University of Kentucky. He served as chair of the Agricultural and Biological Engineering Department and as associate dean for Extension in the College of Agriculture and was a visionary leader in Cooperative Extension in Kentucky and beyond.

Since 1973, forty-one young professionals have been recognized for early career success as Extension Professionals. They continue to have very successful careers. Many have become active in ASABE, serving in leadership roles on committees, providing technical presentations at professional meetings, and publishing in ASABE and other scientific journals.

Dr. Michael D. Dukes, the 2011 recipient of the Larry W. Turner Young Extension Professional Award, has been a member of the Agricultural and Biological Engineering Department at the University of Florida since 2001. Dukes has an exemplary publication record, with 87 peer-reviewed articles in scientific journals, all focused on irrigation and drainage. He is active in numerous ASABE technical committees and editorial and review panels. Since receiving the Larry W. Turner Award, he has assumed leadership roles as director of the University of Florida's Center for Landscape Conservation and Ecology and as interim chair of the Environmental Horticulture Department.

The Larry W. Turner Award is just one of the Foundation-supported young professional awards that recognize future leaders of ASABE and our profession. Contributing to the ASABE Foundation can increase the financial support for these awards and other programs. Please contact Darrin Drollinger at 269-429-0300 for additional information on supporting the Foundation. Learn more about the Foundation or donate online at www.asabe.org/foundation.aspx.

ASABE member and Foundation Development Committee Chair Sylvia Schonauer, P.E., Principal Engineer, Advanced Innovation, W. K. Kellogg Institute, Battle Creek, Michigan, USA, sylvia.schonauer@kellogg.com.

ASABE Fellow Ronald T. Schuler, Emeritus Professor in Agricultural Engineering—Power and Machinery, Conservation Tillage, University of Wisconsin, Madison, USA, rschuler@wisc.edu.

Sustainability as an Issue of Corporate Social Responsibility

Ann Nunnelly

Editor's note: Ann Nunnelly captured first place in the 2015 Ag and Bio Ethics Essay Competition by submitting "an original work of up to 1,500 words on an ethics topic impacting the practice of professions related to agricultural and biological engineering, systems, or technology." Open to undergraduate and graduate student members of ASABE and IBE, second place went to Victoria Garibay, Texas A&M University, for "Earth Ethics: An Analysis of Emissions Policy," and third place was awarded to Richard Colley, III, Auburn University, for "Ethical Considerations of Hydraulic Fracturing in the United States." The three finalists presented their papers at the ASABE Annual International Meeting in New Orleans last July.

Since the Brundtland Commission coined and defined the term "sustainable development" in 1987, sustainability has become a buzzword for companies wishing to present themselves as fiscally, ecologically, and socially responsible. It is a marketing tool to reach a new age of consumers who want to feel good about the products and services they purchase in a world where energy and resources are limited. However, the sustainability of a company cannot be measured by its "green" advertising. The Corporate Social Responsibility (CSR) of a company is determined instead by its core values and its decisions as a global citizen. The idea of CSR is complicated because it means very different things to different people. Therefore, in a general sense CSR is "the continuing commitment by business to contribute to economic development while improving the quality of life of the workforce and their families as well as of the community and society at large" ("Corporate Social Responsibility"). To many, this means that businesses are accountable not only for the effect their activities have on the world today, but also their future impact—in other words, the sustainability of their practices. An increasing number of large companies are beginning to understand the value of a sound CSR strategy that fosters measurable action. In this way, acting in an economically, ecologically, and socially responsible manner is more than just the ethical duty of a company, but it is a practice that pays off considerably in the long run.

Nunnelly takes first place at the Ethics Essay awards presentations at the New Orleans AIM.

As biological and agricultural engineers, we are entrusted in many ways with environmental and public health, safety, and welfare. Therefore, we must abide by a strict code of regulations enforced by organizations, such as the Environmental Protection Agency (EPA). However, simply staying inside the lines does not necessarily mean we are practicing ethical behavior. Although most people may not readily associate biological and agricultural engineering with a substantial amount of ethical decision making, when approached from a sustainability standpoint more questions may arise concerning the integrity of our decisions and practices. For this reason, CSR can also be readily applied to agribusiness and the like. The Code of Ethics of Engineers found in the Constitution, Bylaws, and Rules of the ASABE states that "engineers shall hold paramount the safety, health and welfare of the public in the performance of their professional duties." To abide by this code means to consider the present and future consequences of our practices on public safety, health, and welfare. In other words, this idea is intended to push the boundaries of agribusiness and bring into question sustainability as an ethical issue. In order to further examine this notion, let us take the practice of intensive monoculture.

It is time to reassess unsustainable land use

The global population is well over seven billion and growing. From 2012 to 2014, the United Nations Food and Agriculture Organization estimated that about 805 million people in the world, or one in nine, were suffering from chronic undernourishment ("2015 World Hunger and Poverty Facts and Statistics"). The need for increased industrial agriculture to produce the necessary sustenance for the growing population is undeniable. However, it has also been proven that intensive monoculture rapidly degrades and eventually exhausts the soil. Because of this, as soils are rendered futile, forests must be clear-cut to make way for more agricultural land in order to continually produce the enormous amounts of food necessary to meet global demands.

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The Amazon basin has been experiencing this phenomenon for decades and in the process has lost over 763,000 square kilometers of rainforest in the past 20 years. That is an area two times the size of Germany! (Watts). The soils that support tropical rainforests are typically classified as oxisols. These are the most highly weathered soils and are defined by a thick, oxic horizon that has a very limited capacity to hold nutrient cations, rendering them very low in natural fertility and moderately acidic. These characteristics are not suitable for intensive agriculture (Brady and Weil, 112). Therefore, productivity quickly drops off after only a few years of production. Not to mention, such large-scale deforestation has costly ramifications, such as generating widespread erosion that results in water pollution from surface runoff, severe flooding, loss of biodiversity, the disruption of weather patterns, and the reduction of carbon sinks, which contributes to global climate change (Esposito).

This cycle of intensive monoculture, soil depletion, and deforestation is clearly unsustainable. If we are currently struggling to feed seven billion with these methods, imagine the challenges the world will face in the century to come. The United Nations Population Division has projected that if current trends continue, there is an 80 percent chance that the global population in 2100 will fall between 9.6 and 12.3 billion (Kunzig). With this in mind, it is time to reassess unsustainable land use and begin developing large-scale agricultural solutions now that will play a crucial role in feeding the populations of the future.

What are our options?

As engineers we have an exciting opportunity to be creative in our work and explore innovative avenues for new developments in the field. If we are to follow the Code of Ethics of Engineers, we must also uphold the safety, health, and welfare of the current population and the generations to come. Therefore, instead of supporting the immediately productive, but ultimately unsustainable and destructive practice of intensive monoculture, it is our job to recognize the direction that these practices are taking us and propose productive, economically feasible, and ecologically viable alternatives that will reap benefits for the populations of the future.

Intensive monoculture is only one example of a wide variety of ethical challenges that biological and agricultural engineers face. More issues will present themselves in the years to come as natural resources continue to become limited. In order to begin to solve these problems, we must keep in mind our responsibility as engineers and realize that to be ethical is an individual choice. However, the congregate of individual decisions can effect great change. Whether or not a company is successful in carrying out its CSR is determined by the individual behavior of its employees. The decisions of engineers play a pivotal role in that success. On the other hand, this is a challenge to engineers seeking employment to thoughtfully consider as a part of their employment matrix the CSR of the companies they may be working with in the future. It is up to each of us to determine how we can use our skills to ensure that the practices of the company we work for are providing for a more sustainable future. It is our ethical responsibility to put those skills to work.

ASABE member Ann Nunnelly, Biosystems Engineering senior, Auburn University, Auburn, Ala., USA, agn0005@auburn.edu, http://annnunnelley.weebly.com/.

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IMAGES of AGRICULTURAL and BIOLOGICAL ENGINEERING

VisualChallenge5

Sometimes a theme evolves. Perhaps it shows up unexpectedly, but with confidence and persistence. Usually, it becomes obvious.

As the entries for this year's Visual Challenge were reviewed by *Resource* staff, it became apparent that ag and bio engineers were sharing their skills and capturing beautiful images from around the world. Stunning photos–taken in Botswana, Cameroon, Canada, China, France, Honduras, Italy, Kenya, Malawi, South Korea, Spain, Tanzania, The Netherlands, Zambia, and around the U.S.–"spoke" through their colors and composition to the nature of a globally engaged profession.

Engineers are proficient in science and technology, and they are good communicators as well. Although they usually communicate with words and numbers, *Resource* annually asks the readership of engineers and non-engineers to communicate in images–to call attention to the visual aspects of agricultural and biological engineering.

We present these selected entries for our fifth Visual Challenge, and we celebrate the generous contest contributors. The beauty of meaningful work, research developments, and the Society's technical communities come to life on these pages, showing those outside the ABE field: "This is what we do."

While acknowledging that the selection process was inevitably subjective, we are confident that these photos provide a glimpse into the vast variety of activities, work places, and visual surprises that ag and bio engineering careers can offer.

Here's to a new year full of great photo ops, and another round of great shots in 2016 for the next Visual Challenge.

Globally Engaged

AGRICULTURE AT DUSK IN BANGANG, CAMEROON

ASABE member John H. Lumkes Jr., P.E., *Associate Professor, Department of Agricultural and Biological Engineering, and Associate Director, Global Engineering Programs, Purdue University, West Lafayette, Ind., USA.*

"I was on my way back to the guesthouse in Bangang after spending the day in the shop building a PUP (Purdue Utility Platform), when I saw the sun setting behind the clouds, creating this backlit sky. I grabbed my camera and tripod from the guesthouse and quickly went back to this ridge. The crop diversity evident in the foreground (a mix of vegetables, both grains and legumes, and fruit trees, typical of a small farm plot in this area of Cameroon) was a bonus and complemented the sky."

FROM BRANCH TO BASKET

ASABE member Matt DeKam, *Mechanical Engineer, AMEC Foster Wheeler, Minneapolis, Minn., USA.*

"Coffee in Honduras is a main source of income for the country. Harvested from October to March, the geography is ideal, and the IHCAFE—Instituto Hondureño del Café (Honduran Institute of Coffee)—has prompted a sustained growth in production. Coffee production and exports saved Honduras from certain bankruptcy following a 2009 political crisis. A combination record crop and unusually high international coffee prices generated employment and hard currency, which allowed the economy to stay afloat and not collapse. The farmers I worked with in Honduras receive training from IHCAFE, and they are still exporting. Check it out at www.rioolancho.com."

VIRGINIA VINEYARD

ASABE member Bobby Grisso, Jr., P.E., *Associate Director, ANR Extension Programs, Virginia Cooperative Extension, and Professor, Department of Biological Systems Engineering, Virginia Tech, Blacksburg, USA.*

"Virginia has hot, humid summers that can be challenging to viticulture, but within the last twenty years the industry has taken off. Virginia wines sold in Virginia have the requirement that the majority of the grapes used must be grown in Virginia."

THE COLORS OF MAIZE

ASABE member Klein E. Ileleji, *Associate Professor and Extension Engineer, Department of Agricultural and Biological Engineering, Purdue University, West Lafayette, Ind., USA.*

"While in Kakamega, Kenya, doing a survey on smallholder post-harvest practices, a farmer brought out the various corn hybrids just harvested."

HARVESTING HOPS IN BERRIEN COUNTY, MICHIGAN

ASABE Member Brian McLaughlin,
Notre Dame, Ind., USA.

For interesting background on photo: www.southbendtribune.com/news/business/hops-for-beer-they-re-hopping-in-berrien-county/article_d25edf74-72fa-5662-be52-2d647ec438d1.html

THE FUTURE OF ENERGY

ASABE member Jason Schuster, *Graduate Research Assistant, Department of Agricultural and Biosystems Engineering, Iowa State University, Ames, USA.*

"Recently harvested stover bales await transport to a cellulosic ethanol plant while wind turbines produce energy in Iowa—just two forms of renewable energy that our discipline is working on to create a sustainable future."

A NEW KIND OF IRRIGATION

ASABE member Allison Graham,
Engineer in Training, Seed Hawk, Inc., Langbank, Saskatchewan, Canada.

"As the world begins to appreciate how precious water is, agricultural and biological engineers play an even more pivotal role in looking for new water sources and managing the ones we already have. Water management really brings together all branches of ag/bio engineering—from soil and water to mechanical and electrical design."

SERENDIPITY

ASABE member Paul Funk,
Agricultural Engineer, USDA-ARS Southwestern Cotton Ginning Research Laboratory, Mesilla Park, N. Mex., USA.

"Approaching the Madrid airport from the east in late May, I saw a stunning quilt work of recently tilled fields, young olive groves, forests, and pastures. I thought: 'Your workmanship is marvelous—how well I know it,' Psalm 139:14."

MILAN EXPO 2015

ASABE member Gene A. Giacomelli, *Director, Controlled Environment Agriculture Center (CEAC), and Professor, Department of Agricultural and Biosystems Engineering, University of Arizona, Tucson, USA.*

"The USA pavilion creates walls of production, promoting the EXPO's food theme and attention to future practices."

THE JET IN ACTION

ASABE member Kate Klavon, *Graduate Research Assistant, Department of Biosystems and Agricultural Engineering, Oklahoma State University, Stillwater, USA.*

"Oklahoma State University and Kansas State University faculty members and graduate students work together to measure soil erodibility using the Jet Erosion Test (JET) device in the Fort Cobb Reservoir watershed in Oklahoma. The streambanks in the watershed are experiencing excessive erosion. Because many are as high as 5 m and steep, grad students researching cohesive sediment erosion in the watershed sometimes have to use a rope to get in and out of the stream."

A FISH OUT OF WATER

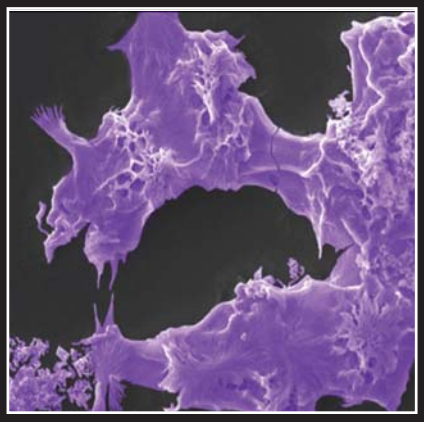
ASABE member A. J. Both, *Associate Extension Specialist, Department of Environmental Sciences, Rutgers University, New Brunswick, N.J., USA.*

"A heron found an unusual vantage point on a tomato greenhouse in Berlikum, The Netherlands."

NANOCOPPER COOKIES AND PURPLE CORALS

ASABE member Suresh Neethirajan, *Program Leader, BioNano Laboratory and Bioengineering, and Assistant Professor, School of Engineering, and students* **Robert Hunter, Nawfal Adam Mungroo,** *and* **Murugan Veerapandian,** *University of Guelph, Canada.*

Top image: Nanostructures of copper-glucosamine. Scale: 1 micron.



Bottom image: Microstructures of artificial DNA tiles in the form of functionalized graphene oxide on a silicon wafer. Scale: 10 microns.

POPLAR ENDOPHYTES

ASABE member Lauren K. Redfern, *Graduate Student, Department of Civil and Environmental Engineering, Duke University, Durham, N.C., USA.*

"There is a whole microbial world inside plants: endophytes. Endophytes help gather and convert nutrients and protect the plants from contaminants, allowing the plant to survive and grow. This picture is of bacterial and fungal endophytic isolates from a tulip poplar in North Carolina."

THINKING IT THROUGH

Tyler Jones, *iAGRI (Innovative Agricultural Research Initiative), photographed at the Sokoine University of Agriculture, Morogoro, Tanzania. Submitted by* **ASABE member John Schueller, P.E.,** *Professor, Departments of Agricultural and Biological Engineering and Mechanical and Aerospace Engineering, University of Florida, Gainesville, USA.*

"Schueller, Kadeghe Fue, and Siza Tumbo discuss the tests of a computer-controlled system to produce vegetables with less irrigation water.

AUBURN
AGRICULTURE

ASSISTANT PROFESSOR OF BIOPROCESS ENGINEERING

The Department of Biosystems Engineering of the College of Agriculture at Auburn University is seeking applications for the position of Assistant Professor of Bioprocess Engineering. This faculty position will be a nine-month, tenure-track position with a 60% research and 40% teaching appointment. The projected start date is August 16, 2016. The successful candidate for this position will be expected to participate actively in the Auburn University multidisciplinary Cluster Hires Initiative in the cluster of Scalable Energy Conversion-Science and Technology. New faculty with expertise in Bioprocess Engineering will complement the University's considerable existing expertise in these areas to form the core of this innovative multidisciplinary initiative. Participation in the Scalable Energy Conversion-Science and Technology cluster will be an important component in faculty annual reviews. Information regarding the Cluster Hires can be found here: http://www.auburn.edu/academic/provost/strategic_hire.html.

Responsibilities: The successful candidate will be responsible for developing a research program with strong extramural funding potential in scalable energy systems, biofuels and biobased product development. The incumbent will work closely with other bioenergy and biobased products faculty. The candidate will also participate in undergraduate and graduate teaching programs for majors and non-majors. The expected course load is approximately three courses per year. There will be additional responsibilities for undergraduate and graduate student advising.

Qualifications: Minimum qualifications include an earned Ph.D. from an accredited institution in Biosystems, Biological, Agricultural, or closely related engineering disciplines by the expected position start date, experience in conducting research in bioprocess engineering and related engineering topics, and must be eligible and able to obtain licensure as a registered professional engineer. The successful candidate also will have documented evidence of ability to conduct research, teach, and work collaboratively with a diverse cadre of faculty, staff, and graduate student colleagues. The candidate is expected to develop collaborative ties to numerous disciplines within the academy; and secure extramural funding from sources such as National Science Foundation, and United States Departments of Energy and Agriculture to support his/her research programs. Possession of excellent communication and interpersonal skills to effectively interact with diverse audiences is required. The successful candidate must meet eligibility requirements for work in the United States at the time the appointment is scheduled to begin and continue working legally for the term of employment.

Desirable qualifications include: teaching experience in bioprocess engineering, biological engineering and related topics; demonstrated record of securing extramural funding for research or education programs; industry experience in bioprocess engineering, food processing, pharmaceutical engineering, biobased products engineering, and similar topics; and/or licensure as a Registered Professional Engineer.

Application: Applicants must apply for the position by visiting the link: http://aufacultypositions.peopleadmin.com/postings/1362 and attach the following: 1) cover letter that addresses the experience pertinent to the responsibilities of the position, 2) current curriculum vita, 3) copies of all academic transcripts, 4) statement of research interests and accomplishments, and 5) statement of philosophy on teaching. When prompted during the on-line process, please provide names, phone numbers and email addresses of three professional references. Only complete application materials will be considered. To ensure consideration for the position, applicants are encouraged to apply by close of business on February 1, 2016. The search will continue until the position is filled. Questions about the position should be directed to: Dr. Sushil Adhikari, Search Committee Chair, email: sushil.adhikari@auburn.edu.

The University: Auburn University is one of the nation's premier land, sea and space grant institutions with an enrollment of more than 27,000 graduate and undergraduate students. The University is located in the city of Auburn in east-central Alabama approximately 100 miles southwest of Atlanta, GA and southeast of Birmingham, AL and is about 60 miles northeast of the state capital (Montgomery). Auburn University is ranked in the top 50 public universities for its undergraduate programs and its College of Engineering is ranked 39th among public institutions offering doctoral programs. Interested applicants are encouraged to visit www.auburn.edu for more information.

The Department: The Department of Biosystems Engineering consists of 14 full–time faculty who solve problems in biological systems through innovative engineering research, teaching and extension activities. The Department offers B.S., M.S., and Ph.D. degrees in Biosystems Engineering with 165 undergraduate students and 30 graduate students. Recent construction projects have resulted in over 30,000 square feet of new laboratory space for the department. More information can be found at www.eng.auburn.edu/bio.

Auburn University is an EEO/Vet/Disability Employer

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For more details on this service, contact Melissa Miller, ASABE Professional Opportunities, 2950 Niles Road, St. Joseph, MI 49085-9659, USA; 269-932-7017, fax 269-429-3852, miller@asabe.org, or visit http://www.asabe.org/JobAdsInfo.

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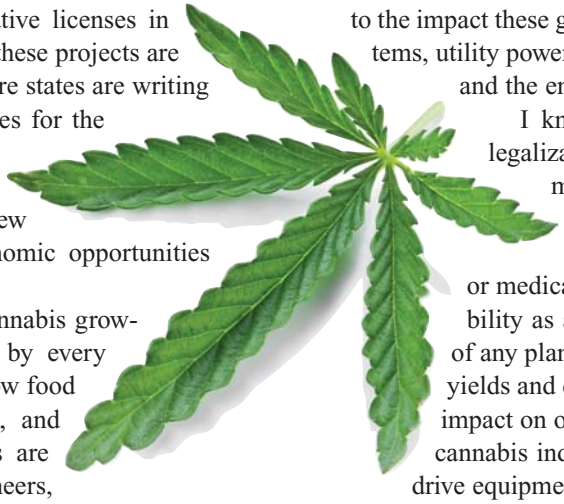
The Cannabis Industry Needs Us

Nadia Sabeh, P.E.

Lately, I've been getting a lot of calls from folks all over the country asking if I would help design the climate control systems for cannabis cultivation facilities. My education and expertise make me uniquely qualified for these projects. As a PhD candidate, I studied greenhouse cooling systems at the University of Arizona's Controlled Environment Agriculture Center, and today I work as a mechanical engineer in California, where I established and currently lead our company's AiCE (Agriculture in Controlled Environments) team.

Over the past year, I've worked on projects in California, Colorado, Washington, Maine, Massachusetts, and Jamaica. I also helped design two grow facilities that competed for one of the five lucrative licenses in New York State last spring. But these projects are just the tip of the iceberg, as more states are writing legislative guidelines and policies for the cultivation and sale of cannabis and as public opinion shifts toward acceptance in light of new medicinal discoveries and economic opportunities associated with the plant.



The challenges faced by cannabis growers are similar to those faced by every farmer, especially those who grow food in greenhouses, vertical farms, and plant factories. Their questions are familiar to all agricultural engineers, whether they specialize in plant facilities, energy systems, natural resources, machinery systems, or sensors and controls. These questions include:

- How much water does my crop need? Can I recirculate, reuse, or otherwise minimize water use?
- What are the ideal growing conditions for my crop? What level of air temperature, humidity, and light does my crop need at various stages of growth?
- What nutrients do I need to give my crop? Should I grow in the soil, with chemical fertilizers, or make an organic tea?
- Are LEDs as effective as HID lighting? Will my plants grow best and express more desirable qualities if I expose them to sunlight?
- What HVAC systems do I need to control the indoor climate? Should I use mechanical cooling or evaporative cooling? Do I need humidification or dehumidification?
- Is there a way to monitor the environment without using pencil and paper?
- Should I enrich the environment with carbon dioxide? Is it okay to use the exhaust gases from a gas heater, or should I use a CO_2 tank?
- What is the most effective method of IPM? How can I eliminate or reduce the use of pesticides, fungicides, and other chemicals?
- How can I reduce the labor associated with post-harvest handling? Is there a way to mechanize the trimming, harvesting, and sorting process?

Unfortunately, right now these questions are being answered primarily by non-engineers and non-plant scientists posing as "experts" to make a quick buck in this rapidly growing industry. Additionally, little thought has been given to the impact these grow facilities have on regional water systems, utility power consumption, local carbon action plans, and the environment as a whole.

I know not everyone is on board with the legalization of cannabis, and I get that. Like many of you, I became an agricultural engineer because I wanted to feed the world, not because I wanted to get it high or medicate it. But I also feel a duty and responsibility as an agricultural engineer to help farmers, of any plant, understand their crop's needs, increase yields and quality, and use fewer resources with less impact on our planet. Furthermore, I believe that the cannabis industry could help spur new technologies, drive equipment costs down, and maybe even provide a training ground for our next generation of farmers, helping to make controlled environment agriculture a more viable option in the quest to feed nine billion people by 2050.

What do you think? Should ASABE and its members be more involved in the cannabis industry? Should we use our knowledge and expertise to help educate cannabis growers, develop new tools and technologies specific to their needs, and seek support from the federal government to fund research? Or should we maintain our distance from this drug-producing plant, a plant that isn't even a food crop? Regardless of where you stand on the issue, I'd like to hear your thoughts and hope that you'll join me in a discussion.

ASABE member Nadia Sabeh, P.E., Associate and Team Leader of Agriculture in Controlled Environments (AiCE), Guttmann & Blaevoet Consulting Engineers; author of *Tomato Greenhouse Roadmap* (HortAmericas, 2014); and contributing author to *Plant Factory* (Elsevier, 2015), Sacramento, Calif., USA, nsabeh@gb-eng.com, www.gb-eng.com.

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Views expressed are solely those of the author and do not necessarily represent the views of ASABE.

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April 8-9, 2016

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About the Young Professionals Community

The Young Professionals Community (YPC) is made up of ASABE members who are graduate students or professional (non-student) members, who are less than 34 years of age. The YPC helps ASABE members develop personal and professional skills, and creates a network of peers who will be interacting for their entire careers.