

January/February 2024

# RESOURCE

engineering and technology for a sustainable world

## *VisualChallenge13*

Also inside

ASABE proposes a Strategic Initiatives Council

AE50 winners

Ethics essay winner

PUBLISHED BY AMERICAN SOCIETY OF AGRICULTURAL AND BIOLOGICAL ENGINEERS



## Congratulations to the “Disruptors for Good”

**G**ame-changing, labor-saving, error-reducing, productivity-boosting, or just plain “wow!”—How would you describe the new products recognized by the AE50 Awards?

Meanwhile, at the 2023 AEM Conference, some common themes of the conversations were: (1) labor shortages are serious; (2) efficient use of energy, water, and other inputs is critical for sustainability and profitability; and (3) better ideas are always welcome. The AE50 winners address these challenges by *disrupting for good* with inspiring ingenuity. Check them out in this issue of *Resource* and on the ASABE website.

I cherish warm memories of working with my dad on our family farm in the Texas Panhandle, and a part of me looks at the new equipment and says, “Where were you when I was \_\_\_\_\_?” (fill in the blank with some task that is easier now, thanks to new technology). Today’s machines are not our fathers’ tractors, planters, balers, and sprayers. Sensors, telemetry, and cloud-based monitoring have simplified data acquisition, and convert data into actionable information.

So congratulations to the AE50 winners! People outside our profession often ask us: “What is agricultural and biological engineering?” Thanks to the development teams behind these important engineering advances, we have some highly disruptive examples to show.



The Visual Challenge answers the same question through the eyes of individual ASABE members. As agricultural and biological engineers, we see things differently from other professions. What is agricultural and biological engineering? Thanks to the entries in the Visual Challenge, we have some very beautiful examples to show.

While *what we do* is important, *how we do it* also matters. Students in the ethics essay and video competitions share their perspectives on general ethics, engineering ethics, and bioethics. The efforts of these students, as well as the committees for Professional Ethics (EOPD-412) and the Engineering Ethics Competition (P-128) raise awareness of ethics in our profession and provide opportunities for conversations about ethics as well as professional development.

Finally, solving big problems requires interdisciplinary efforts. The Alliance for Modernizing African Agrifood Systems (AMAA) and the Circular Bioeconomy Systems Institute (CBSI) strategic initiatives, continue to engage external and internal partners. The dedicated members of these strategic initiatives are to be commended for taking on big issues effectively. I anticipate more exciting member-led strategic initiatives in the future, and the creation of a new Strategic Initiatives Council, if approved on the ASABE member ballot, will provide additional cross-community and staff support for current and future strategic initiatives. More information about the item on the ballot is described in this issue.

As we reflect on the achievements of the past year and look forward to the new opportunities ahead of us, I wish you a happy, safe, and productive new year. I also look forward to sharing more great stories about how ASABE members are *disrupting for good*.

Dana Porter  
d-porter@tamu.edu

## events calendar

### ASABE CONFERENCES AND INTERNATIONAL MEETINGS

To receive more information about ASABE conferences and meetings, call ASABE at 800-371-2723 or email [mtgs@asabe.org](mailto:mtgs@asabe.org).

#### 2024

Feb. 11-14 **Agricultural Equipment Technology Conference (AETC)**. Louisville, Ky., USA.

July 28-31 **ASABE Annual International Meeting**. Anaheim, Calif., USA.

#### 2025

Feb. 9-12 **Agricultural Equipment Technology Conference (AETC)**. Louisville, Ky., USA.

July 13-16 **ASABE Annual International Meeting**. Toronto, Ont., Canada.

#### 2026

Jan. 11-17 **ASABE Global Symposium on Sustainable Microirrigation Advances: Drop to Boom**. Aguadilla, Puerto Rico, USA.

July 12-15 **ASABE Annual International Meeting**. Indianapolis, Ind., USA.

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*Magazine staff:* Joseph C. Walker, Publisher, walker@asabe.org; Melissa Miller, Managing Editor, miller@asabe.org; Glenn Laing, Technical Editor; Jill Straub, Consultants Listings, GuideToConsultants@asabe.org; Darrin Drollinger, Executive Director, drollinger@asabe.org.

*Editorial Board:* Chair Morgan Hayes, University of Kentucky; Secretary/Vice Chair Gretchen Mosher, Iowa State University; Past Chair Erin Webb, Oak Ridge National Laboratory.

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**Think Green!** The poly-bag protecting this magazine can be recycled. Just toss it in with your other recycling.

## ON THE COVER:

Working at night can be beautiful! ASABE Past President and Fellow Keith Tinsey, P.E., contributed this shot. *VisualChallenge13* starts on page 21.



American Society of Agricultural and Biological Engineers  
2950 Niles Road  
St. Joseph, MI 49085-9659, USA  
269.429.0300, fax 269.429.3852  
hq@asabe.org, www.asabe.org



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Your Vote Matters

# ASABE Proposes a Strategic Initiatives Council

Angela Green-Miller



**Editor's note:** Following a successful petition presented at the Society's annual business meeting, held at last year's annual meeting in Nebraska, a proposal with significant implications for the Society will be included with this year's leadership ballot.

The proposal emerged from work conducted by a task force that recognized a need for the Society to have a structure in which emerging initiatives with potential for providing strategic growth and increased impact for ASABE. Read on to learn more about the proposal.

## What will I be voting for?

You will be voting for the creation of a new ASABE council, the Strategic Initiatives Council, which will add a fifth council to ASABE's four existing councils (Membership, Publications, Standards, and Meetings). The full membership must vote on the establishment of a new council. To learn more about the ASABE councils, you can review the ASABE Constitution and Bylaws at <https://asabe.org/Portals/0/AboutUs/Constitution-Bylaws.pdf>.

## When will voting happen?

Voting for the proposed council will take place during the annual voting period from January 11 to March 1, alongside the Society elections. ASABE members will need to log into their ASABE member account to cast their vote.

## Why has the new council been proposed?

The need for the new council was identified in the process of developing new strategic initiatives over the past several years. Initiatives that cross the boundaries of different ASABE communities need support that is not available within ASABE's current structure. This gap in ASABE's structure is an opportunity to increase the reach and recognition of ASABE as a leader in addressing global challenges.



The annual business meeting was well attended at AIM 2023. The proposal was discussed, and a motion was passed to place the constitutional change to facilitate the formation of a fifth council on the 2024 ballot. Voting runs from January 11 to March 1, 2024.

## What is the goal of the new council?

The goal of the Strategic Initiatives Council is to elevate ASABE as a leader in bringing together different disciplines to solve complex problems in environmental, food, and agricultural systems. This new council will support conceptual and early-stage initiatives that integrate the expertise of ASABE members across multiple ASABE communities and with organizations outside ASABE. The council will support opportunities to propose new creative ideas that advance our profession and that expand the reach and impact of ASABE.

Possible outcomes of the Strategic Initiatives Council include addressing pressing challenges that require efforts across different disciplines, leveraging funding to address complex problems, increasing the membership of ASABE, and increasing the engagement of ASABE with external partners and organizations.



**January 11 to March 1**

## Do strategic initiatives already exist within ASABE?

Yes. Recent initiatives include the Circular Bioeconomy Systems Institute (CBSI) and the Alliance for Modernizing African Agrifood Systems (AMAA). Both the CBSI and AMAA have been approved by the Board of Trustees as entities within ASABE. Both the CBSI and AMAA meet the criteria for support by the new council.

More importantly, both of these initiatives could have been accelerated if the Strategic Initiatives Council had existed when they were in their early stages. The need for the Strategic Initiatives Council was identified by the taskforce that led to the creation of the CBSI. New initiatives may emerge from a variety of sources, including existing communities, individual members, and council idea sessions. Many other areas have potential to generate Society-led initiatives, and the new council will support the early stages of these future initiatives.

## What will the Strategic Initiatives Council do?

The Strategic Initiatives Council will facilitate the formation of initiatives that create opportunities for ASABE to address pressing challenges. The council will discover, advise, and support interested individuals and groups in navigating opportunities within ASABE. It will establish a mechanism

and best practices for working across the different communities within ASABE and, where appropriate, advise on strategic collaborations and partnerships with organizations outside of ASABE and/or outside the U.S. The Strategic Initiatives Council will support new ideas by providing a place to house, incubate, and incorporate them into the Society.

## Why can't this be done within ASABE's current structure?

There is no mechanism in ASABE's current structure to facilitate work across ASABE communities. Previous grass-roots efforts emerged within existing committees, or as special communities, or with no home in the existing structure. Currently, the CBSI does not have a home in ASABE. The AMAA exists within ASABE's Global Engagement Committee.

## What happens to an initiative after its early stage?

This is a question that we will address in the process, and we expect to learn a lot along the way. The longevity and permanent needs of initiatives will vary. Some initiatives may need a permanent home, while others may conclude after achieving a specific objective. The proposed council will assist initiatives in the process of finding a home within ASABE.

## What has already been accomplished?

In 2022, a taskforce was appointed to explore the challenges within ASABE's current structure, evaluate the need for a Strategic Initiatives Council, and draft changes to the bylaws. The Board of Trustees accepted the proposal, and members attending the 2023 AIM Business Meeting voted to approve the proposed council and send it to the full membership for approval. Because voting by the full membership is required for amendment of ASABE's Constitution, the full membership will vote on the proposed council on the 2024 member ballot.

## Where can I learn more?

Join us for an ASABE Member Hour on January 10 from 1:00 to 2:00 EST ([www.asabe.org/Event-Detail/strategic-initiatives-council-qa](http://www.asabe.org/Event-Detail/strategic-initiatives-council-qa)). We will have an open discussion and Q&A session to respond to questions from ASABE members. You can submit questions prior to the discussion here: <https://asabe.org/About-Us/Strategic-Initiatives>. A recording will be available on the ASABE Member Hour YouTube channel after the event:

[www.youtube.com/playlist?list=PLtUzQeuteqCp18Rs0nnYhRCTNnz6hGBFn](https://www.youtube.com/playlist?list=PLtUzQeuteqCp18Rs0nnYhRCTNnz6hGBFn)

**ASABE Member Angela Green-Miller**, Associate Professor, University of Illinois, Urbana, USA, [angelag@illinois.edu](mailto:angelag@illinois.edu).

# CELEBRATING THE WINNERS

**R**esource magazine has once again sponsored the AE50 Award program, celebrating companies for their recent developments in agricultural, food, and biological systems. From the many entries submitted in 2023, an expert panel selected the products, showcased on the following pages, for recognition. The award-winning products are those ranked highest in innovation, significant engineering advancement, and impact on the market served.

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

The AE50 Awards had their beginning in June 1984, in a special issue of ASABE's *Agricultural Engineering* (now *Resource*), in which 25 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 engineers.

From this focus on identifying innovative technology, two years later the AE50 Award program was born. As the announcement stated, "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. An enlisted panel of experts reviewed the entries, and in 1986 the first AE50 Awards were presented.

Interest in new technology and innovative applications of existing technology remains constant. Over the years, many award-winning 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 continually strive for excellence, and we are pleased to honor their work with the highest honor in the only awards program of its kind. Kudos to the winners!



## 1 SERIES ROUND BALERS

**John Deere**  
Ottumwa, Iowa, USA  
[www.deere.com](http://www.deere.com)

The 1 Series round balers capture near-real-time moisture and weight data using new electrical architecture and the G5e touchscreen display. Agronomic data can be stored and analyzed through the John Deere Operations Center post-harvest. The 1 Series round balers help ensure that optimal moisture levels and consistent bale weights are maintained in every field, in every windrow, and with every bale. Thanks to integrated technology that automates gate cycle functions, the 1 Series round balers also reduce operator fatigue. Baler Automation automatically opens and closes the gate at the right time, eliminating repetitive tasks, reducing operator error, and minimizing downtime, helping producers get the most bales as quickly as possible, regardless of the age of their tractor. Additional features include a higher-capacity feed system with 33% more capacity, net life assist and net lighting, and an integrated variable-rate preservative system.



## ACCUSAMPLE ULTRA MT GRAIN SAMPLER

**VeriGrain Sampling Inc.**  
Saskatoon, Saskatchewan, Canada  
[verigrain.com](http://verigrain.com)

The VeriGrain AccuSample ULTRA MT is an automated grain sampler that also measures the sample moisture and temperature. The ULTRA MT easily mounts on grain handling equipment such as swing augers, baggers, and dryers. It is controlled by the VeriGrain app on a smartphone or tablet via a Bluetooth connection. The ULTRA MT extracts samples at a controlled time interval to ensure that the samples are representative. It measures the sample moisture and temperature to determine spoilage risk and provides detailed information for optimizing blending. It also tracks sample-related information and grain inventory. The ULTRA MT provides two significant benefits to producers: (1) representative sampling ensures that the analysis is accurate and provides producers with information to get maximum value for their grain, and (2) the samples and stored grain information are easily shareable with buyers, ensuring that buyers receive what they purchased.



### AFS FURROW COMMAND

Case IH Agriculture  
Racine, Wisconsin, USA  
[www.caseih.com](http://www.caseih.com)

AFS Furrow Command from Case IH improves seed and fertilizer depth control by automatically adjusting the hydraulic pressure independently for each frame section across the working width of the implement. Available on the Precision Disk 550T, 550, and 500DS models, AFS Furrow Command helps producers make informed decisions on setting the downforce using gauge wheel sensors that provide real-time feedback. With the hydraulic pressure set automatically, operators no longer need to manually adjust settings for different conditions to achieve consistent seed depth. This feature greatly reduces component wear by minimizing excessive downpressure in conditions that don't require maximum pressure.

### AGRICULTURAL INTEROPERABILITY NETWORK (AGIN)

Agricultural Industry Electronics Foundation (AEF)  
Frankfort, Germany  
[www.aef-online.org](http://www.aef-online.org)

The Agricultural Interoperability Network (AgIN) is poised to revolutionize global agribusinesses by offering an enhanced and streamlined cloud-based data exchange system. AgIN provides a comprehensive framework and software guidelines to facilitate collaboration among agricultural industry stakeholders and



AGRICULTURAL INDUSTRY  
ELECTRONICS FOUNDATION

allied initiatives. This groundbreaking network facilitates peer-to-peer cloud connections, creating a pivotal advance in data sharing for OEM partners focused on interoperability. In addressing the challenges

posed by disparate cloud solutions, such as integration issues and operational complexities, AgIN provides a unified solution. AEF members can seamlessly integrate their existing clouds into the AgIN network, ensuring secure data flow across the entire system. Participants maintain autonomy over their platforms and services, and they can access secure connections with fellow AgIN members. Empowered with software guidelines, participants can effortlessly develop new software aligned with AgIN standards, fostering a cohesive and interoperable agricultural landscape.



### BERRY IMPACT RECORDER

Alpha AgTech LLC  
Athens, Georgia, USA  
[alphaagtech.com](http://alphaagtech.com)

The Berry Impact Recorder is a revolutionary electronic sensor for measuring mechanical impacts on berry fruits. This 1-in. spherical device addresses the needs of berry farmers by accurately recording mechanical impact forces of up to 500 G at a frequency up to 4 kHz, ensuring precise impact data capture. What sets the Berry Impact Recorder apart is its customizability, which allows users to adapt its size and weight to match the requirements of their specific produce. Growers and distributors can benefit from the impact data by optimizing their processes to ensure that their consumers receive the highest quality berries. The Berry Impact Recorder is a game-changer for preserving berry fruit integrity throughout the supply chain, reducing damage, and enhancing overall fruit quality.



### BOBCAT PREMIUM POWER PERFORMANCE

Bobcat Company  
West Fargo, North Dakota, USA  
[www.bobcat.com](http://www.bobcat.com)

Bobcat Company has introduced Premium Power Performance, a power management system that distributes power more efficiently on Bobcat loaders equipped with high-flow and super-flow hydraulics. As the first system of its kind for compact track loaders and skid-steer loaders, it is currently available on the Bobcat T86 compact track loader and S86 skid-steer loader. This enhanced system is designed to intelligently distribute hydraulic power where it's needed, providing up to 13% greater productivity during every work cycle. With this system, the hydrostatic and hydraulic pumps work together using pressure sensors to distribute power between the hydraulics and the drivetrain. The system is engineered to deliver maximum hydraulic performance, so operators can work faster and take productivity to new heights.



## DLI DETECTIVE™

**CABA Tech® LLC**  
Spokane Valley, Washington, USA  
[www.cabatech.com](http://www.cabatech.com)

DLI Detective™ is a free online software tool that allows greenhouse growers to analyze the available daylight at specific geographic locations. Its primary function is to determine the precise amount of supplemental lighting needed to achieve a predefined daylight integral target. Users can customize their analysis by selecting specific variables, including the greenhouse light transmission percentage. What sets DLI Detective™ apart is its reliance on current data from NASA's POWER Project, ensuring that the most current and accurate information is used for analysis. This software tool also includes advanced functionalities for transforming data into actionable insights, offering a critical added value for the global greenhouse grower community. Architects, growers, facility planners, and utilities can benefit from the ability of DLI Detective™ to provide schedules for applying supplemental light, ensuring optimal cultivation conditions, and enhancing overall efficiency.



## CFB26 COMMERCIAL FORAGE BOX

**Art's Way Manufacturing**  
Armstrong, Iowa, USA  
[www.artsway.com](http://www.artsway.com)

The CFB26 Commercial Forage Box by Art's Way Manufacturing is a new design that increases output and safety. With an in-cab CANBUS hydraulic control system, the operator never has to leave the cab and can switch from front unload to rear unload with the push of a button. This increases operator comfort and safety. The CFB26 includes load-sensing circuits for both front unload and rear unload, optimizing the machine's energy efficiency. The front unload uses load sensing to automatically slow the apron chain when the cross conveyor or beaters are overloaded. The rear unload is all about speed and uses a two-speed hydraulic motor design paired with a hydraulic manifold that senses load pressure to shift the motors from a high-torque low speed to a low-torque high speed. This innovative design gives the CFB26 faster rear unload time without sacrificing load capacity.



## CEMOS® TRACTOR OPTIMIZATION SYSTEM

**CLAAS of America Inc.**  
Omaha, Nebraska, USA  
[claasofamerica.com](http://claasofamerica.com)

CEMOS® is a self-learning driver assistance system that optimizes all systems onboard CLAAS tractors. CEMOS® is the first and only system on the market that optimizes both the tractor and its implements. It helps the driver adjust ballast, droop, and tire pressure. In addition, CEMOS® increases tractor area output by 16.3% while improving the quality of work, and it reduces fuel consumption by up to 16.8%. CEMOS® optimizes the machine settings in dialogue with the driver. The starting values for the engine, transmission, and implement are automatically generated upfront. Even inexperienced drivers are always working with the optimal traction and ground protection. The complexity of the settings is reduced, and the machine is optimally adjusted quickly. This support serves as a safeguard for the driver, no matter how long the working day may be, because CEMOS® does not get tired.

## DISCO® 3600 FRC MOVE MOWER CONDITIONER

**CLAAS of America Inc.**  
Omaha, Nebraska, USA  
[claasofamerica.com](http://claasofamerica.com)

The double-roller drive of the DISCO® 3600 FRC MOVE is a new drive concept for a mower conditioner designed specifically for heavy and high-yielding crops. It features an oil-bath-driven scissor gearbox for maximum reliability. The pivoting design allows maximum throughput of crops through the conditioning rolls. The gap between the conditioner rolls is easily adjustable with a wrench that is supplied with the machine. A scale on the side of the mower unit shows the actual size of the roll gap. For the highest possible level of adaptability, the spring tension on the rolls is also adjustable. The new double-roller drive optimizes crop flow and throughput, enhances the processing of forage, and allows higher operating speeds.







## DISCO® 9700 RC AUTO SWATHER

**CLAAS of America Inc.**  
**Omaha, Nebraska, USA**  
[claasofamerica.com](http://claasofamerica.com)

The DISCO® 9700 RC Auto Swather is the world's largest triple mower with conditioner and merger belts. It is designed specifically for large forage volumes and heavy crops, featuring a working width of 31 ft 2 in. (9.5 m). Its new side shifting technology, innovative drive line, and intelligent merger belt design make it unique on the market. The centrally positioned swing arms deliver a side shifting of 27.5 in. (700 mm). They allow a larger overlap on sideslopes and curvy headlands and thus ensure a clean cut on every type of terrain. The innovative drive line with triple telescopic drive shafts and specially hardened large-diameter steel profiles is designed for use with tractors of up to 500 hp. While the DISCO® 9700 RC Auto Swather is rugged enough to tackle high-tonnage cereal crops like rye or triticale, its gentle crop flow makes it ideal for delicate legumes such as alfalfa as well.

## EC-C1700B-420 ELECTRIC CONVERTER

**Danfoss Power Solutions**  
**Ames, Iowa, USA**  
[www.danfoss.com](http://www.danfoss.com)

The EC-C1700B-420 is a robust DC/AC converter tailored for electric or hybrid drivetrains in mobile off-highway equipment. A groundbreaking development, it operates at up to 690 VAC, making it the first electric converter designed for mobile equipment that reaches this voltage threshold. This innovation significantly contributes to the electrification of agricultural equipment by enhancing the power density of electric drive systems. The higher operating voltage of the EC-C1700B-420, coupled with its compact and rugged design, allows equipment manufacturers to reduce the size, weight, and power losses of electric drivetrains. Its advanced software capabilities allow seamless control of various electric motors, connection to local grids, or the creation of microgrids. This versatility allows OEMs to design machines that meet both customer performance needs and sustainability goals.



## EDGE CONTROLLER

**T-L Irrigation Company**  
**Hastings, Nebraska, USA**  
[www.tlirr.com](http://www.tlirr.com)

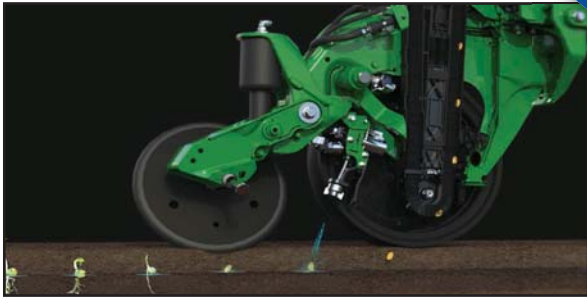
The Edge Controller from T-L Irrigation eliminates the conventional pivot-point control panel found on center-pivot irrigation systems and places the controller at the end tower. Changing the controller location means that all sensor inputs and control outputs are centralized at the end of the pivot, where the work takes place. Coupled with cellular telemetry, the fully remote Edge Controller gives irrigators the power to monitor and control pivot operations at any time and from any place with IoT connectivity. The design increases the overall reliability of the system by dramatically reducing the distance that the monitor and control signals must travel. Closed-loop speed control is performed at the end tower, and combined with the continuous movement of T-L Irrigation's hydrostatic drives, the Edge Controller provides exceptionally uniform water application. The Edge Solar option allows completely wireless operation in areas where copper cable theft is an issue.



## EQUALIZER® SP TRACK UNDERCARRIAGE

**Unverferth Manufacturing Co. Inc.**  
**Kalida, Ohio, USA**  
[unverferth.com](http://unverferth.com)

The Equalizer® SP track undercarriage is designed for 2,000 and 2,500 bushel Brent® and Unverferth® grain carts and is the industry's largest, with a 50 in. wide by 128 in. long track belt providing a 20% greater footprint than the 50 in. by 105 in. equalizer track for greater flotation. The patent-pending design combines the cambering action of the end wheels with 20° of front-to-rear movement and 9° of side-to-side movement. The middle wheels can pivot up to 16° front-to-rear for maximum ground contact over rough fields. Each track lays more than 44 ft<sup>2</sup> (4.1 m<sup>2</sup>), more than 88 ft<sup>2</sup> (8.2 m<sup>2</sup>) per set, to travel over varying field and road contours to reduce track belt heat and extend the belt life. The sealed pivot joints use chrome pins and self-lubricating bushings for reduced maintenance. With the use of urethane springs for the suspension, vibration is minimized, resulting in greater operator comfort.



### EXACTSHOT™ LIQUID FERTILIZER SYSTEM

**Deere & Company**  
Moline, Illinois, USA  
[www.deere.com](http://www.deere.com)

Fertilizing at the time of planting has become a prominent trend, and ExactShot™ stands out as a solution that can significantly decrease the required starter fertilizer by up to 66%. Unlike conventional methods of applying a continuous amount of fertilizer to the entire row of seeds, ExactShot™ precisely doses starter fertilizer onto the seeds as they are planted. This targeted approach results in substantial fertilizer savings and also reduces the need for refills, enabling operators to plant three times as many acres between stops. Aligning with the crucial principles of land stewardship, ExactShot™ uses less fertilizer and promotes better stewardship practices. The beauty of ExactShot™ lies in its adaptability. This technology seamlessly integrates with Deere planters that are already operating in the field.



### FENDT® 200 VARIO® GEN3 SERIES TRACTORS

**AGCO Corporation**  
Duluth, Georgia, USA  
[www.fendt.com](http://www.fendt.com)

As the smallest tractors in the Fendt family, the 200 Vario Gen3 Series combines all the world-class features that Fendt customers expect of its larger tractors with versatility, lightweight maneuverability, and high performance to deliver a feeling of ease, even in tough crop conditions. Fendt 200 Vario tractors are available in three models ranging from 94 to 114 rated horsepower and are available in a standard configuration or with three specialty crop variants. The tractors are powered by the reliable AGCO Power™ 3.3 L engine and feature the unique Fendt Vario CVT, which allows operators to focus on the task at hand instead of shifting gears.

### FENDT® 600 VARIO® DP SERIES TRACTORS

**AGCO Corporation**  
Duluth, Georgia, USA  
[www.fendt.com](http://www.fendt.com)

Fendt contributes to the 200 engine horsepower tractor market with the all-new 600 Vario DP Series. This tractor series features the all-new AGCO Power™ Core 50, four-cylinder, 5.0 L engine in four models with 164 to 224 maximum horsepower. Coupled with the intelligent Fendt VarioDrive™ CVT, this engine provides an efficient and easy-to-operate powertrain that will improve farm productivity. All models have Dynamic Performance (DP) capabilities, which allow the release of up to 15 additional horsepower with the use of smart sensors that determine the power demand. The DP concept does not use a narrow constraint in situations to release extra power; in fact, it can release extra power in any operation when the system detects a need for more power.



### HAGIE EXACTDROP™

**Hagie Manufacturing**  
Clarion, Iowa, USA  
[www.hagie.com](http://www.hagie.com)

Hagie ExactDrop™ is designed to apply crop protection and nutrient products while ensuring full boom width coverage with exact precision. The key to ExactDrop's efficiency lies in its lightweight and flexible drop structure, which enhances application quality while minimizing strain on the sprayer boom. ExactDrop uses a unique fiber composite drop structure, making each drop up to 3.5 times lighter than alternatives on the market without compromising durability or product placement. This lightweight design allows ExactDrop to operate at full boom widths of up to 120 ft (36 m), enabling efficient coverage within a tight application window. The flexibility of the composite drop structure also facilitates seamless transport from field to field without the need to leave the cab, as the drops effortlessly flex out of the way when the wheels are turned.



## M2 SERIES WINDROWERS AND D2 SERIES DRAPER HEADERS

MacDon Industries Ltd.  
Winnipeg, Manitoba, Canada  
[www.macdon.com](http://www.macdon.com)

The M2 Series windrowers advance MacDon's reputation for innovation, performance, and speed by adding more power and simple controls for an intuitive operator experience. The D2 Series draper headers provide super-sized capacity and all the best harvesting performance features of the MacDon 2 Series combine headers on a windrowing platform. All M2 windrowers are equipped with the new Harvest Touch display screen and are powered by Stage V Cummins turbo diesel engines, offering more power with a peak delivery of 280 hp and a rugged high-horsepower engine gearbox. The D2 is a ground-up redesign based on the 2 Series combine headers, featuring ultra-deep 50-in. draper decks and MacDon's ClearCut high-speed cutting system.

## MASSEY FERGUSON® 3 SERIES SPECIALTY TRACTOR

AGCO Corporation  
Duluth, Georgia, USA  
[www.masseyferguson.com](http://www.masseyferguson.com)

The Massey Ferguson 3 Series includes seven specialty tractor models across three versions that focus on meeting the specific requirements of vineyards and fruit orchards at an affordable price. The MF 3 Series features Stage 5 compliant engines, transmissions with up to 30 speeds, a new operator interface, and the brand's global Saber styling scheme. The 3 Series tractors offer a wide variety of power settings and modern specifications, including the 3VI.95 model at widths down to 39.4 in. (1.0 m), and the 3GE.95 and 3GE.105 models with minimal steering wheel heights of 30.7 in. (0.8 m).

The Massey Ferguson 3 Series specialty tractors debuted at farm shows across North America in 2023 and will be available in 2024 after the World Ag Expo.



## MASSEY FERGUSON® 9S SERIES TRACTORS

AGCO Corporation  
Duluth, Georgia, USA  
[www.masseyferguson.com](http://www.masseyferguson.com)

The Massey Ferguson 9S Series tractors expand the award-winning S Series. Ranging from 285 to 425 hp, the 9S tractors are built to meet the demands of a new generation of farmers by providing more profitability without sacrificing capability, ensuring that farmers get the best value for every dollar invested. The 90 gpm ECO pump delivers the additional hydraulic flow needed to reduce fuel usage and maximize power to planter components at 1650 rpm engine speed, while also operating the planter at a more comfortable noise level. The innovative Protect-U™ design leverages an engineered gap between the engine and operator station for a 69 dB cabin environment, providing a comfortable operator experience. Lastly, an improved turning axle provides efficiency on headlands with a 10% improvement in turning radius.



## MASSEY FERGUSON® 500R SERIES SPRAYERS

AGCO Corporation  
Duluth, Georgia, USA  
[www.masseyferguson.com](http://www.masseyferguson.com)

New to North America, the Massey Ferguson 500R Series sprayers are a dependable and economical option to help growers take control of their chemical applications, improve yields, and reduce costs. The 500R Series comes standard with LiquidLogic®, which ensures constant circulation through the entire system and offers boom clean out, product recovery, and no spray priming. These features help reduce costs and waste. Smart all-wheel-drive (AWD) with a transmission management system allows the sprayer to operate at a lower engine speeds and save fuel while maintaining pump pressure and spray pattern, ground speed, and hydraulic flow. Overall, the 500R Series sprayers round out a complete product line from Massey Ferguson, from ground prep to harvesting.



## MERGEPRO HAY MERGER

**Groupe Anderson Inc.**  
Chesterville, Quebec, Canada  
[grpanderson.com](http://grpanderson.com)

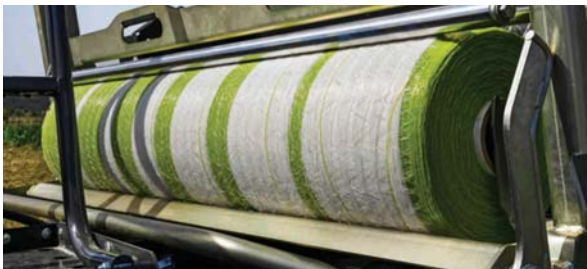
The new Anderson MergePro is the fastest and most efficient hay merger on the market. With its six-row camless pickups and its unique adaptive speed technology, the MergePro can reach speeds up to 28 kph on high yield while ensuring a consistent swath. The MergePro is available in two dimensions. The MergePro 915 has a working width of 25 ft (7.6 m) in the side delivery configuration and 30 ft (9.1 m) for central delivery. The MergePro 1060 is 5 ft (1.5 m) wider for each delivery configuration. The curved tines and the deflector above the pickup and belt ensure constant and smooth flow of the crop from the field to the belt conveyor without damaging the leaves or letting them fly off the swath. The adjustable hydraulic suspension system and large skids result in low soil compaction.



## MODEL YEAR 2024 STEIGER® 425 TO 645 TRACTORS

**Case IH**  
Racine, Wisconsin, USA  
[www.caseih.com](http://www.caseih.com)

The Model Year 2024 Steiger® tractors from Case IH provide increased performance, improved serviceability, and increased operator comfort with a new model lineup. The reliable and efficient Steiger® 425, 475, and 525 models feature an updated Cursor 13 (12.9 L) engine with a single electronically variable geometry turbo (eVGT) in place of the previous waste gate (WG) turbocharger for increased power and improved engine response to changes in load or throttle position. The Steiger® 555, 595, and 645 models feature a Cursor 13 (12.9 L) two-stage turbocharger engine with a larger, more robust low-pressure intercooler. The innovative urea vaporization module (UVM) mixer technology provides improved mixing of the DEF with the exhaust stream. In addition, the cab has been updated with grabrails in the cab roof, integrated RAM rails for mounting multiple displays, and an option for a premium audio system with an integrated amplifier, tweeters, and subwoofer.



## NET WRAP SYSTEM ON VARIANT® 560 RF ROUND BALER

**CLAAS of America Inc.**  
Omaha, Nebraska, USA  
[claasofamerica.com](http://claasofamerica.com)

The high-speed Net Wrap System on the VARIANT® 560 RF variable-chamber round baler is an advancement in engineering with an adjustable stretch and braking system that works independently of the size of the roll. In full view from the tractor cab, the Net Wrap System runs at 9.8 ft/s (3 m/s), covering the edges of the bale and ensuring a proper stretch of all rolls of net wrap, regardless of the wrap quality or size. The net wrap sits on a roller so that dirt and crop residue fall right out. Adjustable devices left and right of the roll make it easy to center even 48-in. net wrap in the 51-in. tying system to the middle of the bale chamber. The drive pulley speed for the net brake roll can be adjusted to vary the stretch and adapt it to different qualities of net wrap.



## RAPID DRY PILE MONITORING SYSTEM

**RealmFive**  
Lincoln, Nebraska, USA  
[realmfive.com](http://realmfive.com)

RAPID (Remote Access Pile Inventory Detection) is a system that combines a novel sensing solution with reliable connectivity and powerful software. The system measures the surfaces of commodity piles, transmits the data to the R5 Cloud via RealmFive cellular connectivity, and presents the inventory data to users via a cloud-based user interface. RAPID consists of a lidar sensing assembly that enables automated remote measurement of the surface of a commodity pile. The solar-powered sensor assembly is easily retrofitted to existing bay-based buildings. Back-end software converts the measurements into volume, mass, and number of truckloads. RAPID includes time-to-empty projections and alerting. As a remote dry pile inventory monitoring solution, RAPID allows retailers to digitize their operations and precisely manage remote inventories of feed, fertilizer, grain, or aggregate within a defined space.



## RAVEN CART AUTOMATION™

Raven Industries  
Sioux Falls, South Dakota, USA  
[www.ravenind.com](http://www.ravenind.com)

Raven Cart Automation makes it easier for harvest operators to effectively run an unload-on-the-go operation by synchronizing the grain cart with the combine's heading and speed when the grain cart is within syncing range (the sync window is 50 m by 175 m). This puts the combine driver in full control of bin positioning, which prevents grain spills, reduces cross-cab communication, and reduces operator stress. Combine operators have shown 33% less stress and tractor operators have shown 22% less stress when working in small grain harvesting. Instead of putting pressure on the grain cart drivers to run spill-free, harvest operators can trust Raven Cart Automation to minimize grain spillage and maximize profits.



## SEE & SPRAY™ PREMIUM PRECISION UPGRADE

John Deere  
Ankeny, Iowa, USA  
[www.deere.com](http://www.deere.com)

Designed and optimized for aftermarket installation on select new and existing John Deere sprayers, the See & Spray™ Premium Precision Upgrade allows the sprayer to see, target, and kill in-season weeds using advanced cameras and machine learning that distinguish crops from weeds and selectively target spray only on the weeds. Growers who modify their sprayers with the See & Spray™ Premium Precision Upgrade will save money on chemicals and gain access to weed pressure map data, while maintaining weed control and reducing environmental impact. To enable this technology on existing sprayers, John Deere is delivering easy-to-install bundles that position multispectral cameras precisely along the boom, along with an updated boom control system that increases stability and accuracy during operation.



## SMART DENSITY® BALER MANAGEMENT SYSTEM

CLAAS of America Inc.  
Omaha, Nebraska, USA  
[claasofamerica.com](http://claasofamerica.com)

The new SMART DENSITY® management system controls the baler's two tensioning arms independently of each other, allowing the operator to switch between consistent bale density and a soft core bale from the comfort of the cab. While the exact density as well as the size of the soft core can be adjusted, the outer shell of the bale is always firm and maintains the optimal shape.

The two independent tensioning arms, along with CLAAS-exclusive software, allow the baler to self-adjust and thus maintain the set bale density parameters in all conditions and at all driving speeds.

The VARIANT® 585 RC baler with SMART DENSITY achieves consistent bale density in all crops, from wet silage to dusty straw. When the hay is a little too wet but rain is moving closer, a soft core can prevent the bale from spoiling.



## STEIGER® 715 QUADTRAC® TRACTOR

Case IH  
Racine, Wisconsin, USA  
[www.caseih.com](http://www.caseih.com)

The Steiger® 715 Quadtrac® tractor from Case IH is the industry's largest and highest-horsepower production tractor, delivering increased productivity for tight harvesting and tillage schedules and accomplishing more work with a smaller labor force. The new Cursor 16 (15.9 L) engine, equipped with two-stage turbochargers, offers up to 778 peak horsepower and 2,401 ft-lbs peak torque, enabling the use of larger implements and pulling existing implements at higher speeds. The redesigned work lights are 11.5% brighter, and an electric actuator for easy hood opening enhances the latest Case IH styling. Ease of service is prioritized with filter relocation and easily removable debris screens. The new HD Quadtrac® track system, featuring an expanded track footprint, provides traction and floatation for this larger vehicle. The driveline components has been updated to accommodate the increased power, and the fuel capacity has been increased to 520 gallons.



### **SYMPHONY NOZZLE**

**Precision Planting**  
**Tremont, Illinois, USA**  
[www.precisionplanting.com](http://www.precisionplanting.com)

SymphonyNozzle is a pulse-width modulation (PWM) system that is easy to install and service on existing self-propelled or pull-type sprayers. SymphonyNozzle can be retrofitted onto sprayers that producers already own without the need to purchase a new sprayer, allowing producers to convert sprayers with conventional nozzles to PWM nozzles, which provide independent control of the spray rate and pressure. SymphonyNozzle uses an easy-to-install point-to-point electronic architecture, rather than large wiring harnesses, on each half of the sprayer. If a wire is pinched or damaged, replacement is easy. The Symphony nozzle body features toolless disassembly for easy cleanout. Similarly, for easy installation, the check valve can be moved to either side of the nozzle body without tools.

### **T6 METHANE-POWERED TRACTOR**

**New Holland Agriculture**  
**Basildon, Essex, UK**  
[www.newholland.com](http://www.newholland.com)

The New Holland T6 is the world's pioneering methane-powered tractor, representing the culmination of a multi-year development project dedicated to advancing sustainable fuel sources in U.S. agriculture. With power equal to its diesel counterpart (180 hp and 740 nm torque), the T6 stands out with a remarkable 30% reduction in running costs. This innovative tractor offers fuel flexibility by seamlessly running on biomethane (RNG) or compressed natural gas (CNG). Boasting a 98% reduction in particulate matter emissions compared to emissionized diesel tractors, it achieves a negative CO2 emission profile when using biomethane. The low maintenance, three-way catalyst eliminates the need for exhaust gas recirculation and selective catalytic reduction

components, as well as diesel exhaust fluid.



### **T7 LONG-WHEELBASE TRACTOR WITH PLM INTELLIGENCE**

**New Holland Agriculture**  
**Basildon, Essex, UK**  
[www.newholland.com](http://www.newholland.com)

The T7 long-wheelbase (LWB) tractor with PLM Intelligence brings together many award-winning features to deliver a multi-tasking tractor that is an ideal fit for a variety of farm businesses. It is compact enough for a livestock loader tractor, has enough hydraulic capability and PTO power for large hay tool tasks such as large square balers, and has the ability to deliver high drawbar pull through its large-diameter tires with minimal soil disturbance. The T7 features the Horizon Ultra cab, the industry's quietest at 66 dBA, up to 300 hp from a high efficiency SCR-only engine with long service intervals, and either a variable or a full powershift transmission, both of which include automated fuel-saving controls.



### **T8088 AG-BAGGER**

**RCI Engineering LLC**  
**Mayville, Wisconsin, USA**  
[www.ag-bag.com](http://www.ag-bag.com)

The T8088 Ag-Bagger completely changes the ag-bagging operation. With no backstop or cable braking system, the T8088 is a faster, simpler, and safer machine to operate. The key to the success of the T8088 is the anchor position control and the two internal anchors inside the forage that is being ensiled. While the concept of an anchor has been used on self-propelled models, it was previously tried on pull-type ag-baggers but failed due to engineering challenges that could not be overcome at the time. The anchor position control on the T8088 overcomes those challenges while taking the ag-bagging experience to the next level. The T8088 also provides a new level of efficiency, forage density, and performance to benefit all users.



## TOOLBAR LIFT SYSTEM FOR CASE IH EARLY RISER 2120 RIGID TRAILING SPLIT-ROW PLANTER

Case IH  
Racine, Wisconsin, USA  
[www.caseih.com](http://www.caseih.com)

The Toolbar Lift System for the Case IH Early Riser 2120 rigid trailing split-row planter offers industry-leading ground clearance in transport, eye-level maintenance and adjustments with ample access to the planter row units, and positive tongue weight for a more stable ride on the road, making it the most productive and accurate rigid trailing planter available. The Toolbar Lift System consists of two unique parallel link assemblies actuated by two hydraulic cylinders through a range of positions, including road transport with the carrying wheels under the toolbar, two storage positions (with and without the toolbar hitch folded) with carrying wheels in front of the toolbar, and a plant position with the carrying wheels farther in front of the toolbar. Four radial tires offer increased floatation over conventional tire technology while avoiding running over planted rows, which occurs with competitive rigid trailing split-row planters.

## TRION 740 AND 740TT COMBINE HARVESTERS

CLAAS of America Inc.  
Omaha, Nebraska, USA  
[www.claas.com](http://www.claas.com)

The TRION 740 and 740TT combine harvesters focus on simplicity and affordability in an industry where harvesting technology continues to evolve but often comes at a premium price. Simplicity is achieved on the TRION combines by using a single-rotor hybrid processor with a drivetrain that has been designed and optimized to specifically meet the requirements for Class 7 combine capacity and performance. This reduction in complexity results in a safe, easy-to-access maintenance environment that is significantly more user-friendly, resulting in more efficient uptime and timelier completion of harvest. The TRION combines can operate with up to a 12-row chopping corn head and auger platform heads or draper heads with working widths up to 40 ft (12.2 m). Additionally, the TRION combines can be equipped with the CLAAS-exclusive CEMOS® optimization system, as well as with popular precision farming and GPS autosteering systems.



## WATCHDOG® PORTABLE WIND SENSOR

Spectrum Technologies, Inc.  
Aurora, Illinois, USA  
[www.specmeters.com](http://www.specmeters.com)

The WatchDog® portable wind sensor measures wind speed and direction and records them using the free WatchDog® Wind smartphone app that provides geolocation and date/time stamps, as well as local temperature, humidity, and barometric pressure. Increasing concern about damage to crops and the environment due wind drift of spray applications has led to a corresponding increase in government oversight and regulation for applicators, which in turn makes

accurate monitoring and recording of current weather conditions more important. While sprayer-mounted systems are available, the vast majority of measurements are made with handheld wind speed meters, which are only as accurate as the operator's ability to determine the precise direction that the wind comes from and the legibility and accuracy of the handwritten information. The WatchDog® portable wind sensor provides accurate measurements that are reliably recorded.



## WTS MULTI-TELESCOPIC PTO DRIVESHAFT

Walterscheid GmbH, a Comer Industries Corporation  
Lohmar, Germany  
[www.comerindustries.com](http://www.comerindustries.com)

The new Walterscheid WTS multi-telescopic PTO driveshaft is a unique power transmission solution that is designed for applications where a very large and variable working range of the shaft is required. Typical machine applications are mowers and rakes, where the PTO driveshaft is compressed during transport and extended during the working phase. All the best-in-class features of the Walterscheid Professional line are included in the new WTS multi-telescopic PTO driveshaft, as well as a completely revised guard concept that is even more user-friendly. The lubrication process has been optimized, and an enhanced profile tube geometry ensures smooth-running performance at speeds up to 1000 rpm.



## XERION® 12 SERIES TRACTORS

**CLAAS of America Inc.**  
**Omaha, Nebraska, USA**  
[claasofamerica.com](http://claasofamerica.com)

The XERION® 12.650 and 12.590 high-horsepower tractors are equipped with a highly efficient 15.6 L six-cylinder engine that delivers up to 653 hp and up to 2,286 ft-lbs of torque at just 1300 rpm. A massive hydraulic output of 142 gpm enables Low Engine Speed Concept 2.0 with the CMATIC® CVT to deliver the maximum acres per hour with 10% less fuel consumption, even with the largest air seeders. A choice of four newly designed TERRA TRAC® tracks or 800/70 R42 duals transfer this power to the ground with minimal compaction and slip. A new four-point cab suspension, better sound insulation, 21% more leg room, and rubber-damped tracks increase operator comfort. The XERION® tractors can reach 31 mph on tires, unique in this power class, and up to 25 mph on tracks. The CLAAS-exclusive CEMOS® optimization system analyzes and suggests optimal settings for specific implements and field conditions, improving overall efficiency.



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- Massey Ferguson® 9S Series Tractors
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- AccuSample ULTRA MT Grain Sampler

### **Walterscheid GmbH, a Comer Industries Corporation**

- WTS Multi-Telescopic PTO Driveshaft



# Plundering Nature's Code: The Ethics and Consequences of Digital Biopiracy

Roselle Barretto



**Editor's note:** ASABE member **Roselle Barretto**, a graduate student at Kansas State University, took first place in the 2023 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 **ASABE member Nitin Rai**, North Dakota State University, "Harvesting the Benefits of Artificial Intelligence in Agriculture: An Ethical Approach" and third place was awarded to **ASABE member Alise Chavanapanit**, University of California, Davis, "Effects of Data-sharing on the Power Dynamic between Farmers and Agricultural Technology Providers and the Dependency of Farmers on Technologies."

Congratulations to our 2023 finalists, who presented their essays at the 2023 Annual International Meeting in Omaha, Nebraska. These winning essays can be found at [asabe.org/Awards-and-Competitions/Student-Awards-Competitions-Scholarships/Ethics-Essay-Competition](https://asabe.org/Awards-and-Competitions/Student-Awards-Competitions-Scholarships/Ethics-Essay-Competition).

Imagine a single act that could forever alter the course of an entire industry. In 1876, Henry Wickham, a self-taught rubber tapper working for the Royal Botanic Gardens at Kew in London, accomplished just that. He collected 70,000 highly vulnerable Hevea rubber seeds from Santarém, Brazil, which some people would later label as the original act of "biopiracy." With the clock ticking, Wickham hurriedly transported the seeds on a steamship to Kew, where they were immediately germinated and sent to British colonies in India. The resulting plantations shattered the Amazon's rubber monopoly and dominated the rapidly expanding market until Japan seized control during World War II and synthetic rubber was later invented (Gollin, 2008). This fascinating story highlights the impact of a single individual and raises important questions about the ethics of exploiting natural resources.

As digital technology continues to evolve, so do the methods of exploitation. Just as the term "biopiracy" was coined to describe the unethical exploitation of natural resources, a new form of theft has emerged: digital biopiracy. This refers to the unauthorized collection and use of digital data related to biological materials, such as genetic codes and chemical structures (Bond and Scott, 2020). The stakes are high, as these digital assets can be worth billions in industries ranging from pharmaceuticals to agriculture (Delgado, 2002). While the methods may be different, the impact it brings is just as significant as its predecessor, highlighting the urgent need for ethical guidelines in the digital age.



Digital biopiracy involves the illegal procurement, processing, and transfer of genetic information from plants and animals without proper consent and compensation to the original sources (Rose, 2016). The extracted data can be used to identify valuable traits and genes that are essential for various purposes, including the development of new medicines, crops, and industrial products. The illegal obtainment of these data without proper consent is a clear violation of intellectual property rights and the sovereignty of nations that own the genetic resources.

One of the biggest concerns surrounding digital biopiracy is the issue of fair compensation. Multinational corporations often target indigenous communities and developing nations since the majority of these communities are melting pots of valuable genetic resources (Mackey and Liang, 2012). Non-payment and unfair compensation violate the principles of justice and fairness, and perpetuate economic inequality between developed and developing nations. The sadder reality is, business politics come in between and officials are often bribed to accelerate the process of getting approvals and environmental certificates that would allow the companies to do their work. Digital biopiracy also exacerbates existing power imbalances, as those with access to advanced technologies and capital are better positioned to benefit from genetic data than those without.

**“ Just as the term “biopiracy” was coined to describe the unethical exploitation of natural resources, a new form of theft has emerged: digital biopiracy.**

Another ethical concern is the potential impact on biodiversity and ecosystem stability. Collecting genetic data from a wide range of species often disrupts the ecological balance and leads to the loss of certain species and ecosystems. The International Union for Conservation of Nature has emphasized biopiracy as a significant threat to global diversity conservation that can lead to the erosion of traditional knowledge systems and extinction of endangered plants and animals (Mackey and Liang, 2012). Moreover, the commercialization

of certain data establishes monocultures where only a few genetically modified species dominate the agricultural landscape. This accelerates the loss of traditional crops in the market and promotes homogenization of cultural diversity.

Digital biopiracy has huge implications for the practice of biological and agricultural engineering. It raises questions about the legality and ethics of patenting biological materials and processes, and monopoly of genetic resources. The potential for companies to control the entire agricultural and medical sector has been controversial for many years, but has not been completely eradicated until now and will not be for years to come. Monopoly has led to overexploitation of genetic resources and exclusion of local communities from the benefits of their uses, and has displaced indigenous communities and local populations that have developed and conserved these resources over generations, with some even having strong cultural and spiritual connections to them (Fredriksson, 2017).

Another ethical concern is the use and transfer of data with proper privacy and security (Martinez-Martin and Magnus, 2020). Genetic data is highly sensitive and contains personal information that can reveal an individual’s health, ancestry, and genetic predispositions. Despite being extra careful and meticulous, researchers and companies have large tendencies to access and share unauthorized data, which significantly leads to privacy violations, discrimination, and stigmatization. Researchers who have experienced such things may also face reputational harm, psychological distress, and potential termination of insurance coverage and loss of employment opportunities. Hence, the need for transparency.

One approach to address this issue is the adoption of international treaties and agreements that promote ethical practices in the use of genetic data. For example, the Nagoya Protocol on Access and Benefit-Sharing outlines the framework for ensuring that genetic data is collected, used, and transferred in a responsible and sustainable manner. It also enhances participation and consent among local populations and communities. To facilitate implementation of the protocol, the Access and Benefit-Sharing Clearing-House (ABSCH) was created. It is a platform under Article 14 that enables the exchange of information regarding access and benefit-sharing. The ABSCH plays a vital role by increasing transparency



and legal certainty of procedures for accessing and sharing benefits, as well as monitoring the utilization of genetic resources throughout the value chain. It also involves the use of a certificate of compliance that has international recognition (CBD, 2023).

The absence of clear and up-to-date legal frameworks to address this complicated and constantly changing problem impedes the fight against digital biopiracy (Yusuf, 2021). The complexity of the problem is not taken into account by outdated laws, making it challenging to effectively prevent and prosecute these crimes. It is imperative that we create and implement new laws that place a high priority on the rights of local and indigenous populations while fostering the ethical use of genetic resources. Furthermore, the frameworks must guarantee that genetic data are gathered, maintained, and disseminated in a responsible, open, and secure manner that respects people's privacy and data security. The widespread theft of digital biological data will continue to endanger the environment and human health without appropriate legal restrictions.

Another important approach is education and awareness-raising. Many people are unaware of the consequences and the ethical issues surrounding digital biopiracy hence it is important to educate them about the significance of respecting intellectual property rights related to biotechnology and genetic resources. Some of the ways people can get involve include creating informative contents that are fact-checked, leveraging technology to reach more people and advocacy groups that could potentially be excellent partners, organizing webinars and workshops to allow open discussion of issues, and developing tools and applications that can be used to track and monitor digital biopiracy activities.

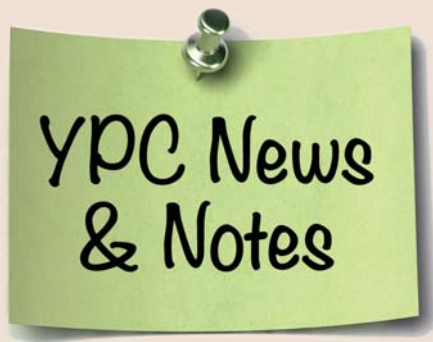
Finally, blockchain technology can be used to create secure and transparent databases of genetic information that are resistant to alteration, tampering, and unauthorized access. For example, the Amazon Bank of Codes initiative, introduced in 2018 as a collaboration between the World Economic Forum, Earth Bank of Codes, and Earth Biogenome Project, aims to log genetic sequences of every plant and animal species in the Amazon basin on the blockchain. This allows recording and tracking of the provenance and use of natural resources, ultimately creating a platform for fair benefit-sharing with the country of origin. This innovative step toward protecting biodiversity through secure and transparent means aligns with the potential of blockchain in the industry (Yusuf, 2021). However, political commitment is still necessary to take further action toward successful eradication of this crime.

The challenge of digital biopiracy extends beyond mere technological concerns; it is a human issue that impacts the rights of various communities and population. We need to act through a comprehensive approach that involves setting up clear legal regulations, promoting international cooperation, increasing awareness, and engaging all stakeholders. Only by working together can we create a fair and sustainable future for agricultural and biological engineering that benefits everyone.

**ASABE member Roselle Barretto**, Graduate Student, Kansas State University, Manhattan, USA, [rosellebarretto@ksu.edu](mailto:rosellebarretto@ksu.edu).

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## What do grad students want from YPC?

**N**oel is a grad student in agricultural engineering at a major university. Noel's Monday morning brightens up when her advisor asks her to present her research on surge irrigation at the upcoming ASABE Annual International Meeting (AIM). That night, Noel excitedly visits the ASABE website's registration portal for the AIM and completes the registration for her Machinery Systems technical session.

On the next screen, though, she encounters a dilemma about what other events to sign up for. The networking event with the department heads? She can never find the right words to say around those eminent professors. The fancy dinner with the trivia contest? That's too expensive for her grad student budget. Maybe the career fair to meet some prospective employers? All the companies are either in fields far outside her research interests or they are solely focused on academia.

Noel sinks into a pit of confusion and closes her laptop. She can't decide, at least not tonight. She's eager to participate, but she's confused about how to proceed.

Noel is not the only grad student in ASABE who's facing these challenges. By presenting their innovative research at technical sessions, contributing to standards development, and serving on various committees, grad students are one of the pillars of the ASABE.

According to a 2018 survey, every year U.S. universities award 208 MS degrees and 131 doctorates in ag and bio engineering. Because the median student age at completion of a



The career fair provides important networking opportunities.



The YPC-Foundation Trivia Night at AIM 2023 was a blast!



The YPC Fun Run is a great way to meet new people and burn off stress.

doctorate is 31.5 years, most grad students in ASABE are also part of the Young Professionals Community (YPC), ASABE's forum for members age 34 and younger.

YPC has always been sensitive to the needs of grad students. Every year at the AIM, YPC hosts a wide variety of grad student events, such as research presentations and communication workshops, socials and dinners, networking with industries, and breakfast with department heads. Outside of the AIM, YPC has organized online professional development webinars, résumé editing sessions, book clubs, and lightning talk competitions.

However, over the years, grad student participation at YPC events has been low. We recognize the need for programming that appeals to grad students, and increasing the involvement of grad students has been a major topic of discussion among the YPC Executive Committee and ASABE leadership.

### If you're a grad student, we want to hear from you!

If you have an idea for a grad student event or initiative, send an email to **YPC president Sushant Mehan** ([sushantmehan@gmail.com](mailto:sushantmehan@gmail.com)) or comment on the Instagram/X/Facebook pages of ASABE or ASABE YPC. You can also reach us through your university's ASABE chapter or your department head.

Your voice matters to the YPC community and to all of ASABE. Tell us what you want to see at the AIM, and at events throughout the year, and together we can make it happen.

**ASABE Member and YPC Meetings Council Representative Ekramul Haque Ehite**, GlaxoSmithKline (GSK), Collegeville, Pennsylvania, USA, [ekramul.h.ehite@gsk.com](mailto:ekramul.h.ehite@gsk.com).

## VisualChallenge13

# WHAT DO YOU SEE?

**F**or the past 13 years, *Resource* has asked ASABE members and their colleagues to communicate with images—statements without words—to celebrate the visual aspects of agricultural and biological engineering. After the call went out this year for *VisualChallenge13*, we were excited to see the submissions. On the following pages, you will see some of our favorites.

We thank our many contributors who focused in on the profession, finding beauty and meaning. Their work comes to life in these images, showing those outside the field: “This is what we do.”

We hope these photos provide a glimpse into the variety of activities, workplaces, and surprises that an ABE career can offer. In 2024, remember to pull out your camera or phone and take a shot for next year’s Visual Challenge!



**ASABE Fellow and  
Past President Keith Tinsey, P.E.,**  
*Grand Ledge, Michigan, USA.*

**MOONLIGHT IS  
JUST RIGHT**

*An early morning potato harvest, by the  
light of the moon on 30 August 2023.*

**ASABE member Brian McLaughlin, Safety Psychographics LLC, Notre Dame, Indiana, USA.**

### TREASURES

*Sun is setting on this 1896 barn that used to support the farm for Riverside Dairy, started in 1911 by Robert Anderson. The Wabash River bottom lands across the road in West Lafayette, Indiana, grew feed for the herd of cows that supplied milk for numerous fraternities and sororities at Purdue University and parts of the school itself.*



**ASABE Fellow and Past President Keith Tinsey, P.E., Grand Ledge, Michigan, USA.**

### FLOW OF GRAIN AND SEEDS THROUGH ORIFICES ASAE D274.1 JANUARY 1992 (R2022)

*Soft white winter wheat seed (untreated and treated to resist undesirable fungi) awaits autumn no-till planting into soybean stubble. It will be harvested the next summer to make a light cake, cracker, or pastry flour due to lower protein and gluten content.*





**ASABE member Javier Rodriguez,**  
*Graduate Student, University of Georgia, Athens, USA.*

## THE FUTURE OF FIELD PHENOTYPING

*A cutting-edge agricultural robot, named BotScout, takes center stage in a Georgia cotton field. BotScout's LiDAR sensors and cameras collect data on plant health, growth patterns, and other vital metrics. This image illustrates how technology is shaping the future of farming, increasing efficiency, and reducing environmental impacts. As the little robot faithfully performs its phenotyping tasks, it offers hope for producing sustainable high-yield crops, ensuring food security for generations to come.*

**ASABE Fellow  
 Gerald E. Rehkgler, P.E.,**  
*Professor Emeritus, Cornell University,  
 Ithaca, New York, USA.*

## A SILO SEQUENCE AS A DAIRY EXPANDED

*Silos are monuments to past glory as well as marvels of engineering. The silos in this photo are on a farm near McGraw, New York. Each silo in sequence marks the growth of this dairy operation, until industry consolidation made them obsolete. In the era of mega farms, bunker silos have become the dominant storage method for fodder.*



**ASABE Fellow Art Johnson, P.E.,**  
*Professor Emeritus, University of Maryland,  
 College Park, Maryland, USA.*

## BERRIES, BERRIES, AND MORE!

*My wife Cathy and I at our farmers' market stand on 12 August 2023. We have been participating in this market for the past 41 years, and 2023 was a good year for our wide array of organically grown fruits. On this day, we sold black raspberries, blackberries, boysenberries, blueberries, elderberries, schisandra berries, strawberries, aronia berries, rose hips, cornelian cherries, peaches, apples, and rhubarb.*



**ASABE member Ekramul Haque Ehte**, *Principal Scientist, GSK, Collegeville, Pennsylvania, USA.*

## WHERE THE WILD THINGS WEAR A CROWN

*The white-tailed deer is one of the treasures of American rangeland. However, the rapid growth of the human population, and the resulting urban sprawl, have reduced the habitat for these majestic animals. Researchers are monitoring the deer population in the Great Smoky Mountains National Park to optimize their habitat requirements. Effective habitat management can help them thrive, and restore the crown that Mother Nature bestowed on them.*





**ASABE member Brian McLaughlin**, *Safety Psychographics LLC*,  
Notre Dame, Indiana, USA.

## HOPE SPRINGS ETERNAL

*(Left) A forlorn stalk of volunteer corn, trying to rise through the asphalt pavement of a retail parking lot in Mishawaka, Indiana. Despite the odds against its success, hope springs eternal as it keeps pushing upward.*

## OUT TO PASTURE

*(Below) A veteran single-axle "honey wagon," the colloquial term for a liquid manure spreader, in Berrien County, Michigan. Smaller models like this were intended for family farms with their more manageable herd sizes. This one has been out to pasture for a while, probably because it's too small for an ever-increasing farming operation. Motorists who are in the know give such implements a wide berth on the road. A honey wagon may have inspired the nickname for the legendary Uncle Honey, as described by agricultural journalist Alan Guebert ([farmandfoodfile.com/the-land-of-milk-and-uncle-honey](http://farmandfoodfile.com/the-land-of-milk-and-uncle-honey)).*





**ASABE member Yasas Gamagedara,**  
*Graduate Research Assistant, Mississippi State  
University, Mississippi State, USA.*

## THE ESSENCE OF AGRICULTURAL PRECISION

*(Top) In a Texas field, a soil expert diligently wields an auger to collect soil samples. The rich brown soil contrasts beautifully with the cloudy sky, symbolizing the critical role of soil sampling in optimizing crop production and land management (photo credit: Praveen Amarasinghe).*

## DISCOVERING EARTH'S SECRETS

*(Right) Despite the day's oppressive heat, a soil expert carefully documents a soil survey in a rough, rocky pasture. His weathered hands and focused attitude demonstrate the strength and concentration required for this work. Soil experts help discover Earth's secrets.*





**ASABE member A.J. Both**, *Professor, Rutgers University, New Brunswick, New Jersey, USA.*

## HANGING OUT

*(Top) The greenhouse comes to life with production of spring bedding plants, hanging baskets, and vegetable seedlings.*

## RED + BLUE = PURPLE

*(Bottom) A large-scale indoor farming operation that produces leafy greens. The purple light is produced by LED fixtures that emit a combination of red and blue light.*



**ASABE member Jasper Cunningham,**  
*North America Processing Vegetables,  
Bayer CropScience, Ravenna, Michigan, USA.*

## TAKING IT ONE ROW AT A TIME

*A one-row vacuum planter sows seeds for an  
early-stage hybrid cucumber trial in Florida.  
Years of such trials may be needed before new  
hybrids or crop varieties become marketable.*



**ASABE member Jasper Cunningham,**  
*North America Processing Vegetables,  
Bayer CropScience, Ravenna, Michigan, USA.*

## BEANS, BEANS, GOOD FOR YOUR HEART!

*The market segments for fresh, frozen, and canned  
vegetables each require varieties with unique characteristics.  
This dark, waxy green bean, with a uniform pod shape and  
nominal sieve size distribution, is a great candidate for the  
frozen or canned whole bean market.*



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# Let's Not Forget About Safety

Salah Issa

**A**griculture is facing a profound transformation. We are on the brink of a technological revolution that will affect every aspect of farming, from land preparation and pest control to phenotyping and harvesting.

In the not-too-distant future, farms will be bustling with small robots that weave under crop canopies, measuring plant biomass and health while identifying and reporting the occurrence of diseases and pests. Drones will hover over the field and swiftly address any disease or pest issues. In another field, precision weeders will target weeds with lasers, like something out of Star Wars. Later, driverless combines and tractors will harvest the crops, and then prepare the land for the following season. Meanwhile, in the pasture, livestock will be herded by drones, while AI-powered robots handle the milking process.

This vision of the future is becoming a reality. Each of the innovations mentioned above is already available and in use to varying degrees on farms in the U.S. and worldwide. However, while these new technologies are getting a lot of attention for their potential to enhance productivity, reduce resource inputs, and safeguard the environment, one crucial aspect is often overlooked: safety.

In a 2013 textbook on agricultural automation, the authors highlight that safety considerations extend beyond technological decisions. Safety, they write, requires input from the entire community. Furthermore, the authors note that safety concerns are often considered “unlikely events”—although with insufficient data to support such claims—and therefore receive too little attention.

This brings to mind the evolution of the farm tractor. The earliest tractors were slow and ungainly machines that ran on steam power and featured steel wheels with protruding lugs. By the 1950s, tractors had evolved to feature pneumatic tires, internal combustion engines, and faster speeds, and they had become essential equipment on American farms.

However, with the increasing prevalence of tractors came an increase in tractor-related safety issues, including rollover/overturn fatalities. Rollover protective structures (ROPS) are an effective safety intervention, but they were not standard equipment until 1976, when a mandate was enacted that required ROPS on all tractors produced after October of that year. That mandate wasn't enough. Forty years later, almost half of the tractors on U.S. farms still lack ROPS, and tractor rollovers remain a significant cause of farm-related injury. For example, in Illinois, there were 98 tractor overturns between 1999 and 2019, accounting for approximately 20% of all fatal agricultural incidents during that period.

Today, with about 80% of the promising new agricultural technology still in the research phase, now is the time to investigate the potential hazards of these innovations. We need to include safety concerns in the research phase, before the technology is deployed on farms, and before unexpected hazards—such as tractor rollovers—make themselves known.

Adoption of new technology off the farm, such as autonomous vehicles on public highways, has been tempered by safety concerns, regulatory hurdles, insurance considera-



**While these new technologies are getting a lot of attention for their potential to enhance productivity, reduce resource inputs, and safeguard the environment, one crucial aspect is often overlooked: safety.**

tions, risk perception, and public acceptance. Adoption of autonomous tractors faces similar challenges. California's Occupational Safety and Health Administration (Cal OSHA) currently prohibits unattended autonomous tractors on California farms. Such prohibitions are necessary until autonomous machines are proven to be safe.

*Views expressed are sole those of the authors and do not necessarily represent the views of ASABE.*

As we develop new agricultural technologies, we need to ask ourselves several questions: Where should we invest in policies and standards to ensure that these technologies have a positive impact on farmers and farm communities? How can we safeguard the well-being of farms, farmworkers, and the surrounding communities? And most of all, how can we anticipate and address safety hazards before they occur?

We are on the brink of a technological revolution in agriculture. That's really exciting, but let's not forget the importance of safety in this transformative journey.

**ASABE member Salah Issa**, Assistant Professor and Agricultural Safety Specialist, University of Illinois, Urbana, USA, salah01@illinois.edu.

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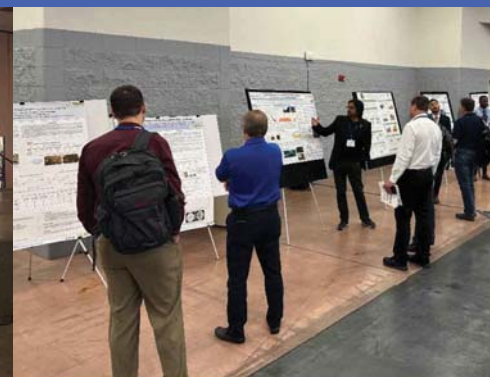


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