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SOY FUTURES
Taking Ag Innovation
to New Heights

FEATURE STORY
New Tools Modify Soybeans
with Surgical Precision

SUSTAINABILITY
Digital Ag Offers New Soil
Management Opportunities

INDUSTRY PERSPECTIVE
Industry Innovations Bring New
Technologies, Higher Yields

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The American Soybean Association (ASA) represents all U.S. soybean farmers on domestic and international policy issues important to the soybean industry. ASA has 26 affiliated state associations representing 30 soybean producing states and more than 300,000 soybean farmers.



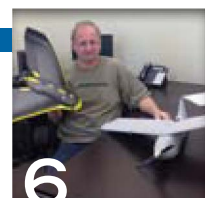
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SOY news

Soybean Nitrogen Breakthrough Could Help Feed the World



Higher yielding soybean plants grown in a Washington State University greenhouse by biologist Mechthild Tegeder.
Photo Credit: Mechthild Tegeder

Washington State University biologist Mechthild Tegeder has developed a way to dramatically increase the yield and quality of soybeans.

Her greenhouse-grown soybean plants fix twice as much nitrogen from the atmosphere as their natural counterparts, grow larger and produce up to 36 percent more seeds.

Tegeder designed a novel way to increase the flow of nitrogen, an essential nutrient, from specialized bacteria in soybean root nodules to the seed-producing organs. She and Amanda Carter, a biological sciences graduate student, found the increased rate of nitrogen transport kicked the plants into overdrive.

Their work, published recently in *Current Biology*, is a major breakthrough in the science of improving crop yields. It could eventually help address society's critical challenge of feeding a growing human population while protecting the environment.

"The biggest implication of our research is that by ramping up the natural nitrogen allocation process we can increase the amount of food we produce without contributing to further agricultural pollution," Tegeder said. "Eventually we would like to transfer what we have learned to other legumes and plants that humans grow for food."

Source: Washington State University News/
Will Ferguson, College of Arts & Sciences

CropLife America Encourages Consumers to Have 'The Talk'

CropLife America (CLA) launched an online video campaign recently titled, "The Talk," to encourage consumers to re-consider the importance of pesticide technology in growing healthy produce. Whether you can remember that nightmare conversation you had with your parents as a teenager or have had to talk with the Human Resources department about an annoying co-worker, we can all remember uncomfortable-yet-important "talks" that have impacted our lives for the better. The conversation on why farmers use pesticides is another necessary talk to have, and CLA is sharing this message with consumers through a new video campaign.

"Every person, regardless of where and how he or she shops for food, has his or her own priorities and opinions about farming and food," said Jay Vroom, president and CEO of CLA. "Though growers use a variety of growing methods to meet consumer preferences and needs, all farms must deal with pests and crop disease. Through this campaign, we want to reach consumers with diverse viewpoints and start an on-going conversation about why and how pesticides are used and the benefits of these products."

All of the videos are posted online at www.GiveACrop.org along with other educational materials, including a Myth vs. Fact webpage, Pest themed gifs and memes and other resources. CLA encourages consumers, foodies and other advocates to use #GiveACrop to speak up and show that you're not afraid to have "the talk" about the produce you love and the pests you don't.



BY THE NUMBERS

70+

The number of countries that grow, import and/or use Genetically Modified Organisms (GMOs) in field trials (*GMO Answers*)

\$200 million

The amount USDA will award to more than 70 agriculture organizations to help expand U.S. export markets in 2017. (*USDA*)

\$5.3 million

The funding USDA will award the American Soybean Association to help expand export markets for U.S. farm and food products through the Market Access Program and the Foreign Market Development Program in 2017. (*USDA*)

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The number of bushels per acre Nebraska soybeans increased from 2015, setting the state on track for a record breaking year of 62 bushels per acre. (*NASS*)

10.3 billion pounds

The total net exports of red meat and poultry expected for 2016. (*USDA*)

U.S. Soybean Industry Celebrates 60 Years in Japan



Women leaders in agriculture attend a reception at the Roppongi Hills Club in Tokyo to recognize six decades of U.S. soybean market development in Japan. Pictured from left to right: Elaine Gilles, director/secretary, Indiana Soybean Alliance; Jane Ade Stevens, CEO, Indiana Soybean Alliance; Pamela Snelson, director, ASA; Danielle Clark, Young Farmers and Ranchers committee member, American Farm Bureau Federation; Nancy Kavazanjian, United Soybean Board (USB) Director and the USB Sustainability Target area coordinator; U.S. Ambassador to Japan Caroline Kennedy; Amy Sigg, director, Ohio Soybean Council Board of Trustees member; Masako Kato, director, Kato Oil; Ayako Miyanojara, director, Shikaya Natto; Yoko Kaneko, Soybean & Sesame Seed Section, Food Materials Department, ITOCHU; and Masako Tateishi, Japan Food Soybean manager, USSEC.

Since the American Soybean Association (ASA) opened its first overseas representative office in Tokyo in 1956, the U.S. soybean industry has worked in partnership with the Foreign Agricultural Service (FAS) to create market opportunities for U.S. soybeans and soybean products in Japan.

This past fall, the U.S. Soybean Export Council (USSEC) hosted a reception in Tokyo to mark the industry's six decades of work in

Japan. Approximately 250 industry partners attended and the event featured remarks by dignitaries, including U.S. Ambassador to Japan Caroline Kennedy and Japan Oilseed and Processors Association President Takao Imamura.

A number of women leaders who represented the U.S. soy industry at the reception also took part in a luncheon dialogue on women in leadership with female members of Japan's oilseeds and soybean industry.

Source: USDA/FAS

SoyFutures

Taking Ag Innovation to New Heights

By Jessica Wharton

Drones buzzing high above crop rows may seem like a scene out of a sci-fi flick for many farmers and consumers, but for Minnesota grower Todd Golly, it's just another day on the farm.

Golly was an early adaptor of unmanned aerial vehicles (UAVs), first putting them to use on his farm in 2012, and later opening a UAV hardware and service company aimed to help farmers “keep every plant healthy” by using drones to collect in-season data and treat problem areas in real time.

The son of a pilot, brother to an aerospace engineer, and agricultural engineer himself, Golly said his family has always known the value of seeing their fields from the sky.

“When we were originally approached to test drones and some new image analysis ideas on our farm we were excited to accept the opportunity,” Golly said. “It’s the intersection of agriculture and technology—two things my family really enjoys.”

Golly said that while the drones he initially tested were flawed—it was easy to see the possibilities of the technology if executed correctly, which led him to purchase his first drone for Golly Farms.

“The first drones were exciting to use, but really the technology wasn’t ready for market,” Golly said. “The basic things were a challenge on our farm at first, but the technology



Todd Golly with two of his Unmanned Aerial Vehicles (UAVs). Golly is cofounder and Chief Operating Officer of Aker, a UAV service company.

has evolved and we’ve been able to utilize them more each year.”

Continuous improvement to UAV technology and equipment has allowed Golly to utilize thermal imagery this past spring, helping him document where the payback on drainage tile is fastest and document any mistakes by nitrogen applicators.

Looking to the future of drones, Golly speculated that sprayer drones will be part of the upcoming natural progression.

“We’ve experimented a little bit with spot spraying or pin point spraying, but someday we hope to supplement our large sprayers with spraying individual leaves instead of large fields,” he said.

Flying around the world

Considered a thought leader in precision agriculture, Golly has

traveled around the world to work with other engineers and farmers interested in better understanding and harnessing the ever-evolving technology.

“I’ve talked to farmers from Guatemala and Malaysia, and they are very hungry for this technology because they want to catch up and surpass other countries in terms of usage and what it means for production,” Golly said.

He added that farmers in other countries look to American usage before trying new technologies themselves.

“They do very much respect U.S. agriculture, and they know we are the leaders in incorporating technology with agriculture,” Golly said. “So when they see that we’re using a new technology they’re very interested in finding ways to use it too.”

While regulations stop many companies from developing, testing and manufacturing drones and new precision technologies in the U.S., Golly said American agriculture is still adopting UAV technology faster than most countries, especially in the specialty crop sector.

Turning a passion into a business

Golly is the Chief Operating Officer and cofounder of Aker, a UAV service company that works to improve crop health to maximize yields. Aker collects high-resolution aerial field images and identifies financial threat zones based on those images, helping farmers identify crop stress and treat problem areas in real time. Using UAVs and a team of experts, they focus on topography, infrared thermal imagery, herbicide targeting, crop loss analytics and more.

“Drones are not just about production data, but about how to integrate the results of the data into a farm’s workflow,” Golly’s cofounder and Aker Chief Executive Officer, Orlando Saez said. “Better data, more accurate data, and more timely data leads to better advice. That’s where we focus with Aker, that’s what we’re constantly trying to help farmers do.”

Using their fleet of UAVs, Aker aims to paint a better picture of what happens in farmers’ fields in real time, so that they no longer have to rely on soil maps at the beginning of planting season and yield maps at the end of a season.

“We take out the guesswork of where things went wrong; using drones to paint a better picture so that farmers can better understand

what is happening in their fields in a timely manner,” Saez said.

Looking to the future

A pioneer of UAV’s, it’s not surprising that Golly’s advice to farmers thinking about getting a drone is “go for it!”

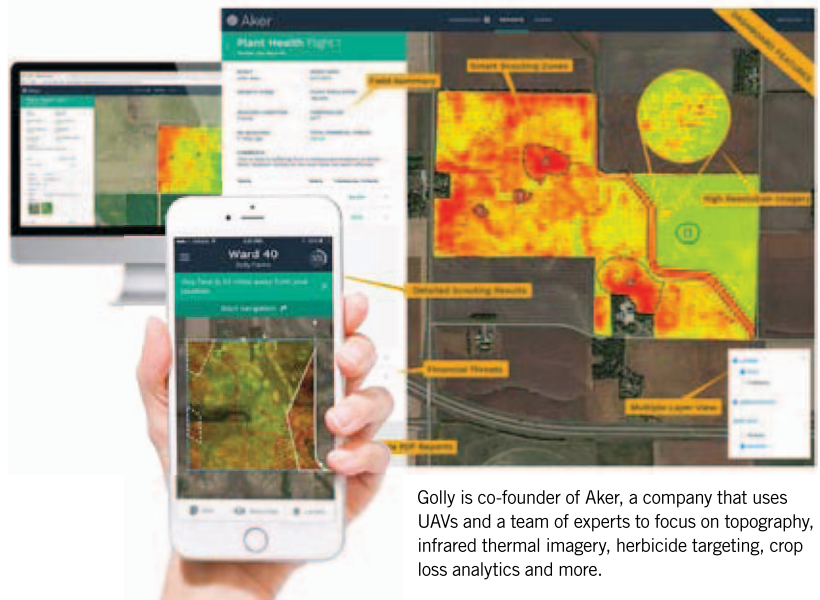
“A \$300-\$500 small drone investment to fly over a few fields may seem small today, but the potential benefits are much, much higher than that,” he said.

Golly also advised that farmers try UAVs over a few acres at a time when first getting started with the new technology and finding where precision ag fits into each farm’s unique business management strategy.

“The reality is that UAV technology is coming, whether it’s for growers or retailers, but it’s going to be here,” Golly said. “And if farmers want to be on the leading edge of it—simply give it a try.”

Farming is changing; it’s hard to imagine that just over 100 years ago combust engines were first being introduced on farms across rural America and now UAVs and precision agriculture has taken farming to new heights.

Courageous early adaptors and companies like Aker have made UAVs and the real time data they provide more common on farms across the country, making farming far more precise, eco-friendly and ultimately, successful. ▣



Golly is co-founder of Aker, a company that uses UAVs and a team of experts to focus on topography, infrared thermal imagery, herbicide targeting, crop loss analytics and more.

Do you know someone who represents the diverse, changing face of agriculture that should be featured in Soy Futures? If so, send an email to jbright@soy.org.

ASA in Action

Ron Moore Assumes Presidency of ASA

Ron Moore, a soybean farmer from Roseville, Ill., assumed the role of president of the American Soybean Association (ASA) at the organization's annual winter meeting in St. Louis in December. Moore served as ASA's vice president in 2016, and per the structure of the organization, the vice president moves into the president's role for the following year.

"The industry faces many challenges and many opportunities in 2017, and I am excited to tackle all of them," Moore said. "As we work to advance farmer priorities on our most important issues like trade, biotechnology and others, I look forward to drawing on the multiple talents of our dedicated board of directors to continue our success for soybean farmers."

Elected to fill the role of ASA vice president is John Heisdorffer, a farmer from Keota, Iowa, placing him in line to become ASA's President in December 2017. Heisdorffer previously served as ASA secretary.

"This is an organization that, as it approaches its 100th anniversary, only becomes more impactful and more important as a voice for farmers," Heisdorffer said. "We've come very far, but there is still so much work to do to make sure that all soybean farmers have the policy and regulation and market conditions in place to succeed. I am excited to work over the coming years to see that through."

Richard Wilkins, who farms in Greenwood, Del., and served in 2016 as ASA's president, now moves to the role of chairman, and outgoing Chairman Wade Cowan of Brownfield, Texas, rotates off the Governing Committee. Davie Stephens, of Wingo, Ky., will serve as ASA's secretary, and Bill Gordon, of Worthington, Minn., was elected to the position of ASA treasurer. Bret Davis, of Delaware, Ohio; Kevin Scott, of Valley Springs, S.D.; Sam Butler, of New Hope, Ala.; and Eric Maupin, of Newbern, Tenn., were elected as at-large members of ASA's Governing Committee.

Also at the meeting, the ASA board celebrated retiring directors Mike Cunningham, of Illinois, Ray Gaesser and Mark Jackson, of Iowa, Kevin Hoyer and Dan Roe, of Wisconsin, Ted Glaub, of Arkansas, Lance Peterson, of Minnesota and Wyatt Whitford, of North Carolina. ASA welcomed new directors Stan Born, of Dunlap, Ill.; Brad Doyle, of Weiner, Ark.; Morey Hill, of Madrid, Iowa; Brian Kemp, of Sibley, Iowa; Brad Kremer, of Pittsville, Wis.; Kurt Krueger, of Rothsay, Minn.; Don Lutz, of Scandinavia, Wis.; Brian Ogletree, of Milner, Ga.; Bill Raben, of Ridgeway, Ill.; Rob Shaffer, of El Paso, Ill. and Jimmy Thomas, of Timberlake, N.C. ▣

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Bill Raben
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Matt Stutzman
Adrian, Mich.



Lawrence Sukalski
Fairmont, Minn.



Jimmy Thomas
Timberlake, N.C.



Bill Wykes
Yorkville, Ill.

ASA in Action

Soybean Growers Challenge Dannon on Retreat from Sustainable Agricultural Practices

ASA, as part of the larger U.S. Farmers and Ranchers Alliance (USFRA), sent a letter to leadership at Dannon in response to the company's recent pledge to eliminate the use of safe and proven agricultural biotechnology to feed the dairy cows that supply milk for its yogurt products.

Together with fellow USFRA members, ASA urged Dannon and other food companies to recognize that their sustainability goals, intended to reduce the use of natural resources, cannot be achieved without the use of modern agricultural practices, despite any misleading assertions to the contrary. Dannon is one of several prominent food manufacturers and retailers that in recent years have taken steps to eliminate genetically-modified ingredients, known as GMOs, from its supply, claiming that such a move improves the sustainability of its products.

"Just as every one of our farmers believes strongly in sustainable biotechnology, we also believe in the competition of a free market," said ASA Chairman Richard Wilkins, a farmer from Greenwood, Del., "But Dannon isn't competing in good faith; Dannon is making false marketing claims to boost the sale of its products. We can't afford to stand by and allow this technology to be further denigrated by untruthful claims like Dannon's." □



ASA Director Jerry Bambaur (left) inspects soy quality at Skretting Feedmill in Ecuador with other U.S. soy farmers. Photo courtesy of USSEC



ASA Chairman Richard Wilkins and Delaware soybean farmer David Marvel show soybeans to the World Initiative for Soy in Human Health's (WISHH) U.S. Department of Agriculture (USDA)-funded training participants from Nicaragua and South Africa. Participants in WISHH's USDA-funded Cochran training said the visit showed them, firsthand, the linkage between U.S. farmers and their local school nutrition programs. Photo courtesy of WISHH

2017 ASA DuPont Young Leaders Sharpen Communication, Management Skills

The 33rd class of American Soybean Association (ASA) DuPont Young Leaders began their leadership journey at DuPont Pioneer headquarters in Johnston, Iowa.

The Johnston training session was the first phase of a program designed to identify new and aspiring leaders and provide them with opportunities to enhance their skills and network with other growers. Representatives from 23 states and Canada participated in training that included educational and skill-building components.

The 2017 Class of Young Leaders are: Cade Grace, AL; Layne and Ryanne Miles, Ark.; Brock Willard, Ill; Jonathan and Derika Spaetti, Ind.; Alex Brownlee, Iowa; Casey Schlichting, Iowa; Brandon and Blair Geiger, Kan.; Brett Neibling, Kan.; Kyle Bugg, Ky.; Mike and Lindsey



Young Leader program participants learn leadership skills during training in Johnston, Iowa. Photo by Kathie Mullen

Gaspard, La.; Angela and June Provost, La.; Andrew Crawford, Mich.; Matt and Jessica Swoish, Mich.; Trevore Brekken, Minn.; Chad and Monica McCollough, Mo.; Blake Hokamp, Neb.; Leslie Hamilton and Dan Stein, N.Y.; Greg Manning and Jessica Harris, N.C.; Kasey Bitz, N.D.;

Trish Levering, Ohio; Jean Lam, Okla.; Jeff and Janie Harrison, Canada; Justin and Jessica Rivers, S.C.; Nick and Shelly Lorang, S.D.; Rob Holman, Tenn.; Doug Singletary, Tenn.; Grayson Kirby and Cindy Dykes, Va.; Wes and Amanda Marshall, Va.; and Tony and Katie Mellenthin, Wis.

Chinese buyers committed to purchase 5.1 million metric tons of U.S. soy valued at \$2.1 billion U.S. dollars at a soybean contract signing ceremony in Des Moines, Iowa. ASA Director and U.S. Soybean Export Council Chairman Jim Miller of Nebraska welcomed the delegation. "These agreements are an example of the strong partnerships between the U.S. soy value chain and the international buyers who purchase our crop," Miller said. Photo by Joseph L. Murphy/Iowa Soybean Association





CUSTOM CROPS:

New Tools Modify Soybeans with Surgical Precision

Soybean trait development is on the cusp of a new generation of opportunities. Researchers are finding that the ability to quickly and accurately edit plant genomes can supplement traditional breeding and biotechnology tools to create crops with not only good yield potential, but also the ability to resist pests, change composition and enhance human nutrition.

| By Barb Baylor Anderson

Beyond traditional breeding

While it may sound like science fiction, the concept of gene editing is still based on the same long-time breeding goal of identifying the best genes and exploiting them to improve soybeans.

In the very early days of improving crop traits, farmers simply selected plants with the desired characteristics and kept the seeds to plant the following season. Later, breeders were able to cross plants through hybridization to try and express the most desirable traits. Again the process was time consuming, as they waited to evaluate results after the production season.

Transgenic technologies were introduced late in the last century, and allowed scientists to insert genes into plants for traits like herbicide tolerance. Researchers still had to screen and select plants with the intended outcome to determine if the modification led to better traits.

Now enters another generation of plant breeding – gene editing. It's different from conventional biotechnology (genetically modified organisms), as no extra genes are inserted into plants, but rather changes are made within the plant.

“Work done through traditional plant breeding is interconnected to work done with biotechnology,” said Tom Adams, Monsanto vice president and biotechnology lead, who has been involved with the field for 19 years.

“Gene editing is a meeting of those two processes.”

Adams notes the gene editing evolution began a few years ago with discovery of zinc-finger nucleases (ZFNs), which provide a process for targeted, precise genome modification. Dow AgroSciences introduced ZFNs as EXZACT Precision Technology. Where conventional biotechnology makes changes at random sequences in a plant genome, EXZACT uses the ZFNs, or designed enzymes, to bind novel DNA sequences with high sequence-specificity.

On the heels of the introduction of ZFNs came transcription activator-like effector nucleases (TALEN). These enzymes are engineered to cut specific DNA sequences to modify genomes. TALEN has been successful creating crops with favorable nutrition and biofuels qualities.



Kan Wang, director of the Iowa State University Plant Transformation Facility.

“Gene editing using the most advanced method has only been available since 2012. But we have



Tom Adams, Monsanto vice president and biotechnology lead.

confirmed it works effectively with corn and rice,” said Kan Wang, Iowa State University global professor of biotechnology and Plant Transformation Center director. “We still need to figure out how it will work to make soybean breeding more efficient. We are doing systematic comparisons and testing components to see how it needs to be refined for soybeans.”

Adams said the large number of known genomic soybean sequences makes it easier to look for differences that can be explored with gene editing.

“As gene editing becomes easy to do, we will be able to move more traits into a stack more quickly than by traditional breeding. We can use gene editing to address specific traits, and if we want to add several traits, we could move them directly rather than sorting through thousands like we would with traditional breeding until we come up with the right product,” he said.

Here comes CRISPR

The gene editing tool with perhaps the most promise is CRISPR, which stands for clustered regularly interspaced short palindromic repeats. CRISPR has yielded success in other crops.

“CRISPR is the most exciting, revolutionary breakthrough in my lifetime,” said Tony Kinney, DuPont Pioneer research director for new soybean traits, who has focused on improving soy for 27 years. “We will be able to create multiple traits with benefits in the next few years.”

(continued on page 14)

“Work done through traditional plant breeding is interconnected to work done with biotechnology. Gene editing is a meeting of those two processes.” – Tom Adams, Monsanto vice president and biotechnology lead

“It is too early to say when gene editing will be fully embraced, but it is faster than traditional biotech methods.”

– Tony Kinney, DuPont Pioneer research director for new soybean traits

CRISPR contains a segment of RNA called the guide RNA, or gRNA. This segment can find homologous segments in the genome, which can be cut by CRISPR’s Cas9



Tony Kinney, DuPont Pioneer research director for new soybean traits.

protein. Editing of the gene takes place during the subsequent DNA repair process.

“CRISPR Cas9 allows plant breeders to continue to do what they have done for generations—select for the traits they want—this is just a rapid and precise way to do it,” Kinney said.

Zhanyuan Zhang, research professor and director of the University of Missouri Plant Transformation Core Facility, sees other benefits as well.



Zhanyuan Zhang, research professor and director of the University of Missouri Plant Transformation Core Facility.

“This technology enables researchers to edit the soybean genome precisely without causing unintended effects. The edited soybean can be transgene-free, causing much less concern from soybean consumers,” he said. “And because of the precise genome modification that will avoid backcrossing, the breeding cycle will be much shorter than conventional breeding. In addition, many good traits can be introduced into soybeans

which otherwise would be impossible to do via conventional breeding.”

Zhang expects CRISPR/Cas9—or a future improved platform—to become a major tool used to edit the soybean genome to create new varieties with high oleic oil but low, undesirable oligo sugars and digestive inhibitors. The resulting soybean would have higher nutritional values.

“Soybean farmers should be able to sell these varieties at a high price, making a profit while benefiting human and animal health. Scientists would overcome the constraint of conventional breeding, which would take longer to combine these traits into a single variety,” he said.

Other researchers agree the sky is the limit as to what might be possible. For example, Wang said they can look at ways to control plant response to specific soybean diseases. Adams agreed.

“We may be able to take two soybean varieties from different maturity groups and move a gene for disease resistance from one to the other without having to wait generations to select for the trait time and again,” Adams said. “With CRISPR, we can cut the soybean genome in one place and accurately and efficiently put all the traits we want onto an island.”

Kinney anticipates an initial focus on quality traits to improve composition. “The next generation of soybean will be for more oil and protein content. Protein especially is limited by amino acid composition, but we can improve that with gene editing. CRISPR will allow us to develop solutions that help farmers be more profitable, while also improving animal and human health

and nutrition,” he said. “We are still in the early stages of discovery.”

Combine tools for the future

While many scientists agree CRISPR technology will pave the way for the future, Wang cautioned questions remain unanswered. She believes a combination of breeding tools will still be used.

“Farmers need to know gene editing will not solve every problem. We are still learning about the biology of soybeans, although we have confirmed some traits can be tackled easier than others with CRISPR, including oil composition,” she said. “The more we study and learn, the more we can determine the expected outcomes. Soybean disease is another area where soybeans have an internal system to resist disease but we don’t know enough about it yet.”

In addition, Cas9 may not be the only enzyme that can be used from the CRISPR technology. Adams said Cas9 is just one enzyme in one family of perhaps several families of enzymes that may have different useful properties and can be used to cut DNA.

“Someday we will be able to exchange traits very easily,” he predicts. “A scientist may even be able to type in a desired genome into a computer and produce it through gene editing. It is not a crazy dream.”

Adams also sees a tie between gene editing and the use of precision agriculture tools. Rather than just confirming a three bushel per acre increase in an area of a field, for example, farmers will be able to tailor

specific refinements for specific areas to further boost yield potential.

"These are great tools to use together," he said. "Researchers will work hard to improve soybeans using many options, and the faster and more accurate, the better."

Missouri's Zhang is working on other transgenic technologies, like the improvement of crop transformation systems, small RNA-mediated gene silencing, novel approaches for gene stacking and for genome editing. He said soybean transformation technology needs to be developed to enable scientists to introduce transgenes for use with CRISPR/Cas9.

"Many soybean varieties, especially elite varieties, cannot be transformed at the present time. As a result, CRISPR/Cas9 technology cannot be applied directly to these varieties," he explained. "Therefore, it is critically important to develop soybean transformation technology which will enable transgene for CRISPR/Cas9 expression to be introduced directly into elite varieties. This will avoid the time and cost in making crosses to transgress CRISPR/Cas9 from transformable to non-transformable varieties. Otherwise, CRISPR/Cas9 technology won't work in soybeans."

Zhang is hopeful soybean farmers will provide research funding to support additional public research into soybean transformation and CRISPR/Cas9 technologies.

"It is too early to say when gene editing will be fully embraced, but it is faster than traditional biotech methods," Kinney said. "We will have nine billion people to feed in 50 years and soybeans will need to be a larger source of food and feed. I believe that also will lead to a shift from seed selection based on yield to selection based on oil and meal and better pricing." ■

ASA excited about gene editing technology

While farmers, scientists and regulators understand biotechnology is safe and sustainable, getting consumers past the " Frankenfoods " perception has taken time and remains an ongoing education process. The American Soybean Association (ASA) would like to prevent any similar misunderstandings about gene editing and to make it clear the technology is much different.

"ASA is excited about gene editing and the surgical changes it allows in the genome," said John Gordley, director of ASA's Washington, D.C. office. "Explaining GMOs to consumers has been problematic. We don't want the same issues with gene editing, which will be more palatable and more defensible to use in the eyes of consumers once they understand it. Our goal is to ensure traits developed through gene editing are treated differently than those created through biotech."

ASA is monitoring three processes which could influence how gene editing is handled:

The U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) review of Part 340 of the Plant Protection Act regarding federal regulation of genetically engineered organisms. APHIS developed a proposed rule which is with the Office of Management and Budget (OMB) for review. ASA and other farm groups are working with the American Seed Trade Association (ASTA) and Biotechnology Innovation Organization (BIO) to recognize in the rule that gene editing uses a different process than biotech tools. The hope is to help shape the rule before it is put out for public comment.

White House review of the coordinated framework to review new biotech traits. The current framework has been in place since the 1980s, and Gordley said it is in need of a facelift to reflect new technology like gene editing.

Federal biotech labeling bill. ASA is communicating with USDA's Agricultural Marketing Service about the definition of bioengineered, so the disclosure law reflects accurately what is and is not bioengineered.

USDA's Agricultural Marketing Service (AMS) is forming a new team to develop and manage the new disclosure program. Craig Morris, deputy administrator of the AMS Livestock, Poultry and Seed Program, said Public Law 114-216 defines bioengineered food as food that contains genetic material that has been modified through in vitro recombinant DNA techniques and for which the modification could not otherwise be obtained through conventional breeding or found in nature. USDA will seek the expertise and advice of all stakeholders on how this definition may or may not apply to emerging and advanced breeding techniques.

"It is important that farmers and all interested stakeholders stay engaged and involved with this process. USDA is committed to open and transparent implementation," Morris said. "There will be multiple opportunities to provide views, in writing or verbally, over the coming months. We look forward to keeping in close contact with soybean producers as this process moves forward."

Gordley hopes that simultaneously, the federal government can streamline the trait approval process worldwide. "USDA, APHIS and the Foreign Agriculture Service (FAS) all need to be on the same page, so we know what various approval requirements exist in different countries and we can prevent new trait approval delays," he said. ■

Issue Update

Transparency Evaluator Answers Farmer Questions on Big Data

| By Beverly Paul

The growth of precision agriculture solutions, the wealth of data those solutions generate and the application of those data is touted as the next “game changer” for farmers. As this technology becomes more widely adopted and more farmers integrate farm data products into their operations, many have significant questions about the privacy, security and stewardship of the data they are collecting. A recent survey found that an overwhelming number of farmers do not know what happens to their data when they use these new technologies.

The Ag Data Transparency Evaluator aims to help producers understand where their data is going and who has access and control over it. Created by a partnership among major farm organizations, commodity groups and agriculture technology providers (ATPs), the Transparency Evaluator requires participating ATPs to answer 10 key questions about their technology product’s use and control of farmer data. A third party administrator then reviews the answers and determines whether

the products meet the standards of transparency set by the Privacy and Security Principles for Farm Data (Data Principles).

Products that meet standards will receive the “Ag Data Transparent” seal to be displayed on promotional materials and product pages. Additionally, farmers can go to the Transparency Evaluator website to see and compare all the products and services that have undergone the evaluation.

The American Soybean Association (ASA) is one of the founding members of the coalition behind the Ag Data Transparency Evaluator (ADTE). ASA now provides access to the ADTE prominently on the ASA home page at www.soygrowers.org.

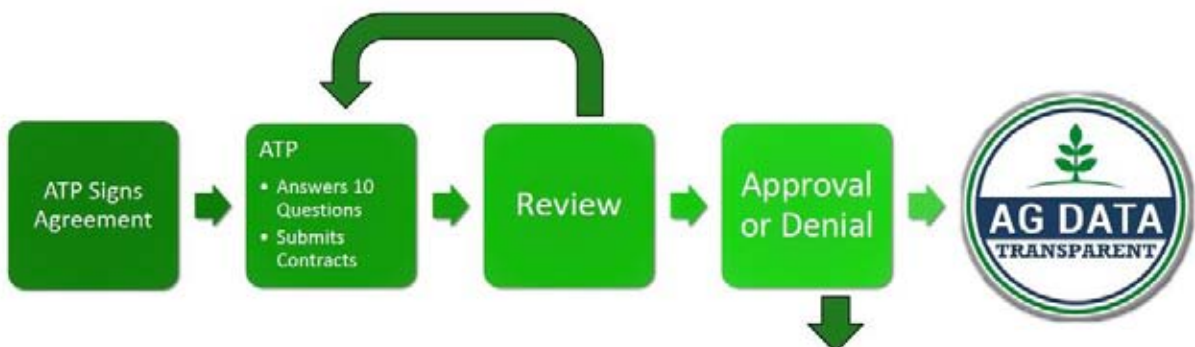
“Data security is on the top of everyone’s minds,” said Davie Stephens, a farmer from Wingo, Ky., who serves as ASA Secretary and chair of the Association’s Research, Precision Ag and Ag Data Advocacy Team. “Information that is understandable and easy for farmers to access is key to helping us profit

from the data we’re all collecting.”

Some of the 10 questions addressed by the Evaluator include: What categories of data does the product or service collect from the farmer?; Will the ATP obtain the farmer’s consent before providing other companies with access to the data?; and Will the ATP notify the farmer if a breach of data security occurs that causes disclosure of the farmer’s data to an outside party?

Additionally, farmers can go to the Transparency Evaluator website to see and compare all the products and services that have undergone the evaluation.

The Ag Data Transparency Evaluator is a non-profit corporation governed by a board of directors from the participating organizations. The corporate bylaws require that all actions be approved by the farmer-led organizations, making the Evaluator truly a farmer-driven initiative not controlled by the ATPs whose products are reviewed. ■



HOW DO YOU GET THE AG DATA TRANSPARENT SEAL?



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Very few leaders in Washington today understand the needs of agriculture. Your contributions to SoyPAC, ASA's Political Action Committee, help us support lawmakers who will serve as legislative champions on issues impacting your soybean production and profitability. In the last election, nearly all the legislators your SoyPAC supported were voted into office.

Here are a few examples of what ASA accomplished with our allies in Congress supported by SoyPAC.

- Increasing biodiesel volumes under the RFS to over 2 billion gallons
- Rescinding the \$3 billion cut in crop insurance included in the FY-2016/17 budget
- Passing a sensible GMO labeling bill in both the House and the Senate that was signed into law
- Increasing funding for waterways infrastructure and harbor maintenance

**To see more accomplishments, visit SoyGrowers.com.
Make an online contribution to SoyPAC at soygrowers.com/about-asa/soypac.**



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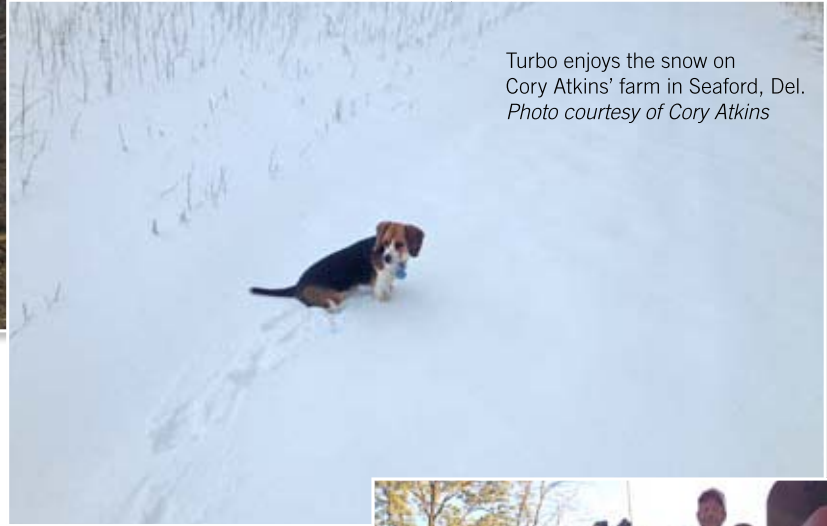
Soy SHOTS

Submit Your
Soy Shots at:

membership@soy.org



Six-year-old Brayden Winsor helps his parents clean up trash and recycling at an old farmstead over Christmas break last winter. *Photo courtesy of LaVell Winsor*



Turbo enjoys the snow on Cory Atkins' farm in Seaford, Del. *Photo courtesy of Cory Atkins*



The Swanson family takes a short break to enjoy lunch in the field with family on a beautiful fall day in Oneida, Ill. *Photo courtesy of Krista Swanson*



Amy (left) and Matt Persohn (right), with their sons, Alex, William and James, love to travel from their home in Chicago to the family farm in Fort Wayne, Ind., and ride the combine with cousin Andrew and grandpa Andy Wyss (top). *Photo courtesy of Pat Wyss*

Industry Perspective

Industry Innovations Bring New Technologies, Higher Yields

By Jessica Wharton

It's a well-known narrative across agriculture: By the year 2050, there will be approximately 2.5 billion more mouths to feed, and the need for increased yields has challenged industry segments, from seed producers and equipment manufacturers, to big data and small precision groups to become innovative, dynamic and forward thinking.

A seed worth sowing

DuPont Pioneer recently introduced their new A-Series soybean varieties, the highest yielding line of soybeans in its history, which are the result of innovative soybean research programs and the DuPont Pioneer proprietary Accelerated Yield Technology 4.0 (AYT4.0).

"The AYT4.0 is a summary of every scientist at Pioneer soybeans doing the best they can, which enables us to double the rate of genetic gain over what we've previously been able to bring to the market," said soybean breeder Jessie Alt. "This product really is the best of both worlds come together—the best of our genetics and the best of our on farm trials, and that is how we can bring this type of yield levels to our growers."

The new A-series soybeans include 54 different varieties, and farm trials saw a 2.3 bushel per acre yield advantage.

A world record holder

New Holland recently celebrated their 120th anniversary. Looking back on the company's past, North American Marketing Manager Igor Kuzmenko said they have long history of innovation at New Holland.

"We are excited to celebrate the heritage of our brand and the story we have to tell, which includes many 'firsts' in the marketplace and awards we have won for new technologies," Kuzmenko said.

An award not easily overlooked is their 2014 Guinness World Record title for harvesting almost 800 tonnes of wheat in eight hours.

"It's not a secret that New Holland combines are the most powerful, highest capacity combines in the world today," Kuzmenko added.

Looking at other impressive innovations at New Holland, their patented Twin Rotor technology provides less grain loss and puts cleaner grain in the tank with less dockage, providing the cleanest grain sample in the industry.

Information overload solved

The Climate Corporation knows the importance of data to growers across the country, and as spring planting season comes around, they are introducing three new products—Climate Fieldview Plus (a software package), Climate Fieldview Pro (focused on agronomics and agronomic advisors) and a digital infrastructure platform that provides data collaboration with the rest of the ag industry.

"What we're trying to do at the Climate Corporation is utilize digital tools to take all the data growers have and help them understand what is causing their variability in the fields, and provide insight and information for them to be able to make informed decisions about how to improve their yields, their productivity, help manage their risks, be more sustainable in their



Mike Stern
The Climate Corp CEO



Jessie Alt
DuPont Pioneer
soybean breeder

operations and ultimately, simplify their operations," The Climate Corporation's CEO Mike Stern said.

Precision farming

TeeJet has been part of agriculture applications since the first crop protection products came to market in the 1940s, and as they continue to advance with the industry, innovative products like their new Sentry 6140 Tip Flow Monitoring System are helping growers produce higher yields.

"A big component of why this technology is important is peace of mind for the grower," said Tim Stuenkel, TeeJet's Global Marketing Communications Manager. "It lets them know that they're working to produce higher yields and be sustainable, and doing a good job while they're out in the fields."

The Flow Tip Monitoring System is a flow meter based system that monitors the flow rates at every spray tip to detect plugs or partial plugs, which normally wouldn't be noticed weeks or months into the growing season, and notifies the operator immediately.

As the spring planting season approaches, growers across the country can look forward to new innovations from all industry segments that are working to heighten crop yield production and simplify on-farm management systems. ■

SoyWORLD

New Frontiers for Soy-based Feeds in West Africa

U.S. soybean growers traveled to West Africa this fall, and saw firsthand how the American Soybean Association's (ASA) World Initiative for Soy in Human Health (WISHH) is trailblazing trade for U.S. soy's use in livestock feeds and human foods.

ASA Directors E.L. Reed of Missouri and Stan Born of Illinois, along with Levi Huffman of Indiana, saw how WISHH's work in Ghana leverages state checkoff funding 6-to-1 by winning government grants and working with supply chain partners who also invest in their use of U.S. soy. United Soybean Board (USB) Past Chairman Bob Haselwood also joined the delegation at WISHH's U.S. Department of Agriculture (USDA)-funded trade conference in Senegal.

"Food is definitely an avenue into a country for U.S. soy," said Huffman, who along with Born and Reed serves on the WISHH Program Committee officer team.

Born added one key take-away from the trip was the connection between school feeding programs, institutional feeding programs and broader use going to grow the U.S. soy business.

"Our farmer dollars that we put into WISHH get magnified, but it is not just about the money," Born said. "It's about integrating with other collaborators for even greater benefit that we as a farmer organization could not get on our own."

The food-and-feed connection was on display when the farmer trio toured a Ghanaian food company that's expanding its soy-based foods lines to also sell livestock feed. They met with Yedent Agro Group CEO Samuel Kwame Ntim Adu who already signed a memorandum of understanding with WISHH to be a supply chain partner.

"I saw how WISHH has supply chain partners who work with WISHH and USDA to promote U.S. soy, and said this is a huge opportunity not only for business but also to ensure that our people also get those quality products,"

Kwame Ntim Adu said. "There is always potential to trade in soybean from the U.S. I can only see a deepening relationship in trade."

Yedent currently uses 300 metric tons per month of soybeans. Its CEO expects to use 12,000 to 15,000 metric tons in the next two to three years as it expands into livestock feed sales.

"The way everybody can win is by working together like we do with Samuel. He will take our soybean (meal) for his

new ideas for food as well as animal feed. We get to sell more of our soybeans. The trade will be great," Reed said.

In Ghana, WISHH leveraged soybean checkoff dollars to implement a \$15 million five-year USDA poultry feed project. All three farmers saw significant demand potential for U.S. soy in Ghana's growing livestock sector. They toured farms that invested this year in

U.S.-manufactured soybean extrusion equipment, as well as built a poultry processing plant that would meet quality standards for companies like Kentucky Fried Chicken that are expanding in Africa. They visited farmers who are building houses that will hold 20,000 broilers.

"Clearly, Ghanaian people like to consume chicken. There is also an opportunity to nurture and grow their egg market. Investment is expanding the layer business, and there are opportunities to improve the efficiency in this value chain," Born said. "As I reflect on this trip, I learned there are more than 8 million birds that eat 0.15 pounds per day of feed and 20 percent of that is soy. This is a significant opportunity, which is not likely to be served by local soy production."

Huffman added that West Africa has a huge growth factor and great market potential. "In the poultry sector, the feeling is they definitely cannot produce enough soybeans of their own and they will have to import," he said. ■



From left, U.S. soybean growers Levi Huffman, Stan Born and E.L. Reed examine feeds manufactured in Ghana. Multiple companies are expanding their livestock feed offerings and recognize the quality of U.S. soy in these feeds.

Sustainability

Digging Deeper: Digital Agriculture Offers New Opportunities for Soil Management

By **Jordan Bright**

Cover crops and reduced tillage are still key practices, but agronomists are using technology to analyze data and develop new tools for the future.

Soil is the foundation of agriculture—ultimately nourishing crops and paving the way for them to grow. To function well, stewards of the land need to manage soil in a way that won't degrade it or create environmental problems like nutrient and sediment losses.

Harold Mathijs van Es, professor of soil science at Cornell University and president of Soil Science Society of America, said while soil testing introduced more than 50 years ago is a great success story, there are new opportunities as farmers and consultants become more aware of the importance of soil health.

"Now we're going to be looking beyond the nutrients and the chemistry to the biology and the physics," he said. "We're in this learning process, learning what soil health is and what sort of health measurements we should use."

Van Es said digital agriculture will take soil management to the next level.

"In the digital age, there's going to be a lot of opportunities to use data from sensors or public sources, like weather data, that will allow us to manage the soil and land more sustainably," he said. "We're starting to collect and use a lot more data on soils and agricultural production, a prime example being yield maps. We're starting to use sensors and things like that and analyzing the data."

Van Es added that by looking at 10 years of yield maps, agronomists are learning a lot about the differences in yield and what factors may have impacts.

"We're also starting to see the development of more sophisticated digital management tools," he said. "We've seen in the past couple of years, several tools come on the market that use weather data, soil data and management data to develop much more sophisticated management recommendations. We're just sort of in the early stages of that process."

Van Es said while the digital age offers new opportunities, maintaining healthy soil still comes down



Digital agriculture is helping advance management tools for the future, as more farmers are introducing cover crops like turnips and radishes to manage soil health.
Photo credit: Orvin Bontrager

to ground management practices.

"It still comes down to changing tillage, or adopting cover crops and things like that," he said. "No till and cover crops are still very relevant. We're still seeing a fairly significant increase in adoption of those—even though it's maybe not new, it's something that's very important and we're still working on."

Orvin Bontrager, technical support agronomist with Servi-Tech Inc. in Nebraska, agreed standard practices are still the way to go in soil management.

As a crop consultant for 38 years, Bontrager said he's seen productivity increase with the help of fertilizers, cover crops and reduced tillage.

"We've just been doing what we think are best management practices over the years with proper fertility, proper weed management, proper irrigation and doing as much reduced tillage as we can to maintain residue on the ground," he said.

Bontrager added growers in his area are slowly increasing cover crops in the late summer and fall—especially on the highly erodible soils. They are also trying some different mixtures and species.

"We're staying with standard practices at this point," he added. "We've got to look at profitability and these have been profitable for the growers I've been working with." ■

SoyForward

Innovation Hinges on Access to Broadband

By **Mark Lewellen**

Cropland areas where soybean and other farming occurs still lag behind in adequate fixed and mobile broadband access. The need to address this shortfall was recently expressed in a letter to Federal Communications Commission (FCC) Chairman Tom Wheeler by Sens. Roger Wicker (R-Miss.) and Joe Manchin (D-W. Va.), and a bipartisan group of 24 other senators representing states with significant rural areas and in which agriculture is a major generator of economic activity.

“Croplands and ranch lands have lagged behind in adequate mobile coverage, even as demand for coverage has grown,” wrote Sens. Wicker and Manchin. “To address this coverage gap, we urge you to consider a metric of broadband access in croplands (and farm buildings), or some other geographic measurement, in addition to road miles, to identify these areas of greatest need. ‘Cropland’ coverage can be assessed using United States Department of Agriculture data for crop operations, the United States Geological Survey’s Land Use classification, or other databases.”

Much of the future of enhanced farming efficiency and productivity turns on the grower’s ability to gather, process and transmit data using advanced information and communications technologies. Wireless broadband service is a necessary technology option (in addition to fixed broadband) to achieve cost-effective coverage for farm-intensive rural areas with significant tracts of cropland.

Mississippi farmer Darrington Seward recently explained to the Senate Commerce Committee’s Subcommittee on Communications Technology and the Internet that his family farm could not manage their 22,000 acres of soybeans, cotton, corn and rice “productively or profitably without extensive use of precision agriculture technologies.” Bringing wireless broadband connectivity to cropland will provide farmers like Seward the ability to make real-time data transfers and design prescriptions that minimize the amount of necessary seed, fertilizer and pesticides, reduce costs for fuel, labor and water, and dynamically identify best practices for fields in a given location.

Cropland is also captive to the geographies, soils, climate, water and land availability required for growing food, leaving the farmer and farm workers and the many others working in the U.S. agricultural sector wholly dependent on whatever public infrastructure is made available to croplands. This is as true of broadband deployment today as it was of rural electrification in the 20th Century. Farms cannot move to areas of better broadband coverage; mobile broadband must move to farms where people actually live, work and function.

Connectivity in cropland is therefore necessary to serve the significant U.S. agricultural sector to meet growing worldwide demand for food. ■

“Farms cannot move to areas of better broadband coverage; mobile broadband must move to farms where people actually live, work and function.”



Mark Lewellen

Mark Lewellen is the manager of spectrum advocacy for John Deere, based in Washington, D.C.



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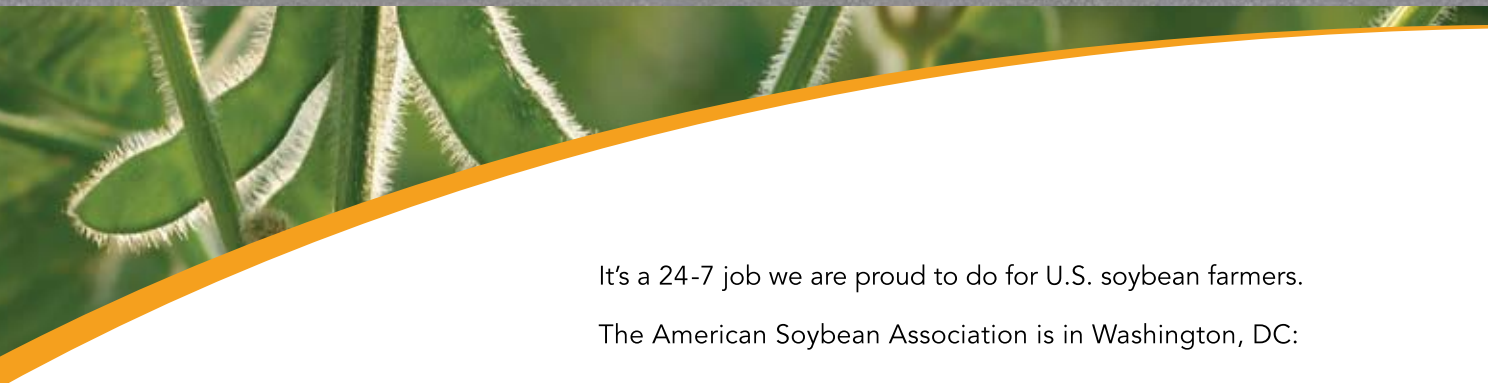
Through Soy in the City, we're highlighting a side of Chicago people don't know. We're making connections and sharing the story of soybeans and Illinois soybean farmers who are responsibly growing a small bean with a big impact.

To follow along with [#SoyintheCity](#),
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