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On the Cover: The multi-species Fuseables Precision Multi-Pellet from PanAmerican Seed offers commercial growers reliability from the point of planting. Fuseables Precision Multi-Pellets ensure more accuracy as each component is sown in the pellet, in the quantities required. According to PanAmerican Seed, Fuseables is the first-ever professional-quality, single-species and multi-species multi-pellet seed.

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PUBLISHER

Shawn Brook sbrook@issuesink.com

ASSOCIATE EDITOR

Lindsay Hoffman lhoffman@issuesink.com

STAFF WRITERS

Mark Halsall, Shannon Schindle, Marc Zienkiewicz

MARKETING

Craig Armstrong carmstrong@issuesink.com

Adria Grewal agrewal@issuesink.com

Hiten Shah hshah@issuesink.com

CREATIVE

Wade Clisby, Jeff Hiebert, Vince Mendella, Lesley Nakonechny

CIRCULATION

Brad Gordon bgordon@issuesink.com

Cam Mitchell cmitchell@issuesink.com

CONTRIBUTORS

Maria Brown, Angela Lovell, Julie McNabb, Dennis Thompson

EDITORIAL BOARD

R.B. Halaby, AgriCapital

Betty Jones-Bliss, Purdue University

Bill Romp, Becker Underwood

John Schoenecker, Harris Moran Seed Co.

Jim Schweigert, GroAlliance

Tom Wiltrot, Dow AgroSciences

Karen Withers, Pennington Seed

Ron Wulffkuhle, GreenLeaf Genetics

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SUBSCRIPTIONS

Seed World is published six times a year. North American subscription rates are: one year USD \$70.00, two years USD \$120.00.

International: one year USD \$95.00.

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What's New in Flowers and Vegetables

A roundup of fresh new varieties coming to market in 2014.

THERE WILL BE lots of new and unique varieties of vegetables and flowers coming for 2014, and the needs of both commercial growers and end consumers will be at the forefront. The upsurge in home gardening and local food production is driving a trend for vegetable and flower varieties that can easily be grown in containers on patios and in limited spaces. Meanwhile, growers are demanding products with earlier maturity, increased yields and better disease resistance packages, which the industry is working hard to deliver.

Here is a sampling of some of the new varieties that are or should be available soon.

New Vegetable Varieties

Nunhems

Nunhems has two new onion varieties with both consumer and grower benefits. Oloroso is a long day onion with high single centers combined and long storage potential for processors who need uniform rings with high solids. In the fresh market, Oloroso offers high bulb uniformity and excellent scale coverage, which makes it attractive in a bag to the consumer. Oloroso is a well-adapted variety that is grower-friendly under pivot, furrow or sprinkle irrigation. It has high pink root, fusarium and bolt tolerance for better yield potential.

Dulciana is a short day onion that can be marketed as a mild-flavored Grano onion. Good scale coverage has consumer appeal and gives the grower bulb protection while handling the bulb through harvest, packing and shipping.

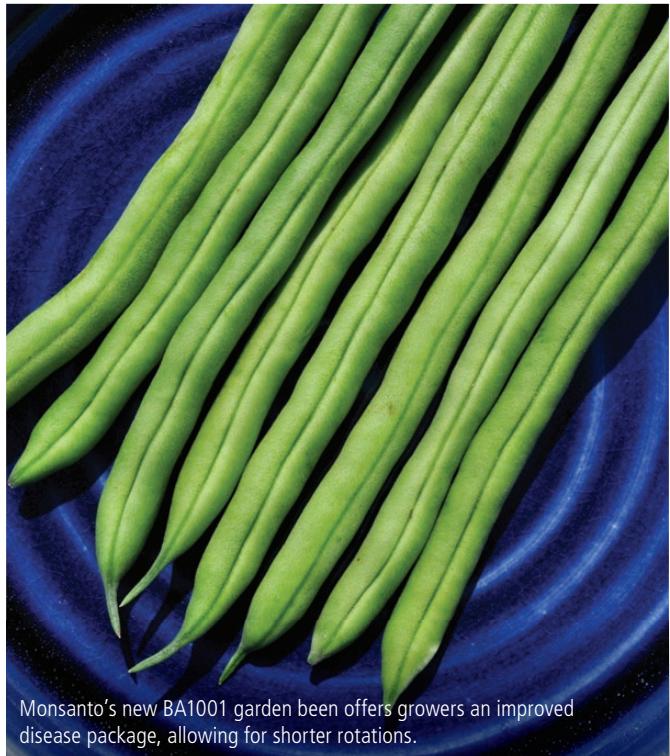
American Takii Inc.

American Takii Inc. is introducing Rising Sun, a new hybrid onion variety that is a fall planted, early-medium, short day onion for growing areas in the southwest United States and northeast Mexico. It has bolting tolerance, a uniform globe shape and tests at less than five on the pungency rating scale, giving it a sweet, mild flavor.

Monsanto

Monsanto's Seminis vegetable range has many new offerings including a new broccoli variety, SV1810BL. It features a firm, green multi-purpose crown with medium-size beads and has shown high tolerance to systemic downy mildew.

A new Seminis Performance Series sweet corn hybrid called SV9010SA combines multiple insect control traits. It offers dual modes of action for aboveground and belowground insect pests and tolerance to Roundup WeatherMAX and Roundup PowerMAX herbicides. This hybrid also contains the RpG and



Monsanto's new BA1001 garden bean offers growers an improved disease package, allowing for shorter rotations.

Photo courtesy of Monsanto

Rp1D genes, which provide high resistance to common rust.

BA1001 is a garden bean that yields well and reduces the likelihood of *aphanomyces* root rot disease development in the field, making it useful for double-cropping or other short rotations.

Abbott & Cobb Inc.

Abbott & Cobb Inc. has four new sweet corn varieties coming for 2014. A white variety is Summer Sweet MultiSweet SS1441 from the company's SuperSeedWare (SSW) line that features improved germination and vigor under most stress conditions.

Summer Sweet MultiSweet SS2742 is a bi-color variety with brilliant HiGlow kernels and produced with SSW genetics that allow it to be planted early and still produce strong, uniform stands.

Summer Sweet HiGlowMS 7401 IMP has enhanced vigor and overall seed quality. It carries new Stays Rich Green (SRG) natural genetics, producing darker green plants and husks and thicker leaves. It has a high resistance to maize dwarf mosaic virus.

Summer Sweet HiGlow 8902 IMP is a bi-color variety that offers enhanced rust resistance. It maintains ear size in fall and winter growing seasons and has a dark green husk and plant, due to its SRG genetics.

Syngenta

New from Syngenta is Captivation, a seedless watermelon variety with mostly 45-count fruits which are a uniform, consistent size with firm shape and red flesh. It offers strong disease resistance and plant growth habit suited for less than ideal field conditions.

Designed for better results in stressful or difficult growing conditions are two new sweet peppers: Bastille and Rampart. Bastille offers fruit with a longer shelf life and its concentrated fruit set allows for a more predictable harvest. Rampart has verdant, thick-walled fruit and continuous fruit set for multiple harvests. It provides exceptional stress tolerance in early fall seasons and yields predictably in difficult growing conditions.

Protector Sweet Corn has an industry-leading disease resistance package and includes Syngenta's Attribute II trait stack maximizing yield and productivity and also has tolerance to Liberty herbicide.

Harris Seeds

Oakley, Harris Seeds' new specialty gourmet bean, is resistant to bean common mosaic virus, curly top virus, and bacterial brown spot and rust, and also has intermediate resistance to halo blight. Rubi bean has scarlet red, slightly mottled pods and can be harvested early for fresh seed consumption or left on the plant for dry seed use.

Silver Slicer is an organic cucumber variety developed at Cornell University that matures in 62 days and offers prolific yields, uniform fruit, creamy white color and excellent taste. Its vines resist powdery mildew.

Another new variety, SV4719CS F1, is the first slicing cucumber to offer intermediate resistance to a new strain of downy mildew that is plaguing many cucumber growers. It also offers resistance to angular leaf spot, anthracnose scab and zucchini yellows mosaic virus.

Johnny's Seeds

Following the trend for smaller, bite-sized vegetables, Johnny's Seeds introduces its Babybeat Beet and Adelaide Carrot varieties. Babybeat is a true baby beet, which means it is well proportioned even when young. Adelaide is a true baby carrot and has an early maturity and forms a blunt root tip at three to four inches long.

Other smaller sized vegetables from Johnny's Seeds include Kabocha Winter Squashes, which are ornamental as well as edible. Shokichi Green produces single-serving size green fruits with light stripes, while Shokichi Shrio is a small single-serving size gray Kabocha squash that works well for stuffing.

Burpee Home Gardens

Burpee Home Gardens' Tomato Indigo collection offers unique snack-sized fruits, which look great in recipes and taste delicious. They are also available as Bumper Crop grafted tomato varieties. New in the collection for 2014 is Indigo Rose, a purple, almost jet-black tomato that ripens to a rosy red. Indigo Starburst is sweet and golden and sets heavy in clusters of about six fruit. Indigo Ruby is a cherry tomato with sweet flavor and pleasant aroma. Indigo Sun has an indigo pigment, indicating healthy anthocyanins.

Also following the trend towards container gardening and multi-variety mixes, Burpee Home Gardens offers Try Basil as



Syngenta's Captivation watermelon offers growers strong yields and disease resistance with a consistent fruit size.

Photo courtesy of Syngenta.

ALL-AMERICA SELECTIONS CHANGES JUDGING PRACTICES TO REFLECT LOCAL FOOD TRENDS

The local food movement has a big impact on the vegetable and edibles seed market, as new compact varieties—bred specifically to be grown on patios and balconies or in containers—are introduced each year.

As a result, All-America Selections is making changes to its trialing process to reflect the local food trend. AAS just announced its first ever regional winners for 2014. AAS national winners have performed consistently well in a majority of AAS trials across North America, whereas the new regional winners have performed very well in a specific region.

"The grow local movement is causing more people to grow their own and so they want to know what grows well in their area," says Diane Blazek, executive director of AAS. "We still have our national winners and I think that in a couple of years we are also going to have a nice selection of regional winners that people can grow."

The AAS trial process is totally anonymous and comparative. Entries are compared side by side against the performance of two similar varieties already in the marketplace. Entries are judged on performance criteria such as plant growth, production longevity and taste. AAS is making its judging timelines for vegetable and edibles more flexible to accommodate entry classes that have longer growing seasons.

"We had a very specific timeline that we always followed and we are starting to be more flexible with that," says Blazek. "For example, I am in Chicago and we are in a zone five, so tomato seeds would be started indoors, transplanted out at the end of May, and would be judged at the end of July or beginning of August. That timeline didn't work well for things like lettuce, brussel sprouts and winter squash. So we are allowing our judges more time to judge things that maybe have a longer growing season. As a result, we anticipate that a wider number of classes will become AAS winners."



Photo courtesy of Pan American Seed.

Pan American Seed's SimplyHerbs multi-seed pellet allows growers less seed waste while producing full, uniform crops.

part of its multi-seed pellet range that allows gardeners to grow and try three different basil in one pot. It includes a blend of Genovese, serrated and dark-red basils.

Ball FloraPlant

BallFlora's late-flowering, disease-resistant BamBasil gives a full season of hearty leaves and stays tidy in gardens and planters with dense branching on strong stems. It has perfect flavor for pesto and fresh summer salads.

PanAmerican Seed

An excellent slicer tomato for containers and small gardens is Homeslice, an early, compact and mounding plant that produces bountiful harvests of round, five- to six-ounce fruit with true tomato flavor. It can be sold in large containers in bloom or with small fruit.

The SimplyHerbs multi-seed pellet is an easy and economical way to grow and sell the most popular herbs. Plants grow from single-species, multi-seed pellets and produce a nice fast fill and a healthy, more uniform crop with no wasted seed. It's available in dill, basil, parsley, sage and thyme.

Rijk Zwaan

A new development in breeding from Rijk Zwaan is its parthenocarpic pickling cucumbers, Puccini and Stravinsky, which do not require pollinator plants and offer benefits for mechanical harvesting. Fruit is uniform and the plants produce a concentrated fruit set. Bees are not required to pollinate the crop and quality is improved because the fruit do not have seeds.

In spinach the company will have six new varieties with resistance to new races of downy mildew.

New Flower Varieties

PanAmerican Seed

PanAmerican Seed is encouraging retailers to "think outside the pack" by providing varieties and mixes designed for containers and combination plantings for consumers who increasingly want a designer look for their back yards and patios with minimal effort.

Its new easy-to-grow Fuseables Precision Multi-Pellets are specially formulated to deliver a balanced mix of two or three flower varieties which germinate and grow together to produce more natural-looking mixes for retailers. Growers are guaranteed that all components of the mix are present at least 90 percent of the time because every component is sown individually directly into the mold. Fuseables are supplied with a 95 percent minimum germination standard and crop time is eight to 12 weeks from sow to finish. Fuseables pellets are easy to sow precisely with a 30-size drum and they transplant easily due to uniform growth.

In its Fuseables Precision Multi-Pellets range, PanAmerican Seed is launching a number of new varieties including multi-species Healing Waters, which includes Shock Wave Denim Petunia, Easy Wave Violet Petunia and large-flowered blue Bacopa. Its multi-species Cloud N Sky mix includes Shock Wave Coconut Petunia and Blutopia Bacopa and Multi-species Blue Dawn, which features Easy Wave Rosy Dawn Petunia and Blutopia Bacopa.

New in the company's recently developed Divine New Guinea Impatiens lineup, the only seed New Guinea variety on the market, are four new colors: Blue Pearl, Burgundy, White Blush and Scarlet Bronze Leaf. Divine New Guinea Impatiens provide high resistance to downy mildew. Plugs can be finished in five to six weeks at average daily temperatures (ADT) of 73°F

or, if growers wish to reduce energy inputs, can be finished in 11 weeks at 66°F ADT or 15 weeks in 58°F ADT.

America Takii Inc.

A new perennial Agastache series, Arizona will be available in three colors: Sandstone, Sun and Sunset. Arizona is a first-year blooming variety that is extremely floriferous, compact and uniform in shape, easily maintained once established, and drought tolerant.

America Takii's new Petunia F1 African Sunset is the first orange petunia from seed and is a 2014 All-America Selections (AAS) winner. African Sunset has an excellent mounding habit, strong stems, vigor and orange-hued flowers. Strong flower petals stand up to humid conditions. It is good in landscapes, hanging baskets and mixed containers.

Sakata Seeds

Grandio Pansy is a new large-flowered pansy from Sakata Seeds, which is bred for ease of growing in today's greenhouses. It has a uniform habit and there is no need for special growing regimes. It comes in 12 colors and five designer mixes.

Profusion Double zinnia is the next generation of zinnia with improved disease resistance and a brilliant nonstop color display that is great for landscapes. In the series, Double Hot Cherry and Double Deep Salmon were 2013 AAS award winners.

Pinball gomphrena is the first vegetative, spreading gomphrena and comes in four colors: Purple, Snow-tip Lavendar and

White. This tough, summer-loving plant is good for landscapes, and is both heat and drought tolerant and is ideal in mixed containers and planters.

Low-maintenance SunPatiens impatiens offers two new colors: Compact Red and Compact Hot CoralSunPatiens. The variety thrives under high heat and humidity and is resistant to downy mildew, providing season-long color in gardens or containers. **Angela Lovell**

Editor's Note: The varieties listed in this article were selected to demonstrate the trends in the industry and are by no means a comprehensive listing of new varieties available.

AAS 2014 REGIONAL WINNERS

Vegetables and edibles:

- 'Pick a Bushel' Cucumber—Heartland, Great Lakes
- 'Cinderella's Carriage' Pumpkin—Southeast, Great Lakes, Mountain/Southwest
- 'Mountain Merit' Tomato—Heartland

Flowers:

- 'Arabesque' Penstemon—Heartland, Mountain/Southwest, West/Northwest
- 'Suntastic' Sunflower—Great Lakes



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GENETICS AND CONSUMERS DRIVE VEGETABLE INNOVATIONS

The introduction of marker-assisted breeding has undoubtedly been a significant breakthrough for plant breeders. The technology has increased the speed of delivery of new products and allowed for new gene combinations that were not previously possible.

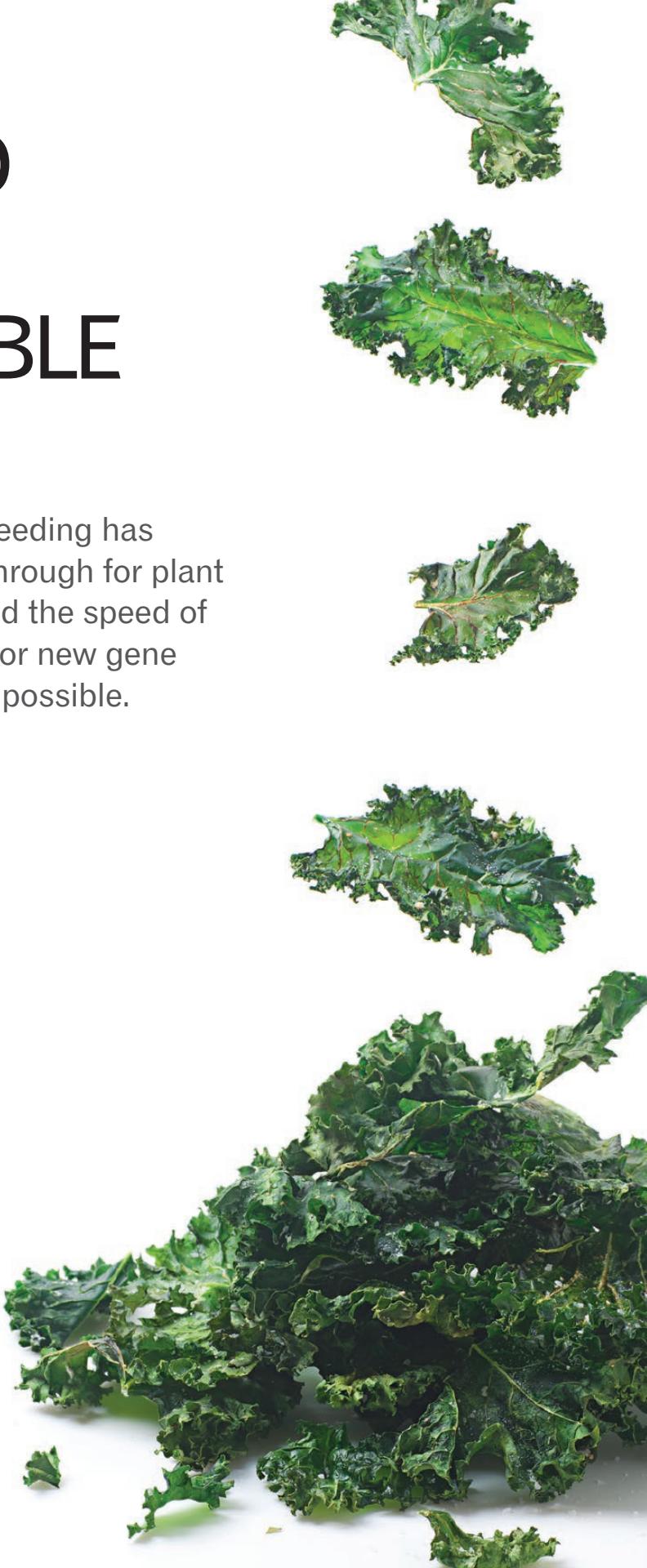
MONSANTO'S BREEDERS ARE using advanced breeding tools to bring added-value seeds to farmers around the world faster by investing in trait-linked molecular markers in 14 crops. "Today, over 200 traits that can be marker-selected are being used to accelerate new product development," says Marlin Edwards, global vegetable R&D lead for Monsanto.

Specific examples of new varieties made possible by this technology are such things as seedless watermelon, super sweet corn and virus-resistant squash. "This technology has allowed for increased yields and resistances to pests and diseases in many crops, as well as the introduction of beneficial traits for nutrition, taste, aroma, color and shelf life," says Teresa Mitzel, head of vegetable product evaluation, Syngenta North America. Syngenta estimates that new developments in conventional plant breeding technology, such as marker and genomic-assisted techniques (that can select and breed in a number of required traits simultaneously), could reduce new variety development times from 12 to 15 years to eight years or fewer, depending upon the crop.

Genome Sequencing

Work to sequence the genomes of a number of vegetables continues worldwide. Potato, cucumber and Chinese cabbage were among the first vegetables to be sequenced. Genomes of pests and diseases such as diamondback moth, pea aphid and the fungal organism that causes downy mildew have also been sequenced.

Genome sequencing combined with powerful computational analysis tools is allowing breeders to accelerate the breeding process and has reduced costs considerably. "This technology allows us to have some standard adaptable approaches," says Michael Mazourek, professor of plant breeding at Cornell University. "Previously, if we wanted to map a gene





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and develop a molecular marker, that would burn through a few hundred thousand dollars over a few years. Now we can do it for \$10,000 in a month."

But it's DNA sequencing tools that have allowed researchers to make the biggest leap forward, says Mazourek. New techniques such as genotyping provide a better understanding of the hereditary makeup of plants. "Genotyping by sequence means you can develop your work with a great awareness of all the diversity that's potentially available to you," says Mazourek. "It allows me to get the DNA information about the traits of a natural population together in a month or two."

Bioinformatics is speeding up the analysis of genetic information and is moving towards automation of the selection process. "We're trying to train computers to build statistical models that will do the selection for us," says Mazourek.

The Human Element

The one thing a computer model can't do, however, is allow for human preferences. "In horticultural crops the part the program can't do is attend to non-commodity aspects," says Mazourek. "For example, a heart-shaped tomato that becomes the latest huge craze a statistical model could never predict that happening."

The horticultural industry remains very much a world where trends are driven by consumer preference. "Consumer-oriented traits have always been important, such as flavor and diversity of products," says Rick Falconer, the U.S. managing director for Dutch breeder Rijk Zwaan and also chair of the American Seed Research Foundation's vegetable and flower research committee. "Seed companies are doing more consumer research projects, more downstream breeding direction and working towards tailoring specific vegetables for different customers."

Local food and organic movements have had a big influence in the marketplace, which feeds back into breeding programs. "People are looking for more heritage and heirloom flavors," says Mazourek. "Things that start in organic or local food movements are having a ripple effect and major industry players and many others are interested in making that a part of their portfolio."

More people are also keen on trying to grow their own food and want to know what will grow in their geographic area. That's driving the development of region-specific varieties and smaller independent seed companies are popping up to serve these niches.

"We went from having lots of smaller seed companies that were getting materials out of land-grant universities, to a few large companies with incredible resources that they focused on a handful of problems and opportunities," says Mazourek. "Now we're seeing a lot of small and regional seed companies back selling all these niche opportunities that have been left open."

What's Cooking?

Celebrity chefs are also doing their part to educate consumers about "designer" type vegetables, while resurrecting some traditional favorites by preparing them in new ways. After chef Dan Barber of Blue Hill Restaurant in New York City published a recipe for kale chips in Bon Appetit magazine, seed companies reported a huge spike in kale seed sales.

"By linking chefs and breeders, it's creating a great dialogue," says Mazourek. "We get information back to influence the breeding program and the chef is getting great new material."

Consumers are also demanding smaller produce, driven partly by convenience but also to make vegetables more kid-friendly. "Parents are really engaged in what they're feeding their kids," says Mazourek. "One of our big interests is what will appeal to a kid in terms of color, flavor and size that will make eating fun."

"Seed companies are doing more consumer research projects, more downstream breeding direction and working towards tailoring specific vegetables for different customers."

— Rick Falconer

Breeding for the Unknown

In an industry that's largely about taste, keeping everyone happy means developing products to meet the needs of seed companies, growers, retailers and consumers.

Monsanto's vegetable seeds division is focused on innovation to improve the quality and productivity of vegetables, says Edwards. "We are putting a lot of effort and resources into developing not only agronomic traits (like harvestable yield, insect and disease resistance), but also consumer (taste and overall appeal) and chain (shelf life) traits," he says.

The challenge that remains is that breeders are more often than not breeding for the unknown, whether that's erratic consumer tastes, climates, or new pests and diseases. "An example is downy mildew, which has broken all the resistances and now looks to be overwintering in greenhouses," says Mazourek. "Insect pests and different pathogens are moving or evolving in new ways and have a lot of us scrambling to be able to address that."

The importance of continued vegetable seed research is obvious and a collaborative approach from all industry players is being encouraged by ASRF through its permanent research fund. "Through the American Seed Trade Association, companies contribute to this research fund and every year when we have our annual meetings, we discuss what problems we have in our industry that we can solve through research as a group," says Falconer. "If a new disease comes to a crop like lettuce or broccoli, it's difficult to solve those problems as an individual seed company. But as an industry we can pull together and solve a problem collectively which is affecting all of us."

Angela Lovell



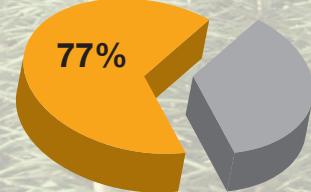
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Lavenders like mild conditions but gardeners who live in much colder climates can try their hand at growing this popular perennial thanks to Burpee's recent introduction of 'SuperBlue.'

Photo courtesy of W. Atlee Burpee

Floriculture Industry Plays Favorites

Breeding efforts focus on improving familiar varieties.

THE ADAGE REFERRING to the circuitous nature of things—"what's old is new again"—could be an apt description for today's floriculture industry. Growers, whether they churn out a thousand flats of bedding plants or plant a few sunflowers for cutting, seem to want the same thing—flowers that are familiar, but with a new twist.

Creating products with this pairing of reliability and beauty serves as the foundation for today's plant breeding and product development programs.

Familiar and Fantastic

For the home gardener, easy-to-grow flowers top the list of best sellers from W. Atlee Burpee selections. Sunflowers, zinnias, cosmos and marigolds that offer something new or a bit unique grab their customers' attention, says product manager Venelin Dimitrov. "Gardening with flowers is like fashion. Consumers are looking at what is new and trendy."

For that reason, the Pennsylvania-based company chooses to take those familiar ornamentals and devote research efforts into producing new varieties with unusual or bold colors, low maintenance requirements and a hardiness that will help the plant bloom through all kinds of conditions. Some plants being trialed currently include an echinacea with more fragrance, a double-flowered zinnia and early blooming lavender.

Johnny's Selected Seeds, a seed supplier in Winslow, Maine, finds the needs and wants of their core customer, the fresh market grower, to be similar. "A lot of our customers are veggie growers who supplement those sales with flowers. They prefer classic, easy-to-grow flowers that have some uniqueness and make a natural-looking arrangement," says Paul Gallione, technical and production education coordinator.

Two of their newest offerings include an aster and rudbeckia with needled or quilled-type blooms.

Commercial growers are seeking out reliability in the form of new seed products from companies like PanAmerican Seed. "Growers are looking for higher germination rates and more uniform crops for easy production. Consumers are looking for the best garden performance with great color and easy maintenance," says Matt Kramer, research director at PanAmerican Seed.

Nearly four years ago, PanAmerican Seed introduced multi-species multi-seed pellets for its Fuseable line. Advances in seed technology make this product easier to sow and it promises a mixed but balanced and natural-looking plant combo with tried-and-true blooms like petunias, bacopas and lobelias.

The company also sees value in building upon its popular Wave brand petunia. Earlier this year they introduced the Cool Wave pansy, known for its hardiness and trailing habit.

Kramer promises that other Wave brand expansions are

coming, including new colors and textures in the Wave Petunia series. It's been nearly 18 years since PanAmerican Seed introduced the Wave brand.

Status of Specialty Seed

Although flower enthusiasts can find more organic and heirloom seed on the market today, there is little demand for it, Dimitrov says. He surmises that organic preferences are focused on plants that are consumed. As for heirlooms, hybrids outshine them in disease and stress resistance. "Old heirloom flowers set seed and die back. They have a shorter bloom period. Here and there, people will try them but they always go back to hybrids."

Gallione of Johnny's Select Seeds said they see some interest in organic seed but not a lot of interest in heirloom varieties. Like Dimitrov, he sees those options being more popular in the vegetable world, for instance — the taste qualities associated with heirlooms.

Growers do like untreated seed but with more companies moving toward pelleted offerings, options are becoming limited, Gallione says.

They might not carry specific specialty labels, but Johnny's Select Seeds has seen interest grow in flower types known to support pollinators and predators and now offers two seed mixes, a beneficial insect attractant and a bee feed.

Dealing with Downy Mildew

In terms of disease issues, downy mildew in impatiens has had a significant impact on the floriculture industry in recent years. Some of the first regional outbreaks among the classic bedding plants were detected in 2011 and by the end of the 2012 growing season, the disease had spread to 34 states.

Kramer says PanAmerican Seed has worked hard to provide education and resources for customers, including a comprehensive growers' guide for those raising *Impatiens walleriana*. The company's breeding team is also exploring various avenues for improving disease resistance in impatiens. "At the same time, we understand the nature of the market and have also increased our efforts to provide a wide range of plants to serve as alternatives where impatiens have been lost, including New Guinea impatiens, an impatiens product highly resistant to downy mildew, begonia, coleus and other shade varieties," Kramer notes.

While some scientists have been urging greenhouse growers and gardeners to seek out alternatives, Burpee's Dimitrov says they are encouraging customers to buy impatiens seed and grow their own at home. "This is not a seed-borne disease. If gardeners have a good seed source and sterilized and hygienic soil, impatiens can be grown successfully."

What Does the Future Hold?

Offering sustainable products, both for the commercial and home grower, will continue to be important.

"We are the original 'green' industry so it follows that we are doing everything we can to make our products more sustainable. Plants bred with cold tolerance can reduce energy use in the greenhouse. Plants bred with heat or drought tolerance can reduce water use in the home garden. As the consumer becomes more aware of sustainability issues, promoting these plant traits



PanAmerican Seed has expanded their popular Wave brand series with the introduction of the Cool Wave Pansy, known for its hardiness and trailing habit.

Photo courtesy of PanAmerican Seed.

"Gardening with flowers is like fashion. Consumers are looking at what is new and trendy."

— Venelin Dimitrov



One of Burpee's newest sunflowers, Ms. Mars, is a smaller version of this garden favorite, making it ideal for container and small space gardens.

Photo courtesy of PanAmerican Seed.



The new multi-species Fuseables Precision Multi-Pellet from PanAmerican Seed offers commercial growers reliability from the point of planting.

Photo courtesy of PanAmerican Seed.

will make them more attractive to the eco-conscious market,” Kramer notes.

In light of the container garden trend, which continues to be very popular, Venelin Dimitrov says it’s fortuitous that breeding efforts include improving drought tolerance in plants. “If you have a plant with low water needs it might mean the difference between life and death in a container. This is proving to be an important attribute to plants in the ground too, considering the extremely hot weather we’ve seen.”

Helping consumers to explore the boundaries of gardening with the right plants also holds potential.

Extension of the growing season is gaining in popularity. In addition to PanAmerican Seed’s introduction of the Cool Wave pansy, the company has also identified several crop options, called ‘Mum Pals,’ referring to chrysanthemums. “These grow alongside traditional mums and meet certain criteria including easy-to-grow and are relatively inexpensive for summer production, a wide variety of plant habits and flower types for use in landscapes and home gardens and a focus on colors popular in the autumn,” Kramer says.

Seed breeders are also looking at ways to break the boundaries that dictate traditional growing areas for plants. Burpee now offers two hardy lavenders, ‘SuperBlue’ for cold, northern climates and ‘Phenomenal’ which endures the heat and humidity of the south.

What Recession?

While many industries are just now seeing measured recovery from the Great Recession, flower seed sales, especially on the consumer and fresh market end, remained strong during or even benefited from the economic downturn.

Dimitrov attributes that to the minimal investment and effort flowers require in return for the great curb appeal they offer. “Growing flower gardens from seed is one of the best ways



Photo courtesy of W. Atlee Burpee.

Burpee product manager Venelin Dimitrov says easy-to-grow flowers, like marigolds, are a favorite selection among their customers.

to improve the value of your property. Also, flowers are a great mood elevator and promote more positive social behavior.”

At Johnny’s Select Seeds, a date much earlier on the calendar serves as a milestone of sorts for product demand—the year 2000 and speculation that came with ‘Y2K.’ Gallione said some of the rather wild predictions about a collapsing economy prompted renewed interest in home gardening and their seed sales have been growing ever since. “We’ve seen no change in flower seed sales from the recession. Our exponential growth came around Y2K and we’ve been able to sustain that in a very positive way.” **Maria Brown**



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THE GREAT FLAVOR HUNT

In the quest for high yields and best possible disease resistance, has taste been neglected? The produce industry thinks so, and is trying to bring it back.

THE TERRIFIC ADVENTURES of Tasti-Man is an online comic book that follows a superhero who is half man and half tomato.

Tasti-Man uses his powers to rid the world of inferior tomato varieties. The comic is featured on Tasti-Lee.com, which promotes the new vine-ripened Tasti-Lee tomato “that brings significant improvements to health, flavor and freshness in grocery store tomatoes,” according to the website.

The Tasti-Lee variety and its associated marketing campaign represents a new trend in produce marketing, showing that produce marketers are thinking about seed and new varieties in ways they never have before.

“I think what has changed in the last three or four years is a more active engagement in trying to find a diversity of product—what’s new, what’s next,” says Bob Whitaker, chief science and technology officer for the Delaware-based Produce Marketing Association, the largest global not-for-profit trade association representing companies that market fresh fruits and vegetables and related products.

Changing Times

Whitaker says that while produce marketers have always had an eye on the seed industry and new varieties of fruits and vegetables, the way they are factoring that into their marketing strategies is changing. “The chef as a celebrity has emerged in the last 10 years—you see a lot more attention paid to things on the Food Network and Food Channel and all these kinds

of things. And so [produce marketers are] looking for that tomato that really has that backyard flavor, the peach that has that just-picked texture and flavor. I think there’s more and more of that out there,” he says.

The Tasti-Lee tomato is a prime example. It was developed by University of Florida horticulturalist Jay Scott with flavor in mind, according to Greg Styers, a sales and product development manager for California’s Bejo Seeds, the Dutch-owned company that distributes the Tasti-Lee tomato. Not only is the Tasti-Lee tomato touted to be bursting with flavor, it’s also 50 per cent higher in lycopene—an antioxidant believed to help prevent cancer—than other varieties. The quest for produce varieties that taste great while being highly nutritious is a trend that Whitaker says is becoming more common.

“It’s becoming more and more mainstream, and that’s the nutritional attributes of these things,” he says. “Is it possible to boost the vitamin A content in something, or boost the folate level in a leafy green, or something like that, so you can have something that’s demonstrably better than anything else out there.”

Paradigms Hard to Change

But it wasn't easy to get the Tasti-Lee tomato project off the ground, says Styers. He found out that paradigms can be hard to change in agriculture. "We approached all the big growers in Florida, and they didn't feel the industry was either ready for it or needed such a tomato," he says. "We had some growers we first approached saying the problem with the tomato was that it was too small."

To get things rolling, it took the involvement of some smaller growers willing to give the Tasti-Lee a chance. "We approached growers like Flavor 1st and Tomato Time here in Florida, and said 'hey look you guys, this is a great tomato. You can distinguish yourselves from the big guys,'" says Styers.

Flavor 1st, a North Carolina-based grower whose main focus is vine-ripened tomatoes, is happy with how well the Tasti-Lee is doing in the market despite what some growers saw as drawbacks in size. "We really believed in the fact the tomato had superior flavor, better color, better shelf life," says Mike Porter, who handles sales for Flavor 1st.

Where's the Flavor?

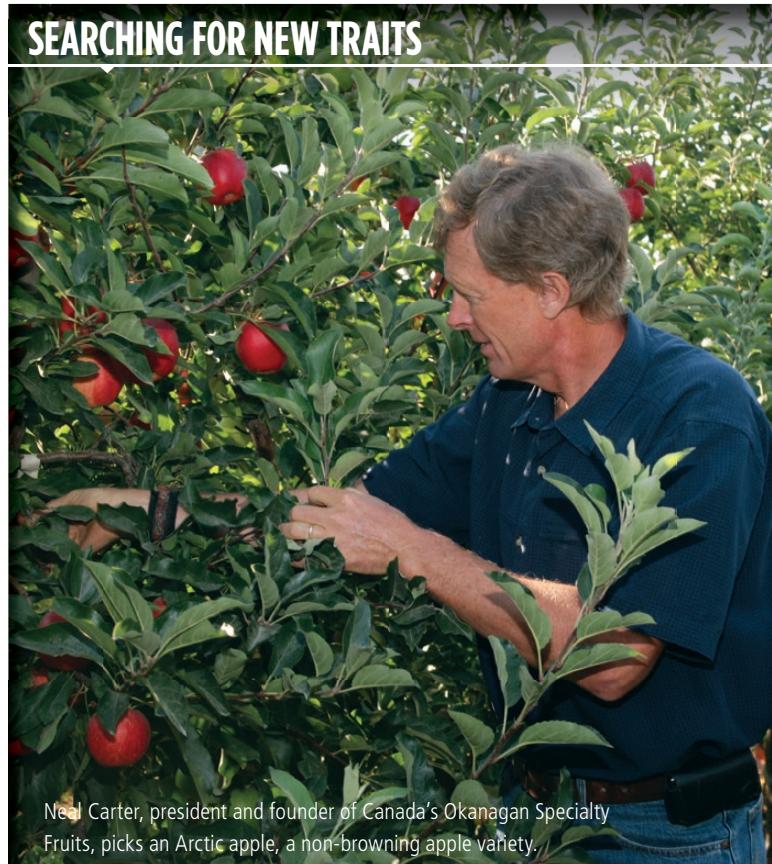
The quest for more flavor in produce is gaining speed, according to Jeffrey Brecht, a postharvest physiologist at the University of Florida. Brecht recently collaborated with a number of other researchers to conduct a large-scale study on how the flavor of fresh produce can be improved.

"I can't think of a single crop where breeders are not now paying more attention to the flavor when they select and release those new varieties," says Brecht.

That's largely because consumers have lamented what they say is a lack of taste in supermarket produce, something the produce marketing industry has taken notice of. "A lot of the old heirloom varieties, for example, that people remember fondly that tasted really great, well, we all know the yield was horrible compared to what's considered the norm nowadays, and that's why they're not commercial anymore. But it's possible to get the flavor back in, I think," says Brecht. "It's not a recent thing, it's longer term than that. There has been some forgetting about flavor [as yields have increased]."

Successfully promoting the Tasti-Lee variety to growers took some careful planning, considering the variety isn't as resilient as other common supermarket tomato varieties. "It does not have an exotic disease package. In fact, it had just a basic one, verti-

SEARCHING FOR NEW TRAITS

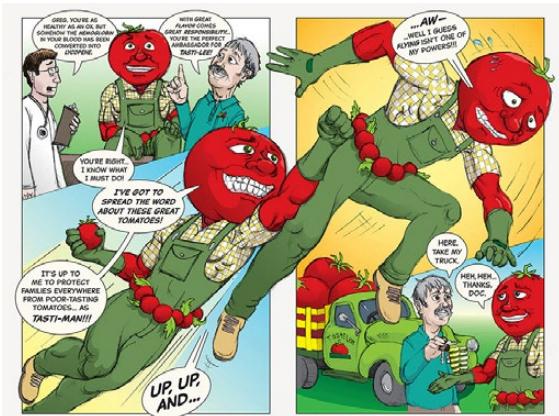


Neal Carter, president and founder of Canada's Okanagan Specialty Fruits, picks an Arctic apple, a non-browning apple variety.

It's not just tomatoes that have become part of the quest for new varieties with very specific traits. California's Bejo Seeds is about to begin selling Léttage, a new cabbage variety that's essentially half cabbage and half lettuce. Canada's Okanagan Specialty Fruits has created a non-browning apple scheduled to hit the U.S. market in 2015. It was created by introducing a non-browning trait into apple leaf tissue, thus eliminating enzymatic browning that can occur within minutes after an apple is sliced or bruised.

Such traits can only further satisfy a growing consumer desire, says Bob Whitaker, chief science and technology officer for the Delaware-based Produce Marketing Association, and will further drive the produce industry to consider seed and new varieties in ways they never have.

"You're looking at functionalities in terms of 'can I slice it, or it won't brown, what's the texture, is it appealing, does it have a sweetness to it, or maybe seedless, or is it the right size,'" he says. "I think it's that kind of functionality that folks are beginning to look for now."



The Terrific Adventures of Tasti-Man is a web comic used to promote the Tasti-Lee tomato.

cillium resistance and fusarium 1, 2 and 3. It doesn't have virus resistance or anything like that. That was another holdup for some growers, even though 50 percent of the acreage grown here are varieties with a similar disease package," says Styers.

For Flavor 1st, Tasti-Lee's small disease package hasn't been an issue. "We grew them this year up here in North Carolina, and we had some really rough weather conditions all year, and for some reason they did very well throughout the whole summer program—even without the disease package, which was pretty substantial because some of our other tomatoes that have disease packages still didn't do as well," says Porter.

Such good performance from a variety with a small disease package could help sell skeptical producers on the idea, adds Styers. Brecht says a major reason so much produce lacks significant flavor simply comes down to how early it is picked and sent to market.

Changing when produce is harvested represents a challenge for the industry, Whitaker notes, since it may not ship as well if it's ripe, and "the farmer still has to be able to get a decent enough yield out of these things so that it's agronomically feasible and also financially possible to grow these things."

Exclusivity Deals

Return on investment is also a major issue at the retail level. "If you're going to sell a new variety to a large retailer, what's in it for them? And how do they know you're not going to another retailer? ...The retail system, the way it's set up in this country, is not exclusive. It's based on supply and on availability windows and relationships, but not necessarily on your ability to deliver a specific variety," says Whitaker.

But the Tasti-Lee tomato has helped prove that can change. Bejo Seeds owns the distribution rights and has been selling the tomato in Florida exclusively through the Publix supermarket chain. "Tomato Time and Flavor 1st, both have sold since the mid-1990s to Publix. That's how we got in there," says Styers.



The Tasti-Lee tomato is a vine-ripened variety distributed by California's Bejo Seeds.

NEW VARIETIES AND PACKAGING

Both producers and produce marketers have an important role to play in whether a new variety is commercially viable. A large part of that success comes down to packaging methods and whether the variety is appropriate for them, says the Produce Marketing Association's chief science and technology officer, Bob Whitaker.

Bejo Seeds' Tasti-Lee tomato is sold in one-pound boxes, a marketing tool that sales and product development manager Greg Styers says has been very successful. "This variety has maybe 40 or 50 percent extra large fruit and the rest are kind of large to medium. That's one of the reasons we have ... a little cardboard pack with flow-wrap plastic that goes over it and we can put two, three, four, or five tomatoes in it to make a pound. ... It gives consumers more choice."

But package type also plays a major role in marketing success. University of Florida postharvest physiologist Jeffrey Brecht notes that a new type of container called the Hammock pack allows fruit to be transported already ripe. "We've done shipping tests on that with pears and peaches that were very ripe—ready-to-eat ripe—and shipped from California to either Atlanta or Jacksonville, and they arrived in great condition."

An advantage of the non-browning Arctic apple, developed by Canada's Okanagan Specialty Fruits, is actually its resilience to (rather than suitability for) shipping and packaging. "We actually shipped some Arctic apples and some control apples to New Orleans by courier," says Neal Carter, Okanagan Specialty Fruits president and founder. "The controls were just completely hammered, they were just a mess. They were brown and ugly, and the Arctics weren't."

That's another step forward for the exclusivity model, adds Brecht. "They've been selling that tomato by the variety name, which is really not the norm for vegetables. I think that's sort of the wave of the future, having these sorts of special varieties that you can only get from a certain exclusive source." **Marc Zienkiewicz**



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Ensuring Safety and Market Access



Much progress has been made recently on the development and adoption of international phytosanitary standards, while at the same time staying on top of food safety practices right here on U.S. soil—which will lead to safer food and better market access.

IMPROVING AND STREAMLINING phytosanitary measures to ensure market access around the world is one of the most important issues in the seed industry today, especially for the flower and vegetable sector.

According to the American Seed Trade Association, “international standards create a predictable trade environment as well as a level playing field for how different countries regulate seed shipments, and provide a basis for challenging regulatory actions when they are not justified according to these standards.”

The seed industry has been encouraging international organizations such as the North American Plant Protection Organization and the International Plant Protection Commission to develop and adopt international phytosanitary standards for many years. Fortunately, progress was finally made last spring. On March 19, 2013, the first international standard for seed movement was finally approved and adopted by NAPPO.

Referred to as Regional Standard for Phytosanitary Measures 36 and titled *Guidelines for the Movement of Seed*, this standard lays out criteria for the movement of seed into, from, and among NAPPO member countries and for procedures to facilitate re-exportation of seed, says Ric Dunkle, senior director for Seed Health and Trade for ASTA. The NAPPO member countries are Canada, Mexico and the United States.

“Work on this standard began in 2009 by a NAPPO seed panel that consisted of members from the national plant protection offices and ex officio industry representatives from the three countries. I served on this panel as the U.S. industry representative,” says Dunkle.

This standard outlines the general phytosanitary requirements for a National Plant Protection Office of the country of origin to follow for moving seed internationally, including seed for re-export, into, from and among NAPPO member countries.

These general requirements include how to properly document country of origin and guidelines for including additional official phytosanitary information on a certificate that will

“International standards create a predictable trade environment as well as a level playing field for how different countries regulate seed shipments”

— Ric Dunkle

assist NPPOs in the issuance of phytosanitary certificates for re-export. In addition, these general requirements address pest risk assessment and pest risk mitigation by including criteria for determining if seed is a pathway for the potential introduction of regulated pests, and if plant pathogens are known to be seed-borne or seed transmitted.

Seed certification, testing and diagnostic protocols for particular seed pests are recommended under the standard. It also provides guidelines for obscured and restricted/prohibited seed. Technical appendices and an annex are included to identify specific recommended protocols for seed pests, as well as phytosanitary treatment options for specific seed pests.

“At present, the annex and appendices include information only for a few pests of concern to the NAPPO region. A NAPPO expert working group will be established to develop information on additional pests of concern,” says Dunkle.

Since the standard was adopted, Dunkle says it has already had a major impact. Mexico has already made a number of improvements to its phytosanitary requirements for U.S.-origin seed based on this standard plus outcomes from a joint ASTA-



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“The seed industry cannot control diversion or unintended use of seeds after the seeds leave the producer’s facility.”

— ASTA

Mexican Seed Trade Association cross-border workshop held in Nogales, Mexico, in October, 2012.

Progress has also been made within the International Plant Protection Commission, which recently made the decision to develop a phytosanitary international standard (ISPM) for seed movement. According to Dunkle, an expert working group has been formed and in July, 2013, it began work on drafting this new standard.

Last October, an ad hoc seed industry working group was formed through the International Seed Federation to draft a series of white papers on issues proposed by the industry to be included in the new seed standard. This ad hoc working group consisted of representatives from ASTA, the International Seed Federation and the Seed Association of the Americas and a number of other national seed associations and worked to develop consensus positions on all the issues proposed for inclusion in the standard.

“A total of 13 documents were developed and forwarded to the [IPPC expert working group] several weeks prior to the meeting,” says Dunkle, who was part of the group. “The [expert working group] produced a first draft which is expected to go out for country consultation sometime in 2014. The IPPC Standards Committee must first review this draft before it goes out for country consultation. The goal has been set for the IPPC to adopt this standard at its annual meeting in Rome in 2016.”

According to Dunkle, the new NAPPO standard will be extremely useful to the expert working group in the development of the global standard. Now that the process has begun, it will take at least three years to develop and to get the standard adopted by the IPPC. Once adopted, the IPPC member countries will be encouraged to base their phytosanitary import requirements and measures on this standard, which will make international seed trade much smoother and more predictable.

Food Safety Concerns

Food safety is another important aspect of proper phytosanitary measures, and one that must be dealt with at a local and domestic level. The 2006 outbreak of *E. coli* in the United States, associated with spinach production in California, has drawn closer scrutiny to seed as a possible source of infection. Although never proven scientifically, seed remains a concern for many as a possible source for human pathogens such as *E. coli*, salmonella and others.

The highest risk for the seed industry is seed that is used for the production of sprouts. ASTA maintains a capability to respond rapidly to outbreaks of human pathogens associated with vegetables which could potentially impact the vegeta-

ble seed industry through its Food Safety Pathogen Working Group. ASTA recently supplied comments to the Food and Drug Administration on their proposed rules for produce safety under the Food Safety Modernization Act.

ASTA’s comments focused on the agency’s proposed regulations that would affect seeds used for sprouting. According to its comments, ASTA strongly supports a requirement for sprouters to only use seeds that are expressly intended for sprouting. Unfortunately, some sprouters currently use seed that was not intended for that purpose.

“The seed industry cannot control diversion or unintended use of seeds after the seeds leave the producer’s facility,” says the ASTA’s report. “We hope that FDA’s produce safety regulation can help prevent this diversion problem from occurring in the future by requiring sprouters to verify that the seed they use was intended for sprouting.

“It will not improve food safety for FDA’s produce safety regulation to impose requirements on facilities that produce seed for agronomic/planting purposes. That is, FDA’s regulation should only affect facilities that produce seed expressly intended for sprouting. As noted in previous comments ... seed used in fields and greenhouses for the production of fresh produce does not contribute to pathogen outbreaks. Therefore, we support FDA’s proposed limitation to only regulate seeds under the produce safety rule if they are produced with the express intent to use the seeds for sprouting. We urge FDA to clearly narrow the scope of regulation for seed to only those seeds that are produced with the express intent to use for sprouting,” continues the report.

ASTA is also preparing comments to the FDA for their proposed rule on preventative controls for feed which are due on Feb. 26, 2014. FDA is under court order to publish Final Rules for all of the regulations under FSMA by June 30, 2015.

By continuing to stay on top of safety and phytosanitary measures, the U.S. seed industry is ensuring market access and a predictable trade environment for the years to come.

Julie McNabb

WHERE
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Visit the ASTA website to learn more about phytosanitary regulation and emerging issues. www.amseed.org/Issues/Phytosanitary/Key-Issues/

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protecting pollinators

PROTECTING POLLINATORS RESOURCES GUIDE

Over the past five issues of *Seed World* you have read about the stressors impacting honey bee health, global research initiatives for pollinator health and the seed industry's response to protecting pollinators. In this final installment, Protecting Pollinators brings you a resource guide of links and tools you can share with your sales team and farmers. We hope this guide will encourage discussions on pollinator stewardship and underscore the important role pollinators play in agricultural production.

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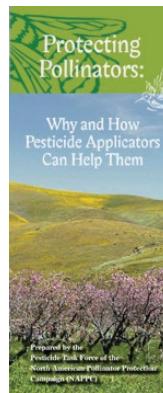
POLLINATOR RESOURCES

Honey Bee Health: Understanding the issues, providing solutions

A comprehensive booklet providing information on a broad range of topics including honey bee health, stressors, impact of crop protection products and stewardship guidelines. Available for download at: www.beecare.bayer.com.

The Guide to Seed Treatment Stewardship

The American Seed Trade Association, CropLife America and several other industry partners have worked together to create an all-in-one guide for seed treatment applicators and farmers for handling and managing treated seed effectively.



Factors Affecting Global Bee Health

CropLife International's report on honey bee health and population losses in managed bee colonies.

Protecting Pollinators: Why and How Pesticide Applicators Can Help Them

A four-page brochure from the North American Pollinator Protection Campaign on the basics of pollinator interaction with pesticides and minimizing pollinator exposure.

Seed World: Giant Views of the Industry

Watch *Seed World*'s interview with Robyn Kneen, Bee Care project manager for Bayer CropScience on the role of pollinators in agriculture, neonicotinoids and why Bayer CropScience has invested in the Bee Care program. View online at www.SeedWorld.com.

POLLINATOR LINKS

- **Pollinator Partnership**—The Pollinator

Partnership's mission is to promote the health of pollinators, critical to food and ecosystems, through conservation, education, and research. Signature initiatives include the NAPPC (North American Pollinator Protection Campaign), National Pollinator Week, and the Ecoregional Planting Guides.

- **United States Department of Agriculture Natural Resources Conservation Services**—The USDA NRCS offers a dedicated section on insects and pollinators, including information on how farmers can help pollinators. The USDA offers several other internal links on pollinator information and other resources for download.

- **The Xerces Society**—The Xerces Society is a nonprofit organization that protects wildlife through the conservation of invertebrates and their habitat. Established in 1971, the Society is at the forefront of invertebrate protection worldwide, harnessing the knowledge of scientists and the enthusiasm of citizens to implement conservation programs.

- **Bayer Bee Care**—The Bayer Bee Care program is part of Bayer CropScience's commitment to bee health. Its aims are to: further promote and develop solutions to improve bee health; actively promote the bee-responsible use of our products; and share knowledge and expertise with stakeholders from the beekeeping and agricultural communities and with scientific and governmental institutions, NGOs, policy makers and regulators.



SOCIAL MEDIA RESOURCES

Stay connected for the latest information on the Bayer Bee Care program and pollinator education.

Facebook

Bayer Bee Care Center
www.facebook.com/BayerBeeCareCenter

The Pollinator Partnership:
www.facebook.com/ThePollinatorPartnership

The Canadian Pollination Initiative
www.facebook.com/pages/NSERC-CANPOLIN-Canadian-Pollination-Initiative/55556112822

Status and Trends of European Pollinators (STEP)
www.facebook.com/pages/Status-and-Trends-of-European-Pollinators-STEP/177104628996076

YouTube

Bayer Bee Care Center
www.youtube.com/BayerBeeCareCenter

The Pollinator Partnership
www.youtube.com/user/PollinatorPartners

Twitter

Bayer Bee Care Center
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The Pollinator Partnership
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POLLINATORS AND TREATED SEED

Wild and managed pollinators are vital to agricultural production and the environment. Many farmers, including those who grow corn, use seed treated with insecticides to protect their crop from insect pests. Some insecticides, such as nitro-guanidine neonicotinoids, may be toxic to pollinators. Depending on a number of factors, planting of treated seed can emit dust-containing pesticide into the air, placing pollinators at potential risk if they are exposed to the dust.

The following best management practices are provided to reduce the risk to pollinators, particularly honey bees, from exposure to dust from treated seed.

KNOW WHERE BEEHIVES ARE LOCATED

Communication and co-operation among growers, seeders and beekeepers on the timing of seeding and the location of hives can help reduce the risk of bee incidents. Such communication can enable beekeepers to confirm that hives are located upwind of the planting field or in shelterbelts, and have access to clean water sources. It can also permit beekeepers to temporarily protect or relocate hives where this is feasible.

WEATHER CONDITIONS CAN INFLUENCE POLLINATOR EXPOSURE

Pollinators can be exposed to treated seed dust when it is carried in the air or is deposited onto flowering crops, weeds, soil or water sources. Since very dry and/or windy conditions may favor dust transport and exposure, it is important to monitor environmental conditions and avoid planting treated seed in such conditions.

QUICK FACT

While staple crops such as corn, wheat, rice, and potatoes are self-pollinated or wind-pollinated, around 70 percent of the world's most widely produced crop species rely to some extent on insect pollination.

Where possible:

- Avoid planting treated seed in windy and/or very dry conditions.
- Consider wind direction and avoid planting treated seed if bees are foraging downwind or nearby.
- Control flowering weeds in the field before planting so that foraging bees are not attracted to the planting site.

AVOID GENERATING DUST WHEN HANDLING TREATED SEED

Follow best practices when handling and loading treated seed:

- Check that treated seed and coating are of high quality: seeds should be clean and the coating should be well-adhered to the seeds.
- Handle bags with care during transport, loading and unloading in order to reduce abrasion, dust generation and spillage.
- Do not load or clean planting equipment near bee colonies, flowering crops or weeds, or hedges.
- Pour seeds carefully into the planter in such a way as to avoid the transfer of dust from the seed bag.
- Do not shake any loose material or dust from the seed bag into the planting equipment.
- Use of Seed-flow Lubricants:
 - Follow recommendations of planter manufacturer for use of talc or graphite.
 - Avoid excess use rate of lubricants to minimize dust.
 - Use proper lubricant rate to avoid buildup of unwanted residue, and to minimize dust.

MAINTAIN PLANTING EQUIPMENT

It is important to use planting equipment that minimizes spillage and dust emission from the planter, and to follow planting equipment manufacturer directions.

- Follow manufacturer's recommendations for operation, cleaning and maintenance as found in equipment manual.

- Direct planter exhaust downward towards the soil surface, if possible. (Use of downward deflectors may decrease off-site movement of dust.)
- Always plant at the recommended seeding rate.
- Calibrate planting equipment properly.
- Avoid using the same equipment for treated seed and for harvested commodity seed or grain, if the treated seed labeling states it is not for food, feed, oil, ethanol, or other commodity grain channel uses.

QUICK FACT

In a normal bee lifecycle during the summer season, some 2,000 worker honey bees will leave the hive to die naturally every day due to their short lifespan of only four to six weeks. The dead bees are replaced by newly-hatched bees, so maintaining the colony.

ENSURE PROPER CLEAN-UP AND DISPOSAL

Take care when cleaning up after planting seed and follow county/state disposal requirements. For more detailed guidelines on disposal of both small and large quantities of treated seed, visit *The Guide to Seed Treatment Stewardship* at www.seed-treatment-guide.com:

- Spilled or exposed seeds and dust must be incorporated into the soil or cleaned up from the soil surface.
- Keep treated seed and dust away from surface water.
- Properly dispose of any dust or treated seed remaining in planting equipment (for example, empty into a container and vacuum any dust remaining in the hopper).

- Do not leave empty bags or leftover treated seed in fields or the environment.
- Participate in collection programs for seed bags where available.
- Bees should always be provided with a source of clean drinking water.
- Provide pollinator-friendly habitat (for example, alfalfa, clover, wildflowers) away from active fields.

QUICK FACT

Scientists and regulatory authorities agree that bee health is a complex issue. Several studies have also indicated that bee health may be affected by many different factors, including pests and parasites, microbial diseases, inadequate diet, bee management practices and climate change. It is widely believed among the scientific community that Varroa mite is the main factor affecting the health of honey bee colonies.

EXERCISE POLLINATOR-FRIENDLY PRACTICES THROUGHOUT THE GROWING SEASON

Bees collect pollen, nectar and water from different sources that could become contaminated with pesticide residue. For example, bees collect pollen and nectar from flowering crops and weeds, as well as water from puddles and moist soil in or beside fields.

- Avoid contamination of plants, soil and water sources that may be used by bees.

DON'T FORGET TO WEAR PERSONAL PROTECTIVE EQUIPMENT

Wear appropriate personal protective equipment (PPE) when handling treated seed and avoid exposure to dust.

- Wear PPE for handling treated seed as specified on the seed tag and the product label. PPE may include long pants, a long-sleeved shirt, coveralls, shoes and socks, chemical resistant gloves or a respirator.
- Avoid exposure to dust when handling treated seed when opening and emptying treated seed packaging, loading and planting, and during cleanup and disposal activities.

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IS BIG MONEY

THE LAST DECADE saw boom times for agriculture. Supply squeezes, emerging market growth and dire warnings about the planet's ability to feed itself combined to spark waves of investment interest in the sector all over the world. Since then times have tempered, the result of bumper crops, slowing economies and dampening prices for agricultural commodities.

The result, according to some investment experts, is that ag investing may have lost its lustre—perhaps to the point where the big money represented by fund managers and institutional investors is now flowing out of the sector.

Michael Coleman is firmly in that camp.

"Investors have cooled on the commodity story," says the veteran trader and co-founder of the Merchant Commodity Fund, a Cayman Islands-based discretionary fund that typically has somewhere between 30 to 50 percent of its capital invested in agricultural commodities. Coleman says Merchant has seen a massive drop in capital in the past two years with assets under its management shrinking from \$1.5 billion at the start of 2011 to just \$130 million today.

money is not growing. It hasn't been pulled out yet, but my sense is that there hasn't been much new addition."

Low Returns on Investment

Agriculture products, the so-called soft commodities, are part of the larger commodity picture that includes energy and metals. Gold and other hard commodity investments have performed poorly in recent years, dragging down the sector generally.

"Overall, commodities have been very disappointing for investors," Coleman says. "It's been a case of, generally, returns not being very good. So if you've been a commodity index investor through the biggest bull market since the early years of the 20th century, you actually haven't made any money."

Coleman says such things as strong economic growth in emerging markets like China contributed to a robust ag sector and corresponding investor interest during much of the 2000s. Since then the ag picture has changed as a result of shifting supply and demand factors.

"From an investor's point of view, at the top headline level, it looks like this commodity super-cycle, if it's not over,

Why investors may have soured on agricultural commodity funds.

LEAVING AG?

"Sadly, our experience has been reasonably typical," says Coleman, a former Cargill trader who nine-and-a-half years ago founded Aisling Analytics, the Singapore-based management company for Merchant, along with former Cargill colleague Doug King.

The result, he says, is that a number of high-profile discretionary funds with "reasonably-sized agricultural exposures" have had to shut down in recent months. One example is the U.K.'s Clive Capital, which at its peak had \$5 billion in assets, according to Coleman.

And it's not just discretionary fund managers, he says, who are feeling the pinch. Coleman believes institutional and other large investors aren't as keen on commodity index investing or commodity exchange traded funds as they once were.

"I think in general there have been fairly significant outflows on the commodity sector. Those outflows have been concentrated more with discretionary funds [like Merchant]," he says. "Where there's been less outflow is in the index investing. So I think the situation vis-à-vis the ag market is that commodity index money is still a sizeable element in the market, but that

it's taking a breather," says Coleman, pointing to recent news items about lower growth trajectories projected for China and big supply-side increases in various ag commodities as the kind of stories influencing investors these days. "There's no top headline story anymore about why I should be invested in commodities."

According to Coleman, a lot of money flowed into gold and other commodity investments, much of that into index funds, for diversification purposes and as a hedge against inflation. "That argument for diversification and inflation hedging has been much weakened over the last couple of years," he says.

Coleman maintains many investors unfamiliar with the sector jumped on the ag commodities bandwagon during the mid-2000s—and many of them have since left.

"Commodities were in a boon, and lots of people who hadn't traded commodities before got involved and have been disappointed," Coleman explains. Compounding the problem, he says, is the fact that over the last year, commodities have "massively underperformed" other equities.

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Diego Parrilla, CEO of NARECO Advisors.



Philippe de Lapérouse, managing director of HighQuest Partners.

What does Coleman think it'll take to turn ag commodity investment around? "It's got to be some combination of Chinese and emerging market growth reaccelerating and really the creation of shortage again," he says. "In the period 2004 to 2008, you had structural deficits appear in a wide range of agricultural commodities, so prices went up and that attracted more investment."

However, Coleman believes a bearish ag market is a trend that could continue for some time. "Commodities have been hot, now they're now cool and they're probably going to be cool for awhile," he says. "The last time they went cool was back in 1981, and they stayed cold for 20 years."

Diego Parrilla is founder and CEO of NARECO Advisors, an asset management firm specializing in natural resources and commodities also based in Singapore. Parrilla agrees investment interest in the ag sector has definitely cooled as a result of soft commodity prices, and he believes biofuels also come into play.

"I think the agricultural flows are a reflection of the general sentiment towards commodities," says Parrilla. "The energy revolution in our view will have a major deflationary impact across energy prices, and that will impact agricultural commodities as well, which have seen a major increase in production capacity to cope with biofuel demand and government mandates. If Mother Nature is kind and we see normal weather, we could see much lower agricultural prices for a long time."

Parrilla believes that on the supply side, it will take "some very adverse weather" negatively affecting agricultural production to spark strong tactical interest by investors in the ag sector. "Otherwise the trend remains for lower interest, and given the herd-ish mentality of investors they are unlikely to get involved," he says.

Market Volatility

Philippe de Lapérouse is managing director of HighQuest Partners, a strategy advisory firm serving strategic and financial investors in the global agricultural space based in St. Louis, Mo., and chair of the Global AgInvesting conference series. While he agrees there has been "quite a bit of movement" in the commodity index funds in recent years, de Lapérouse stresses that volatility is the nature of the beast.



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"Those are fairly liquid strategies, so the money there has a tendency to kind of swing," he says. "I think we're going to continue to see fairly strong volatility in the markets."

However, de Lapérouse is optimistic about the long-term prospects of ag investing. "I would argue there's still a lot of opportunity," he says. "There are lots of ways to play, to invest in agriculture besides commodity index funds."

One of those ways is to look at buying farmland with an eye on the long term. "To say that farmland investing today is not a good deal, I would argue that someone who has a 30-year time horizon, it may be a great time to buy," he says. "It's a different perspective, different needs."

De Lapérouse cites the case of numerous large corporate landholders in the United States that are looking for investments which preserve capital and provide a return over the long haul as a means to meet long-term financial commitments. "They're investing in farmland, but they're looking at it as a 25- to 30-year investment," he says. "That's quite different than if you're a private equity investor and you're looking at a seven-year life cycle or term on your fund."

De Lapérouse suggests that infrastructure required to support production and movement of food is another aspect of agriculture that shouldn't be overlooked by investors. "The money, it hasn't really come to the infrastructure area, which is really where I see the big opportunity," he says.

"To say that farmland investing today is not a good deal, I would argue that someone who has a 30-year time horizon, it may be a great time to buy."

— Philippe de Lapérouse

"The commodity business is like the real estate business. It's all about location—the location where the commodities are grown and where the consumption markets are located and getting them from one place to the other," de Lapérouse says. "Whether it's building of fixed facilities, networks of elevators, storage facilities, transloading facilities or port facilities, I see a lot of opportunity on the logistics side."

Mark Halsall



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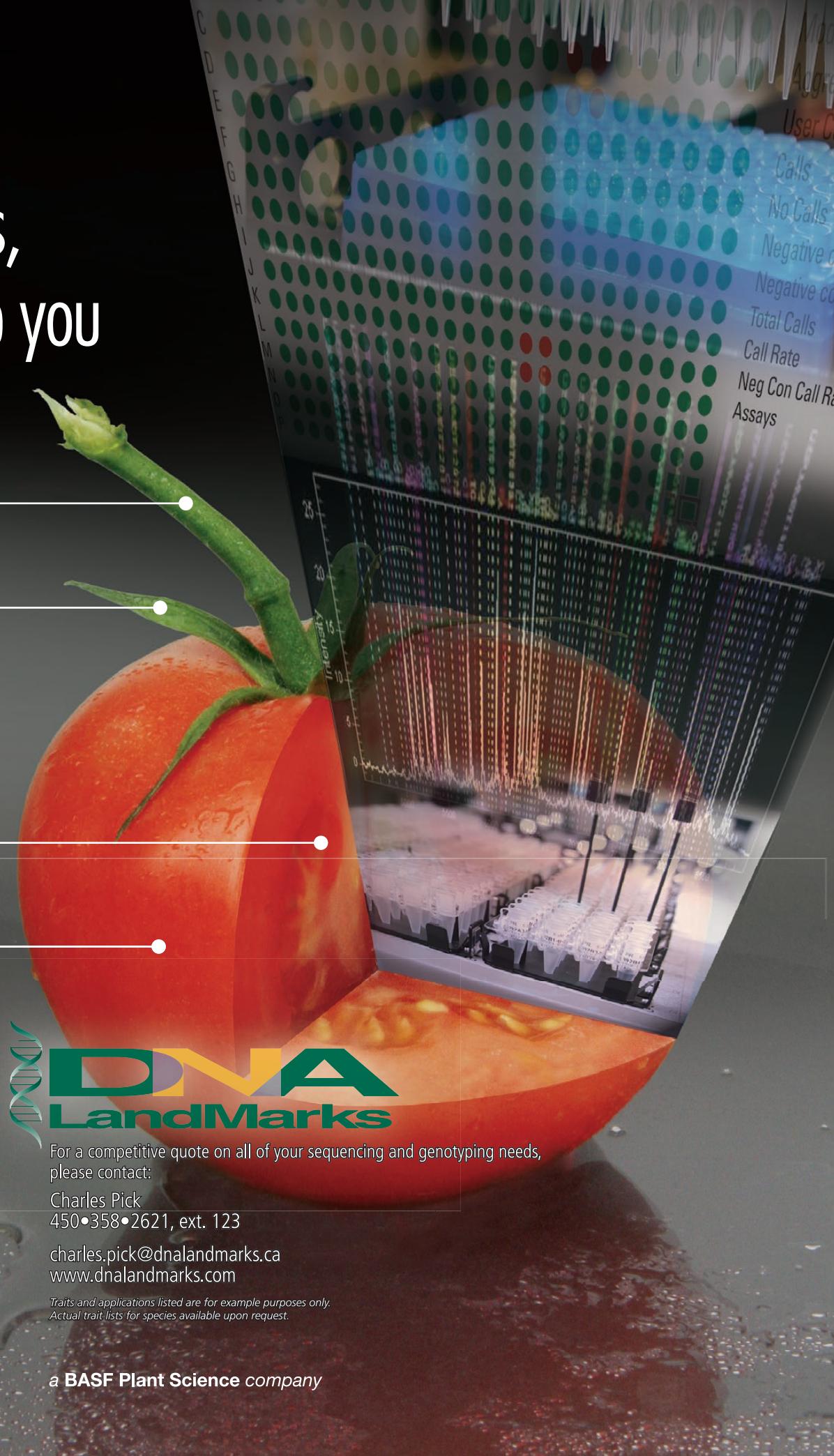
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MAINTAINING THE SEED EXPORT SYSTEM

U.S. National Seed Health System keeping the flow of seed exports running smoothly.

SINCE ITS INCEPTION in 1999, the U.S. National Seed Health System has been striving to set standard seed health testing and inspection protocols. The goal is to further advance the export process of seeds throughout the country in order to aid international trade. The NSHS arose out of the need of the seed industry to move seed internationally to meet world demands at a time when phytosanitary requirements are increasingly used as potential barriers to trade.

The NSHS is a program authorized by the United States Department of Agriculture's Animal and Plant Health Inspection Service. It's administered by the Iowa State University Seed Science Center to accredit both public and private entities (seed company or other non-government agency) to perform certain activities needed to support the issuance of federal phytosanitary (export) certificates for the international movement of seed.

Once a private or public entity is accredited by the NSHS, they can then conduct seed health testing, phytosanitary field inspections, as well as seed sampling inspections. The results of these inspections and/or tests are then submitted to USDA-APHIS who then issue the phytosanitary certificates. This process offers major logistical benefits to seed companies by eliminating delays in the process of shipping seed lots.

The NSHS also develops new-and-improved phytosanitary testing and inspection methods, and according to Lisa Shepherd, director of the National Seed Health System Administration Unit at Iowa State University, their work is intended to develop the most accurate, consistent and easy-to-use methods for certification. "It's really helped to speed up the process for companies, they can now internally plan ahead in terms of seed exports and do not have to wait for inspectors," says Shepherd.

Seed Company Perspective

According to John Stevens, phytosanitary issues manager with DuPont Pioneer, having an accepted set of seed health testing and inspection methods is very valuable to a seed company.

"Standardized testing and inspections ensures consistent results between production areas in different states, and removes

the uncertainty which occurred when different methods were used in the past," says Stevens.

Since the NSHS not only publishes its methods but makes them available to all importing and exporting countries, it removes any doubts among importing countries as to how the seed has been tested. "By publishing its methods, the NSHS can be viewed as a model system for international seed movement and other countries can evaluate and use NSHS methods themselves."

"Standardized testing and inspections ensures consistent results between production areas in different states, and removes the uncertainty which occurred when different methods were used in the past."

— John Stevens

The ability of U.S. seed companies to become accredited is important to seed production as well as to a company's research operations. An entity can become accredited in four areas:

- laboratory seed health testing,
- field inspections (of seed crops during growth),
- seed sampling for seed health testing,
- and visual inspection of the finished seed just prior to export.

Stevens notes that with the continual erosion of state and federal resources to provide the services needed by seed companies (or any other exporter), the ability to perform many of the formerly 'official' functions (testing, inspection, sampling) means a seed company can expedite exports, often saving as much as

two weeks in the shipping process. "For a seed company, [two weeks] can mean the difference in shipping a cargo by boat (relatively cheap) to shipping by air (relatively expensive).

"In addition, by inspecting one's own crops, a seed company can determine with a greater degree of certainty the eventual plant health status of the crop prior to harvest," says Stevens. "This helps in inventory management, as well as crop segregation (infested vs. non-infested) and greatly increases efficiencies at the seed plant level and increases throughput."

Impact on the Industry

Since 2001, NSHS certification has allowed the U.S. seed industry to use the accredited entities to help facilitate and accelerate the issuance of seed phytosanitary export certificates.

In addition to its value to seed production, Stevens adds that the NSHS is also valuable to seed research as the efficiencies it provides also help seed researchers to rapidly move their material between research locations globally to accelerate product development and testing.

Through the NSHS, new testing and diagnostic methods are incorporated into the accreditation program to maintain the program on the cutting-edge of technology. "A number of new testing methods will be released to the industry in early-2014," says Shepherd. The NSHS also serves as a resource for pest risk assessment and phytosanitary resolution whenever disputes arise that disrupt the international movement of seed.

Shannon Schindle

ACCREDITED ACTIVITIES

Activities for which entities can obtain accreditation by the NSHS include:

- Laboratory seed health testing: laboratory-based program to test for plant pathogens in seeds.
- Phytosanitary (growing season field) inspection: disease inspection of plants grown to produce seed in the field, nursery or greenhouse.
- Seed sampling: sampling seeds that require laboratory seed health testing.
- Visual inspection: inspection of seed shipments at exporter's facility prior to issuance of phytosanitary certificates.

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Further information about the U.S. National Seed Health System can be found at: nshs.iastate.edu/index.html



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GMO Food Labeling Issues Affect Vegetable Industry



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CONVERSATION SURROUNDING GMO food labeling legislative initiatives in the U.S. will become part of the overall biotechnology experience observed around the globe and will contribute to the development of agriculture in other lands. Many leading disparate conversations focus on canola, corn or soybeans and may overlook or perhaps just fail to understand the complexity of the issue and potential negative impacts on the vegetable industry. Well-meaning people and policy can sometimes lead to unintended consequences and detrimental effects.

Very few fruits or vegetables offered in U.S. grocery stores are genetically modified. The vast majority have been conventionally bred. "But in preparation of these [non-GMO] products, they can be mixed with GMO oils, sweeteners, etc. that essentially render these products as being GMOs at that point," says Southern Illinois University professor of vegetable science Alan Walters.

The U.S. has long enjoyed a robust system of providing the public the assurance of a consistent and healthful food supply. Key agencies on the forefront of doing so include the U.S. Food and Drug Administration, United States Department of Agriculture and U.S. Environmental Protection Agency. The system is underpinned by various bodies of scientific knowledge, a responsible multi-level public sector (federal, state and local) and a participatory private sector. And these are being underpinned by a free-market system operated within the framework of a democracy.

Bodies of knowledge evolve over time. Finite answers are hard to come by. Science is not perfect. Public officials can't always satisfy the entire spectrum of stakeholders as they often hold opposing opinions based upon differing values. Nor should public officials always be expected to "get it right" when making decisions. No system is perfect. Even with the inherent shortcomings of the U.S. system it is more than sufficient.



Most vegetable varieties are conventionally bred, however, when processed they can be mixed with products containing GMOs, creating consumer confusion.

The U.S. system has historically embraced science-based knowledge and information in the administration of programs to provide a safe and reliable food supply to citizens and trading partners. Science, and thus U.S. policy, does not distinguish between food produced by genetic modification by means of biotechnology versus traditional means of genetic modification. The resulting products from these gene modification methods are deemed as being essentially equivalent. They are considered to be "one and the same" with respect to food safety and consumer protection purposes. Labeling laws that differentiate between the two, in the name of "greater consumer choice," may cause number of unintended and undesired consequences.

How might the citizenry and elected officials choose to address the unintended consequences brought about by enactment of GMO-based food labeling legislation? This remains a question of concern. Broad themes are emerging for public consideration.

A brief introductory discussion of six such themes follows:

- 1) The future range and selection of food products that will be available to consumers, including those having specific attributes such as non-GMO, may in reality be reduced from what consumers presently enjoy and currently expect.



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The complexity of “food” reaches far beyond individual commodity crops or given grocery store food items, each being complex in its own right;

2) Consumers may be required to pay proportionately more for food in the future than what is presently accepted as the norm. The simple disruption of the nation’s current large and efficient food system alone will likely distort and drive food system costs higher. New indirect costs may surface only to be added to system costs to compensate for compliance and enforcement activities. Further cost escalation may be set in motion to offset expenses associated with new economic risks and legal liabilities;

3) Participants throughout the food system might be legislated to take on tasks that are not practical or readily achievable, all in the name of giving “choice” to consumers of foods that are “one and the same.” Distinction between GMO and non-GMO foods based on segregation must certainly begin at the production level and will likely raise new discussions about seed stock purity and the adventitious presence of GMOs in seed and grain. Similar segregation concerns are likely to ripple throughout the food ingredient sourcing process and also at all levels of the processing and manufacturing process. Some participants simply may choose to withdraw from the industry or to scale down business activity;

4) Responsible enforcement efforts resulting from food labeling legislation will require the establishment of appropriate science-based sampling and testing protocols, technical capabilities and an administrative infrastructure that can be applied uniformly and fairly across a diverse local, state, regional and national food and agricultural industry. Governmental access to proprietary information and intellectual property concerning GM technologies and appropriate testing protocols would most certainly be required to underpin a legislated enforcement program. Enforcement must be accomplished in view of the fact some regulated entities want to do business only in a limited geography while others aspire to engage in interstate or international business. Regulations established on a state-by-state or regional basis may differ from those in other jurisdictions, thus increasing operational business difficulties;



Would the average consumer be willing to pay more for the same product to ensure it's accurately labeled?

5) In the event state or national food labeling legislation is enacted, significant issues and unanswered questions may arise with respect to liability. Both civil and criminal liability issues may abound. Did a violation occur inadvertently or by intention? Will allowances be made for the adventitious presence of GM components? What action level may be considered as being “legal” versus what level might be deemed as “illegal”—for an essentially equivalent food product? Are measurement and detection limits scientifically supportable and defensible? How might courts handle such issues? Liability exposure resulting from enactment of food labeling legislation may be a major disincentive for companies to continue participating in the food and agriculture industry;

6) Consumers may be inclined to unjustly malign foods that contain biotechnology-derived components, and those persons or entities that produce or distribute them, due to a common misconception that “if it is required to be labeled it must be unhealthy, unsafe, or inferior in some way.” This ramifica-

tion may unfairly and negatively impact an entire industry or at minimum certain individuals and companies within the food and agricultural industries.

New burdens of proof, likely to be created by GMO food labeling legislation, will be placed squarely on the shoulders of those choosing to remain in a re-ordered food and agriculture industry. Food ingredients, agricultural raw commodities, intermediate processed goods and fully-processed products will be placed under tremendous additional scrutiny. Food and agriculture entities and industry principals will be forced to operate under increased levels of economic and legal risk. These additional burdens of proof will have been created in the name of providing increased consumer choice over foods deemed by science and the U.S. government to be “one and the same.”

The GMO food labeling conversation is far from over. Agriculture, particularly the seed industry segment, remains a dynamic and developing industry, ever-changing and constantly evolving. You play a vital role. Do it well!

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Adding Value in the Vegetable Seed Market

ADDING VALUE TO agricultural products is a concept that's been gaining traction in recent years. Enhancing food products from field to plate can occur at numerous points in the value chain, from production to processing to marketing, and the vegetable market is no exception. Many ag experts, however, will tell you it all starts with seed.

Brad Kortsen, new product and business development manager for INCOTEC North America, is one of them. "Today, seed is playing the most important role in ag production in terms of adding value for farmers. It is amazing to see how we have progressed over the past 20 years in adding value to seeds, and we have only scratched the surface of what benefits seeds will bring to the farmer going forward," Kortsen says.

"Grower demands for increased yields, improved quality and efficiency have never been greater. Seeds, and the increased value they will bring, will allow growers to continue to raise the bar in field production. No other input will have as large an impact on increasing yields, quality and efficiency."

Brian Naber, vegetable seeds global marketing lead for Monsanto, agrees that seed is the key to adding value in the vegetable market, given the growing complexity of modern agriculture.



Brad Kortsen, new product and business development manager for INCOTEC North America, believes seed plays a primary role in adding value for farmers.

"Throughout the growing season, vegetable farmers are constantly facing challenges, many of which are agronomic ones. New diseases and races of diseases manifest each year and the control options are often limited," Naber says. "Monsanto, along with others in the seed industry, provides value by developing seeds that are more resilient and/or resistant to diseases and viruses."



Brian Naber, vegetable seeds global marketing lead for Monsanto, calls seed dealers a trusted point of contact between his company and growers.

According to Naber, Monsanto is constantly innovating in order to provide vegetable farmers with the best-performing seeds. "Monsanto's vegetable seeds division is focused on innovation to improve the quality and productivity of vegetables," he says. "Providing value to our farmer-customers through our seeds is an absolute priority."



Naber adds that a lot of effort and resources are put into developing not only agronomic traits—like harvestable yield and insect and disease resistance—but also traits related to consumers, such as taste and overall appeal, as well as shelf life.

Scott Langkamp is head of vegetables for Syngenta North America. He agrees that agronomic challenges as well as retail and consumer needs are all important considerations in the added-value equation for vegetables.

"The vegetable market is driven by an increasingly consolidated, integrated and international value chain striving to fulfill the needs of consumers and retail in terms of quality, affordability and sustainability of produce," says Langkamp.

"In order to assist growers in fulfilling these needs, breeders must continue to develop varieties that offer elite genetics, which are at the heart of every healthy crop. Growers benefit by increasing productivity and marketing premium produce for consumers and the value chain."

Enhancing value in the vegetable market is something his company takes very seriously, Langkamp says, adding it's an essential part of Syngenta's R&D

investment that on a global basis exceeds \$3 million per day.

"Bringing added value to our customers is what Syngenta is all about," he says. "We are focusing our science and technology efforts on the development of vegetable varieties and tools that satisfy the needs of the entire produce value chain, from growers to consumers.

"By combining agronomic [input] and consumer [output] traits and attributes, we strive to bring more varieties to the market that delight the consumer with their attractive flavor and aroma; provide enhanced health and nutritional contents; enable growers to maximize their yield and quality potential through conventionally bred pest and disease resistances; and make Syngenta vegetables a good value proposition for the entire value chain."

In addition to traits, more and more technology is being added to vegetable seeds these days. INCOTEC'S Kortsen says his company is on the leading edge of innovation efforts in this area.

"The pesticide packages, both fungicides and insecticides, being applied to seed are bringing tremendous value. In addition to chemical pesticides, more and more

bio-pesticides and microorganisms are being applied to the seed to enhance plant growth as well as assist in resistance management," Kortsen says.

"Our entire business at INCOTEC revolves around creating and delivering sustainable added value to seeds. In this effort we can play an important role in supporting the increasing need for healthy food to a growing global population."

ESSENTIAL ROLE OF SEED DEALERS

Kelly Keithly is president and CEO of Keithly-Williams Seeds, which is based in Yuma, Ariz. The independent vegetable seed dealer sells a variety of produce seed, including lettuce, carrots, spinach, cauliflower, broccoli and peppers to growers throughout the western United States as well as Mexico.

Keithly says one way his company provides added value is by ensuring their farmer-customers get the best seed products. "We are constantly on the lookout for new varieties and for new genetics that will do a better job than the varieties that the grower is using now," he says, adding Keithly-Williams Seeds sources seeds from suppliers including Monsanto, Syngenta and Enza Zaden, a Dutch vegetable seed breeder.



"When we get a new variety from a seed company, we put it through our product development department and test it to find out whether or not it will work for the growers [in terms of] the quality that they need and the right specifications that they're looking for," says Keithly. "We help the grower figure out where the variety might fit in planning schedules so that he can be more successful with it."

Keithly says farmers are presented with new variety of options from many sources all the time, so one of the important services his company provides is helping cut down on the noise.

"Everything that we learn about [a new variety], we can turn around and give information to the grower as to when to plant it, how to grow it, and things like that that he needs to know but just doesn't have time to do himself," he says. "We're there for customer service as far as getting the seed delivered to him, helping him with germination problems [and providing] a lot of different things that he needs to know about a specific variety."

Monsanto's Naber maintains farmers benefit greatly from the communication role played by independent seed sellers such as Keithly.

"The reality is we can't reach every grower out there, and that's where our seed dealers come into play," he says. "Dealers can communicate tailored information about our products specific to the grower's needs because they

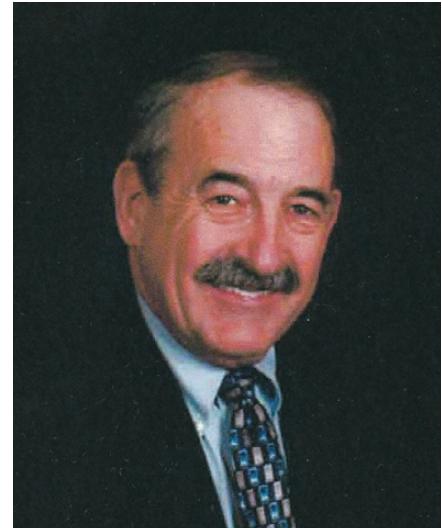


Scott Langkamp, head of vegetables for Syngenta North America, says seed dealers play an integral part in new product introduction.

have played a key role in trialing pre-commercial varieties and giving us input on the specific varieties that would bring the farmer-customers the most value. Because they have the first-hand knowledge of the varieties, they are better equipped to communicate the value to the farmer-customers.

"Also, the dealers are that trusted point of contact for both the growers and for us. They help bridge the gap between the growers' needs, our product development and customer experience."

Langkamp agrees seed sellers play a vital part in helping roll out new, consumer-targeted products in the vegetable market.



Kelly Keithly is president and CEO of Keithly-Williams Seeds, an independent seed dealer based in Yuma, Ariz.

"A shift in focus to bringing value opportunities for growers versus strictly providing inputs is one way seed dealers can help provide added value for their customers," he says. "Unlike some of the larger row crops, the vegetable business is a world of micro-markets—driven by the myriad of consumer preferences. This gives growers an enormous opportunity to bring new products to their customers. Seed dealers can play an integral part in new product introduction and value creation downstream."

In addition to the area of new product introduction, Langkamp says Syngenta works closely with its seed dealers in numerous ways, including field trials, agronomic support and personnel training.



Strategies for Adding Value

Big ag companies like Monsanto, Syngenta and INCOTEC clearly recognize the importance of adding value in the vegetable seed market, and have developed a wide array of strategies and tactics. At Monsanto, for example, much attention is paid to trait development.

"Our breeders around the world are using advanced breeding tools to bring added-value seeds to farmers around the world faster," says Naber. "This is thanks to our investment in trait-linked markers in 14 crops. Today, over 200 traits that can be marker-selected are being used to accelerate new product development.

"Monsanto works with our dealers to conduct technology development trials so that we can ensure our dealers can have visibility to our pre-commercial varieties that are going to bring the most value to the farmer-customers. In addition, we are working on building better brand equity in our Seminis and De Ruiter brands. We have recognized that an excellent customer experience is key to this and it is a big focus area for us. We recognize that a strong brand makes it easier for all of us to sell high-value products in the market."

Naber cites seed health as another area where Monsanto is adding value. "In the area of seed health testing and seed sanitation, Monsanto provides additional value through our focus on being a world-class leader in the industry. In fact, we have a special team of quality experts that study the physiological,

horticultural and genetic factors that affect seed quality," he says.

"We believe that the best way to manage phytosanitary risk is to minimize or prevent the exposure to seed pathogens in the first place. We take pride in following very controlled production methods and maintain high quality-assurance standards."

Kortsen agrees that seed disinfection is an important area of seed technology that's adding value for farmers. "Seed, naturally, is infected with fungus and bacterial pathogens. These pathogens affect the performance of the seed and plant. Today there are numerous innovative seed disinfection technologies that remove the harmful diseases while maintaining and sometimes improving the viability and quality of the seed," he says.

As an example, Kortsen cites INCOTEC's ThermoSeed, an innovative seed disinfection technology that uses hot, humid air to clean and disinfect seed. "It is not only very effective in removing harmful pathogens, but it is also very gentle on the seed as well as the environment. Human and animal safety is not an issue. The treated seed can be easily disposed of and could even be used for consumption," says Kortsen.

"Another important area where we are adding value to seed is by creating more seed space. By this I mean we provide technology that allows seed companies to effectively apply more and more

actives and additives to seed. This is quite a challenge because seeds have a limited space and you can only apply so much to the small surface of the seed," he says.

"Our technologies facilitate the application process as the many actives and additives are applied to the surface of the seed. And, we are able to do this in a quality manner, which provides precise levels of active ingredient to each seed, then seals the surface of the seed so no dust or rub-off is generated. This is becoming more and more important as more is applied to the seed."

Langkamp cites his company's Full Count program as one area where Syngenta is adding value for farmer-customers.

"In watermelons and melons, our Full Count Plant Program takes the guesswork out of seed purchases. Full Count delivers Syngenta genetics to every major U.S. production region from preferred transplant producers that growers can depend on," says Langkamp.

"This eliminates the challenges associated with germ, emergence and usable plants when purchasing seed for your crop. Instead, you get the assurance of receiving the 'full count' of your plant order and the simplicity and choice of selecting from our leading transplant producers."



CROSS POLLINATION

Exploring ideas and views on all aspects of the seed industry.

THE BIOAG ALLIANCE

"Earlier this week, the economic value of agricultural biologicals was on prominent display as the agricultural giant Monsanto teamed up with the international microbial expertise of Novozymes to create an initiative called The BioAg Alliance. The arrangement calls for the technologies of both companies to converge in a joint R&D pipeline that will 'transform research and commercialization of sustainable microbial products that will provide a new platform of solutions for growers around the world.' While Monsanto has some own discovery programs, Novozymes has a laser-sharp focus on microbial fermentation technologies for all manner of consumer products such as the enzymes used in detergents, foods and beverages, biopharmaceuticals, and biofuel production. In the alliance, Novozymes will provide Monsanto with the scale-up and production of microbial products inherent to their leadership in fermentation technologies. Monsanto will leverage its vast field-testing capabilities and be responsible for the registration and commercialization of resulting products. **THESE 'BEYOND-THE-SEED' TECHNOLOGIES ARE INTENDED TO PROVIDE ADDITIONAL ENVIRONMENTAL PROTECTION FOR CROPS and maximize nutrient utilization, increasing fertilizer efficiency.**"—Excerpt from a recent *Forbes* article



PROTECTING IP

American Seed Trade Association president and CEO Andrew W. LaVigne released the following statement on the recent announcement by the U.S. attorney general about individuals charged with conspiring to steal seed and trade secrets of several U.S.-based seed manufacturing companies: "The American Seed Trade Association is deeply concerned by the action that has led to the arrest of individuals conspiring to steal and export seed products, seed technology and trade secrets developed by U.S. agriculture companies. ASTA HAS LONG SUPPORTED INNOVATION IN THE U.S. SEED AND AGRICULTURE INDUSTRY, AND THE PROTECTION OF INTELLECTUAL PROPERTY RIGHTS FOR THESE INVENTIONS AND THEIR INVENTORS.

"We are extremely pleased to see that the matter at hand is being taken seriously by the U.S. government. The swift action sends the message that no matter the nationality, either domestic or international, this practice is unacceptable.

"With a population that is expected to reach over nine billion people in the next several decades, the agriculture sector and its customers will continue to rely upon plant breeding, research and product development to meet the growing world demands for food, feed, fuel and fiber."

MORE SOYBEANS ON HORIZON

David Murphy, LG Seeds resource manager in central Illinois, is predicting a continued trend toward more soybean acres in 2014. "Overall, looking at how we're going to manage our acres next year, I've seen a slight switch away from corn more to 50-50 rotation and I saw a large switch last year. There will be [a] smaller switch this year of moving corn acres to soybeans, I think, primarily due to commodity prices," he says. "The soybeans have had strong prices this fall. As guys are making their plans for next spring, that's one of the key factors that they're looking at in the profitability."



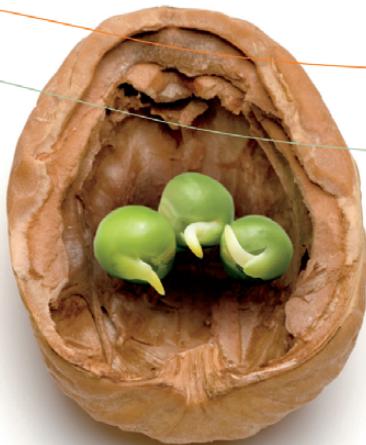


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 - Marker Assisted Backcross (MAB)
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WHAT MOTIVATES SHOPPERS TODAY?

According to a report by AMG Strategic Advisors, which examined generational differences on shopper behavior, the wide variety of ages, life stages by age and unique generational viewpoints in the marketplace is unprecedented. "Engaging the various generations effectively while not alienating other generations will require retailers and manufacturers to have **HIGHLY-TAILORED MESSAGES THAT APPEAL TO EACH TARGET GENERATION'S DISTINCTIVE VALUES AND PREFERENCES**," says the report.

Millennials (51 million): Identify the key categories that will influence trips and engage these shoppers through digital, social and shopper marketing. This is a highly multicultural generation that is moving into heavier spending years. They are social, technology dependent, environmentally-conscious and heavy users of natural/organic foods and baby products. Retailers and manufacturers have the opportunity to be the curators for new mothers who are seeking education and networking opportunities. This generation is highly dependent on peer recommendations and is willing to switch brand loyalty if a brand can offer a better value proposition—not meaning lower price, but a better set of benefits at a given price. They invest the time to understand benefit claims and reward design and unique benefits. Creating touch points with the millennial shopper physically and virtually to effectively communicate a product or brand's value proposition, especially non-price related benefits, is critical to success with this generation.

Gen X (60 million): This generation is the largest spender on groceries but is stretched and seeking value. They are more likely to do "stock-up" trips. It is especially important to capture these shoppers during the pre-shopping part of their path to purchase, as a lost trip will mean the loss of a larger basket than their younger counterparts. This generation is often raising young children on dual incomes. They are time starved. Solutions that save Gen X shoppers time, products for busy mothers and loyalty-building programs are essential for long-term success.

Baby Boomers (81 million): This economically relevant generation is starting to downsize. They are becoming empty nesters but still

have a large disposable income. Success means focusing on health and wellness solutions and smaller package sizes. This generation is technology capable, but not dependent on technology, so traditional marketing is more relevant than with younger generations. Pet food and pet care are key categories that are highly relevant to this generation. In fact, Baby Boomer households have more pets than kids at home.

Silent (39 million): The Silent Generation is mostly retired. Key categories relevant to this generation are largely health and wellness-related categories. This generation is helped with larger labels and signs, better lighting, lower shelves and magnifiers at the shelf. It is particularly important to be able to explain the product's value proposition at the point-of-sale to this aging generation.

WHEAT BY THE NUMBERS

According to Syngenta, wheat breeding is a numbers game. The new varieties introduced each year all start somewhere, and that's as one of thousands of potential wheat lines often more than a decade earlier. Syngenta has developed an infographic that illustrates the typical path taken by new winter wheat varieties en route to commercial release.

SUPPLY AND DEMAND

According to a recent International Grains Council five-year forecast, world total grains output is expected to decline slightly in 2014/15, from the record level forecast for the current season, but then to rise by an average of 1.6 percent per acre over the remainder of the five-year period, exceeding two billion tons by 2016/17. "While some area expansion is anticipated, particularly in the major exporters such as the CIS and Brazil, **THE INCREASE IS LARGELY DRIVEN BY IMPROVING PRODUCTIVITY**. Firm demand growth is also expected and, while the absolute level of stocks is likely to rise, the ratio of stocks to use is projected to fall slightly to 18 percent by the end of the 2018/19 season, from 20 percent forecast for 2013/14. The projections indicate a marked increase in trade volumes over the five years, as increased demand is met by production growth in the key exporters, most notably in South America and the Black Sea region," says the report.



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1916

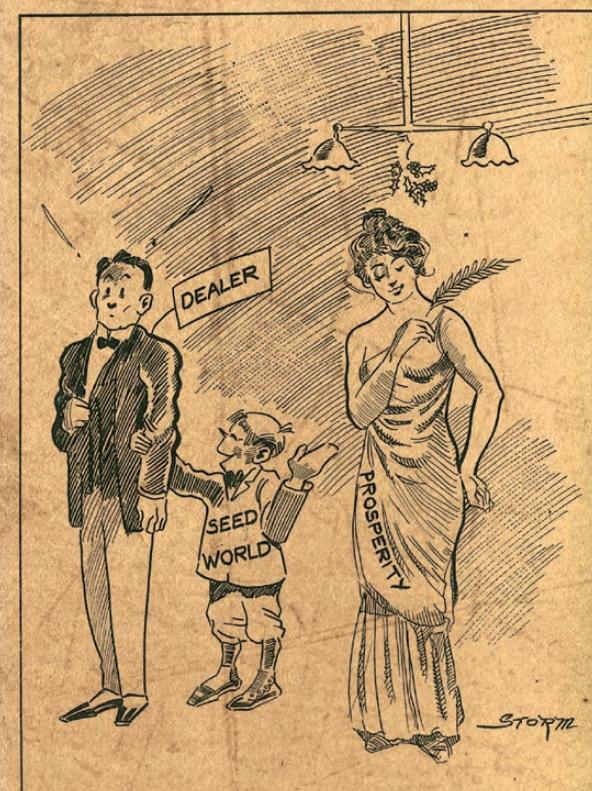
New Creations in the World of Plants

To the student of nature, there is nothing so interesting as the birth of new types, the evolution of which is governed by the same general laws in the vegetable and animal kingdoms. If we go far enough back to the lower forms of both, it is impossible to point to the exact spot on the ascending scale where they start to differentiate. The perpetuation of both depends on sex and the comingling of selected units of the opposite gender [which] may produce endless variety of form and species. It is by taking advantage of these variations by selection, crossing and sometimes inbreeding, that new varieties are produced.

Crossing, which is the mixing of different varieties of the same species, must not be confounded with hybridizing, which is the breeding together of different species. For instance—one variety of corn bred with another would produce a cross; but corn bred with sorghum would (if it could be done) yield a hybrid.

The plant breeders of the past depended more on selection than crossing, for in all nature's productions there is always some slight variation in different units; as no two people are ever identical, so no two plants are ever the same. Plant breeders say "it is easy enough to produce new varieties, the difficulty is to fix the type." Grafting and budding are invaluable aids to the breeder because in propagating a new find, they cut out all the trouble and bother of fixing the type. A graft always comes true because it is a part of the parent tree, and after a few have been grafted from the new acquisition, millions of scions may be cut from them and grafted onto other trees of the same species all over the continent for the benefit of those who raise them. Thus any fruit of special excellence accidentally discovered or scientifically bred may become a standard variety almost at once.

1915



UNDER THE MISTLETOE

1940

What Is the Equivalent for the Lavish Business Once Derived from Large Private Estates?

A chance remark by an executive for a large seed house in Philadelphia, to the effect that he considered the greatest blow to the seed business in years was the vanishing of the once large private estates all over the country, with their lavish orders for supplies of many kinds. It suggested the thought "are seeds men, generally, finding, or do they hope to find some substitute for this formerly liberal trade? Does anything thus far discovered promise approximately an equivalent in volume, or in dollars and cents, to offset the



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diminishing of that business which once was the mainstay of many concerns?"

That the dwindling of the accounts from such important factors in the trade's success is quite general, appears to be conceded. Leading figures who were owners of spacious and zealously tended acres surrounding imposing mansions have died. Before their passing on, much of the original wealth held by these families had been sacrificed. Especially since 1932, many noble properties have gone to waste, or been sold and used otherwise. Since then, in instances where the property has been held by the family, taxation from various sources has taken a heavy toll.

As this business, as a whole, has definitely been lost to the seed trade, what is being done about bringing from some other source a like revenue? The loss hardly seems to be made up by some special attention to acquiring the business of such public enterprises as those of city parks and cemeteries. A number of executives of Philadelphia's larger seed houses evidenced keen interest in the situation.

Anthony Waterer, of Hosea Waterer, a firm which particularly has concentrated on the business of private estates, in substance said, "I can say in the past year or so, our books have been supplied with a great many names not previously placed there, these coming from the owners of homes valued at from \$12,000 or less and up to \$20,000. Business compensating for the loss of order from the old large private estates, now vanished, is found in the increasingly large number of medium-sized and even rather small estates."

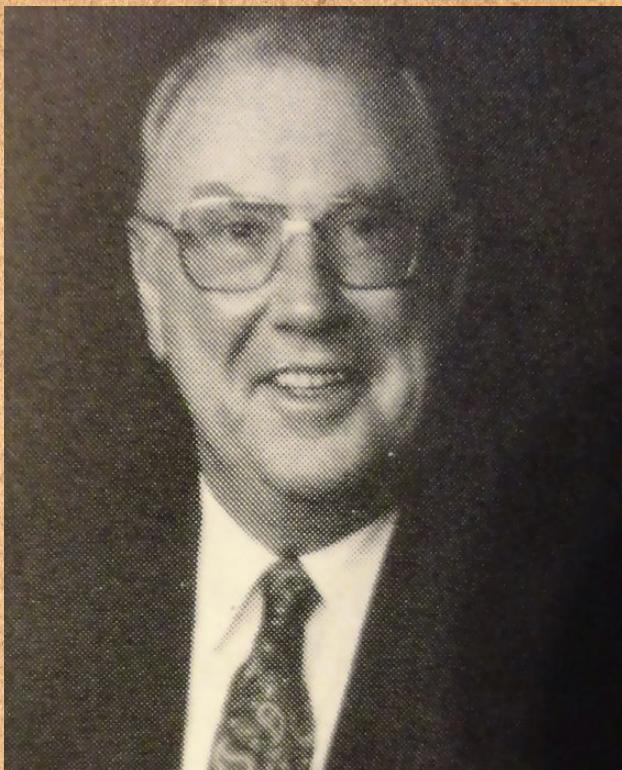
1987

ASTA Lends Energy to U.S. Seed Exports

Contrary to the unfavorable trend for many industries and U.S. trade deficits in general, U.S. seed exports have risen dramatically—in fact tripled—in the past decade, reaching an impressive \$364 million in the year ending Sept. 30, 1986. Vegetable seeds lead the list with 35 percent of total exports, followed by corn at 25 percent, forage at 16 percent, sorghum at nine percent, soybean at five percent, flower at two percent and all others at seven percent.

Why those successes? There are many reasons. According to ASTA's executive vice president Bill Schapaugh, farmers around the world undeniably understand the significance of "First—the seed", the ASTA motto which expresses the basic premise of the U.S. seed industry.

The American seed industry is also strengthened by a diversity of climates and crops, an economic system which encourages private investment and an educational system which supplies technically competent persons to support breeding and production of a very sophisticated and high quality plant genetics supply industry. These strengths,



Jim Carnes will serve the American Seed Trade Association as president over the next year.

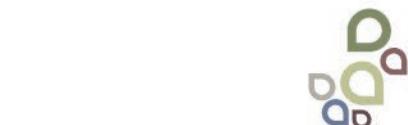
coupled with international business experience and expertise of a diverse, competitive industry, make the U.S. seed industry a leader in meeting the needs for "Seeds of Success."

Exports receive a helping hand from ASTA. Under a long-standing cooperative program with USDA's Foreign Agricultural Service, ASTA's International Committee Members and staff carry out a wide variety of activities to develop export markets.

"Most of our international marketing activities fall into four general categories. They may be promotional in nature to showcase the American seed industry. Or, activities may be 'trade policy' in nature, designed to eliminate artificial barriers of other countries which restrict U.S. seed export opportunities. Our activities also include those which are informational in character—supplying trade leads and rules and regulations required by importing countries are examples," explains Michael Vincent, ASTA international marketing director.

"Finally, ASTA is very much involved with other organizations, such as OECD, EEC, UPOV, FAO, FIS and ASSINSEL, to ensure consideration of U.S. positions and philosophies on rules of trade, intellectual property rights and other matters of long-term importance to the U.S. industry."

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An in-depth overview on the global seed industry.

From research and development advancements in the Australian potato industry to the current landscape of the seed industry in Pakistan



STATUS AUSTRALIA

KEY RESEARCH and development information was taken directly to hundreds of potato growers and other industry members across Australia in 2013, in a successful year of R&D-related activities arranged by AUSVEG as part of the Potato Industry Extension Program.

"In what is a challenging time for the Australian potato industry, the high level of support that the Potato Industry Extension Program has received throughout the year demonstrates growers' eagerness to learn about new R&D findings that could help to boost their productivity and competitiveness," says Luke Raggatt, AUSVEG special projects coordinator.

AUSVEG is Australia's leading horticultural body representing more than 2,000 potato growers. "Support for this important initiative has continued to climb this year, with the R&D workshops and field days held across the country proving a particular hit," says Raggatt.

In 2013, AUSVEG hosted nine potato R&D workshops and field days across Australia as part of the program's activities, and produced a raft of

material including fact sheets, e-newsletters and articles for Potatoes Australia magazine. Key potato R&D information was also showcased at several industry events, including the AUSVEG National Convention and the Simplot Potato Futures workshops held in Tasmania.

"More than 500 industry members have now taken part in the various potato R&D events that have been held since the program commenced in January 2012, indicating a strong appetite for new R&D information that will produce practical benefits," continues Raggatt.

Leading potato experts from around Australia and abroad have engaged in this year's activities, discussing key production issues such as crop nutrition and fertilizer application, pest and disease management strategies, alternative farming practices, and emerging technologies.

Regular feedback from Australian potato growers and agronomists, obtained by AUSVEG, suggests that knowledge and uptake of beneficial R&D findings is rising as a result of the program, which is seen as a vital source of new information within the industry.

"More and more growers are getting onboard with the program's activities to enhance their understanding of new farming approaches. This is extremely positive, as it will help keep the Australian potato industry at the forefront of 21st century potato production," says Raggatt. "With a new potato growing season underway, AUSVEG will continue to extend the reach of potato R&D information, to ensure that potato producers are in a strong position to tackle some of the key challenges they face."

—AUSVEG

STATUS PAKISTAN

Pakistan's modern-day seed industry is much to the credit of the World Bank-aided project, which took place from 1976 to 1981. This project established seed institutional arrangements at the national and provincial levels.

The country's current seed production system is backed up by a strong public research and crop improvement program. Due to lack of incentives, the private sector has not yet shown the desired interests in crop breeding or the release of new varieties. However, some efforts are visible in the



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national private sector to invest in hybrid seed production of corn and sorghum crops.

Pakistan has a strong seed production base as well as diverse and ideal agro-climatic zones for producing high-quality seeds of several tropical, temperate and sub-tropical crops at competitive prices. Yet, 20 percent of the estimated seed requirement of various crops is met by four public, more than 700 national and five multi-national seed companies. Seed requirements of hybrid corn, vegetables and fodders—both hybrids and open-pollinated—are met by the imported seeds.

Over the past three decades, these multi-national seed companies have built up a core of competent and experienced staff, yet these companies have not invested in local research and breeding programs.

In spite of their more than 30 years of presence in the country, these companies continue to import hybrid seeds from different countries around the world. This deficiency is costing the country millions of dollars on import seed of various crops.

National private sector seed companies mostly concentrate

on production of open-pollinated varieties. The bulk of hybrid seed for crops like corn, sunflower, canola, forage, sorghum and vegetables is imported from a number of Asian, European, North African, North American and Australian seed companies. However, as previously stated, the private sector has recently demonstrated local production of hybrid seed of cotton, corn and sorghum but to commercialize hybrid seed production, support and encouragement from the Pakistan government will be necessary.

—Syed Irfan Ahmad, Pakistan Seed News

STATUS AMERICAS

As 2014 begins, the Seed Association of the Americas has several main goals that will form the basis of its work over the next number of months.

The SAA held its fourth annual Seed Congress last fall in Punta del Este, Uruguay, attended by more than 280 key industry stakeholders from 15 countries in North and South America, during which it decided on its course for the coming year and the challenges ahead—the main ones including issues surrounding biotechnology

(specifically low-level presence), phytosanitary issues, seed treatments and protection of intellectual property.

“SAA has a huge commitment to dealing with LLP, and we have been recognized by governments in North and South America as the perfect partner representing the industry when addressing LLP issues both at the technical and regulatory level,” says Diego Risso, secretary-general of the SAA. Associations like ASTA and CSTA have been active in discussion regarding LLP. These discussions have contributed to coordinating and aligning positions with the International Seed Federation.

Phytosanitary issues have been a major trade barrier in some countries, and the SAA supports regulations based on sound science. “We think phytosanitary regulations should exist because they are crucial for safe trade, but we demand that regulations should be based on science,” says Risso. “Just as each country is studying the best regulations regarding seed treatment, SAA has also identified this issue as a priority. SAA created a specific working group to deal with these particular challenges. An action plan was drafted in 2013 and, in 2014, we [are starting] to execute it.”

In the past, SAA has worked closely with government regulators. It intends to do the same for the issue of seed treatment and protection of intellectual property.

—Seed Association of the Americas



NATIONAL

ARREST OF SEED CONSPIRATORS

American Seed Trade Association president and CEO Andrew LaVigne released the following statement on the recent announcement by the U.S. attorney general about individuals charged with conspiring to steal seed and trade secrets of several U.S.-based seed manufacturing companies: "ASTA is deeply concerned by the action that has led to the arrest of individuals conspiring to steal and export seed products, seed technology and trade secrets developed by U.S. agriculture companies. ASTA has long supported innovation in the U.S. seed and agriculture industry, and the protection of intellectual property rights for these inventions and their inventors," says LaVigne. "We are extremely pleased to see that the matter at hand is being taken seriously by the U.S. government. The swift action sends the message that no matter the nationality, either domestic or international, this practice is unacceptable."

ENLIST E3 SOYBEANS COMPLETE FDA CONSULTATION

Dow AgroSciences LLC and MS Technologies have announced that the United States Food and Drug Administration has completed its consultation for Enlist E3 soybeans. The agency has no further questions based on submitted data that concluded Enlist E3 soybeans are not different in composition, safety, and other relevant parameters from soybean-derived food and feed currently on the market. The Enlist E3 soybean event includes, for the first time, three herbicide-tolerant genes stacked together as part of a single genetic event in the soybean genome. These genes provide tolerance to DAS' new 2,4-D product, glyphosate, and glufosinate. The innovative product is being developed through a collaboration between MS Technologies and DAS. The USDA is currently assessing the Enlist corn and soybean traits and is conducting an environmental impact statement as part of the review process.

MARRONE BIO SUBMITS NEMATICIDE FOR U.S. EPA APPROVAL

Marrone Bio Innovations Inc., a leading provider of bio-based pest management and plant health products has submitted MBI-302, a biological nematicide, for registration with the United States Environmental Protection Agency. The product utilizes a new patent-pending species of bacteria, *Flavobacterium* sp. strain H492, discovered in MBI's discovery screen for suppression of nematodes in agricultural and horticultural crops. It is active against a broad range of plant parasitic nematode species. Field trials conducted in 2013 show that MBI-302, when applied as a seed treatment, reduced soybean cyst nematode numbers and enhanced soybean yields. MBI is developing the product as a seed treatment and as a liquid to be applied via broadcast, in-furrow, shank, banded or chemigation methods.

KEYGENE ISSUED U.S. PATENT

KeyGene has been issued U.S. patent 8,614,073 entitled High Throughput Screening of Mutagenized Populations by the United States Patent and Trademark Office. The patent protects methods for detecting induced and natural genetic variation in large plant populations that form the cornerstone of KeyGene's KeyPoint MB programs. The issuance of the U.S. patent follows earlier grants in Australia, Europe, Japan and China, securing broad patent protection for the methods in important areas for crop improvement. KeyPoint MB delivers genetic variation in important crop traits such as yield, (a)biotic stress resistances, and plant reproduction. KeyPoint MB has enabled KeyGene to produce pre-breeding materials for canola, corn, soybean, wheat and a number of vegetable crops within timeframes of months. Application of KeyPoint MB does not fall under GMO legislation, thereby leading to further cost savings and broadening the application space of KeyPoint MB for genetic improvement of a wide variety of crops.

USDA REVIEWING DEREGULATION REQUEST

The United States Department of Agriculture's Animal and Plant Health Inspection Service has released its Draft Environmental Impact Statement as part of its review to determine whether to deregulate genetically engineered corn and soybean plants that are resistant to several herbicides, including 2,4-D. APHIS is performing an assessment of these GE plants, while the U.S. Environmental Protection Agency is conducting a concurrent review of the related herbicides. APHIS will consider all public comments submitted during the comment period before finalizing the DEIS and plant pest risk assessment and then, based on these, making its final regulatory decision on DAS' deregulation request. DAS' GE corn and soybean plants are the first developed to be resistant to 2,4-D and are intended to provide farmers with new plants to help address the problem of weeds that have developed resistance to other herbicides.

INTERNATIONAL

CSTA WELCOMES THE INTRODUCTION OF BILL C-18

The Government of Canada has taken a very substantial step forward with the introduction of Bill C-18: the Canadian Agricultural Growth Act. Included in this legislation are amendments to Canada's Plant Breeders' Rights Act, to bring it into compliance with the 1991 Convention of the International Union for the Protection of New Plant Varieties. "The Canadian Seed Trade Association supports all of the measures included in this Bill as they continue to modernize regulatory and policy measures affecting agriculture and agri-food, but we particularly welcome the changes to Plant Breeders' Rights," said CSTA President Peter Entz. Updated PBR legislation will bring Canada's intellectual property toolbox in line with those in

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other countries. CSTA is confident that it will help to stimulate investment in the development of new varieties for Canadian farmers. Just as importantly, when the new Act is implemented, farmers will have access to superior varieties developed beyond our borders.

FSANZ CALLS FOR SUBMISSIONS FOR GM CANOLA

Food Standards Australia New Zealand is accepting submissions on an application to change the food standards code to allow food derived from a genetically modified canola line. FSANZ CEO Steve McCutcheon said the application, from Pioneer Hi-Bred Australia Pty Ltd., seeks approval for food derived from GM canola for tolerance to glyphosate herbicides. "The FSANZ safety assessment found no public health or safety concerns and that food from this canola line is as safe for human consumption as food derived from conventional canola lines," says McCutcheon. "FSANZ welcomes comments from government agencies, public health professionals, industry and the community."

RUSSIA TO ALLOW GM CROP CULTIVATION IN 2014

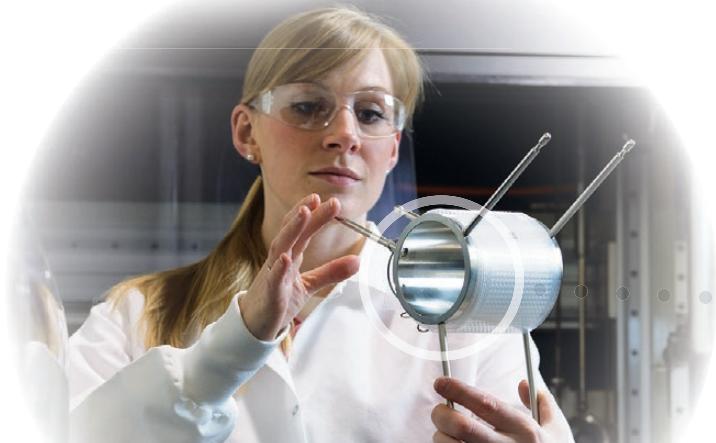
Russia will be allowed to cultivate biotech crops in 2014, according to a government decree. The decision will be implemented July 1, 2014. However, the registration of commercial biotech seeds is expected to take a couple of years. Currently, genetically modified crops can only be grown in experimental fields in the country.

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PEOPLE NEWS

Wageningen University, located in the Netherlands, has appointed **Leo Marcelis** as chairholder of horticulture and plant-product physiology. Until recently, Marcelis was professor by special appointment of crop production in low-energy greenhouses at Wageningen University and team leader at Wageningen UR Greenhouse Horticulture. In his new position, Marcelis will be engaged in horticultural production and physiology.

Incotec Field Crops North America, a division of Incotec, a worldwide leader in coatings and seed technology, has hired **Terry Meyer** as integrated product research manager to lead product development efforts at the company's facility in Oxford, Ind. Meyer is a veteran of the seed industry with over two decades of experience in biotechnology, with project leadership in various functions from discovery through commercial development. He has co-authored numerous scientific publications and has 48 issued patents. Meyer will be responsible for building a strong research organization focused on bringing new technologies and products to the market.

PRODUCT NEWS

A.T. Ferrell Company, known for the Clipper seed-cleaning brand, has added perforated metal **screen production** to its facility in Bluffton, Ind. In addition to punching screens in-house for its entire Clipper machinery line, the new screen production capabilities also allow customers to purchase a growing supply of competitor screens. "We've listened to our customers and they are looking for high-quality, American-made screens that carry the trusted Clipper name," says Steve Stuller, president of A.T. Ferrell Company. "This is an exciting venture for us and a new chapter to help our customers gain access to screens they can rely on." A.T. Ferrell plans to grow this division over the coming years.

BASF plans to expand its services and initiatives for growers and agricultural professionals worldwide. The investment will drive the development of unique, **integrated IT** tools that will support growers to make agronomic decisions, manage their business operations and better connect to the global agricultural community. The company plans to launch the first integrated tools in key agricultural markets around the world by the end of 2014 with additional markets and tools to follow. BASF will also launch new tools for field scouting and field documentation to support on-farm decision-making and reporting. As part of this investment, BASF will establish strategic partnerships with ag service and data providers, with particular focus on areas in data management, predictive analytics and information processing.

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BUSINESS NEWS

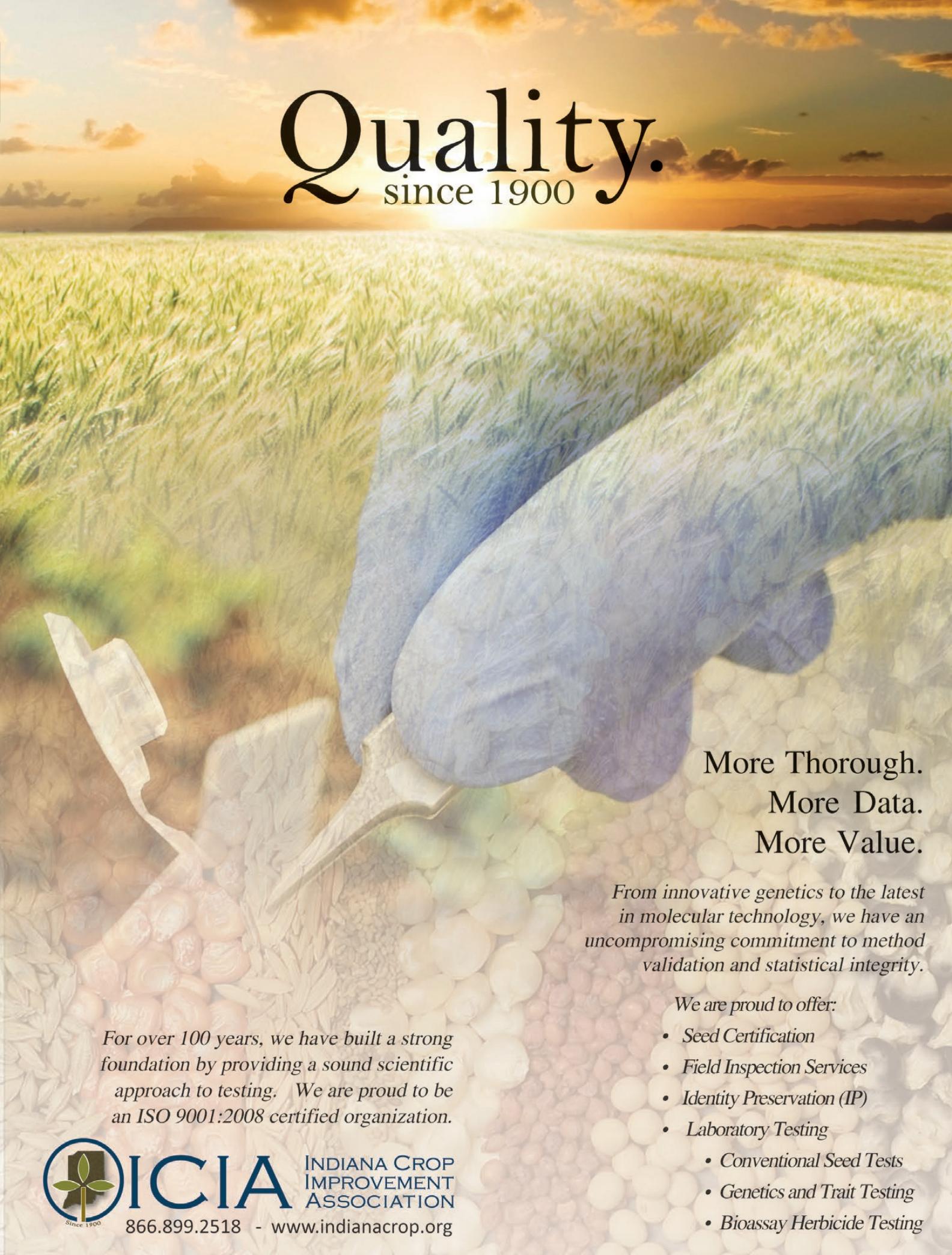
Syngenta has signed an agreement to sell its **Dulcinea Farms** business to **Pacific Trellis Fruit LLC**, a U.S.-based international grower and marketer of fresh produce. Based in California, Dulcinea was formed in 2004 initially as a vehicle for branding proprietary mini-watermelon and specialty melon genetics directly to consumers through national food retail chains. Syngenta and Pacific Trellis have also signed a long-term supply agreement whereby Syngenta will continue to provide Dulcinea with mini-watermelon and specialty melon seed varieties. The deal was expected to close by the end of 2013.

Sakata Seed Corporation has signed an agreement to acquire a stake in **Genetwister Technologies B.V.** Sakata is a world leader in breeding and producing vegetable and ornamental seed and vegetative cuttings. With this alliance, Sakata will boost its marker-assisted breeding endeavors with the most advanced genome sequencing and gene analysis techniques in order to accelerate the development of novel flower and vegetable varieties.

Ikasido Global Group B.V. is pleased to announce its recent launch onto the global stage. Ikasido aims to develop the international horticulture sector and supply its customers throughout the globe with high-quality plant genetic materials

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of various crops. The primary objective of Ikasido is to build a network of independent breeders and breeding companies to provide a platform for marketing and distribution of their genetics. Ikasido offers a wide assortment of genetics of flower and bedding plants and vegetables for open-field and greenhouse cultures.

Syngenta has invested more than US\$3 million to better meet the needs of vegetable growers with an expansion of its seed processing facility in **Pasco, Wash.** The improvements, which will be complete for the 2014 season, include an expanded seed quality testing lab and an in-house seed treatment facility. The new quality lab improves turn time and accuracy for vegetable seed testing and the investment in seed application equipment enables Syngenta to broaden the use of its FarMore Technology platform, an on-seed application of separately registered seed protection products and proprietary application

technologies, on different vegetable varieties. The Pasco facility employs state-of-the-art technology, including advanced sweet corn dryers and a conditioned warehouse, to provide customers with the highest quality vegetable seeds.

Verdeca, a soybean technology joint venture between **Bioceres** and **Arcadia Biosciences**, and **GDM Seeds**, a leading South American soybean seed company, have announced an agreement to develop and commercialize new soybean varieties based on Verdeca's HB4 stress-tolerance technology. HB4 technology enables plants to adapt to multiple stresses and achieve higher yields. The agreement and collaboration leverage Verdeca's technology and regulatory expertise, and GDM Seeds' soybean germplasm and breeding capabilities. Under the collaboration, GDM Seeds will develop and commercialize proprietary soybean varieties incorporating HB4 stress-tolerance technology. Integration

of the HB4 trait into the GDM Seeds soybean breeding program has been in progress under an earlier research agreement.

John Deere and **BASF** plan to jointly develop a suite of integrated precision farming and farm management solutions for improved execution in the field. These tools, developed together with growers, will provide enhanced field scouting services and tailored agronomic advice. These will help growers turn data into management decisions more efficiently. As part of the agreement, BASF will offer a new service for field scouting and agronomic decision support. John Deere will provide a new application for sprayer setup as well as integration of field data via its collaborative farm management portal MyJohnDeere.com, which will enable growers to better manage their farm operations. The goal is to launch the first joint integrated tools by the end of 2014 in key agricultural markets with additional markets to follow.

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INDUSTRY NEWS

After testing samples taken from rice fields across the state, **Mississippi State University** scientists found that seed treatments are effective in managing the crop's most troublesome insect pests. "We've been evaluating seed treatments for about five years," said Jeff Gore, entomologist with the Mississippi Agricultural and Forestry Experiment Station and MSU Extension Service. "Our research has shown that rice grown with a seed treatment typically yields from eight to 12 bushels more per acre than untreated rice." Gore said seed treatments are effective in both conventional rice varieties and hybrids. "Seed treatments provide good control against a whole complex of other rice pests and get the plants off to a good, healthy start."

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Transgene spreading is a major concern in cultivating genetically modified corn. Cross-pollination may cause the spread of transgenes from GM cornfields to conventional fields. New biological confinement technologies are highly desired to



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mitigate transgene spreading in addition to physical separation and isolation methods. In a study conducted by scientists from **Zhejiang University** in Hangzhou, China, researchers developed a built-in containment method to mitigate transgene spreading in corn. The GM corn plants that were generated were found to be sensitive to nicosulfuron but resistant to glyphosate, which is exactly the opposite of conventional corn. This study suggests that this built-in containment method for controlling the spread of corn transgenes is effective and easy to implement.

Cibus Global Ltd., a cutting-edge technology firm and leader in the area of gene editing has acquired the remaining interest in **Nucelis Inc.** Nucelis will now become an independent operating unit of Cibus, which employs approximately 100 people worldwide, and also includes Cibus US LLC and Cibus Europe B.V. Nucelis CEO and president Sean O'Connor will continue to lead the Nucelis operating unit as its CEO and will join the Cibus executive management team as a senior vice president of Cibus. Nucelis will continue to be the exclusive licensee to Cibus' Rapid Trait Development System technology in its key product areas of fermentation and bio-based chemicals.

The **Seed Association of the Americas** understands the importance of UPOV '91, and is extremely pleased to see that the Government of Canada has also recognized the importance of the global standard with the introduction of the Canadian Agricultural Growth Act: Bill C-18, which contains important amendments to Canada's plant breeders' rights legislation. "Canada is recognized as a leader in the global seed industry. The work that Canada has done to build support for UPOV '91 with government, farmers and industry creates a win/win scenario for protecting plant breeders' rights," said Diego Risso, secretary-general of the

Seed Association of the Americas. "To be very clear, this is critical to ensure the required investment in plant breeding to improve yield and quality and ensure that Canadian farmers have the best possible opportunities and access to the latest technology. Support for **UPOV '91** is the first step in this process. Its implementation will require all stakeholders to respect and adhere to these important regulations."

The American Seed Trade Association's **First the Seed Foundation** has announced it is the recipient of a significant donation by Peterson Genetics Inc. to be used to build the core curriculum program related to seed production for middle school students. The First the Seed Foundation is a not-for-profit organization established in 2008 to inform today's consumers

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and tomorrow's workforce about the importance of the seed industry. "The mission of the First the Seed Foundation is to conduct education, outreach and communication on the value of crops and food produced from seed," says Mike Peterson, president and owner of Peterson Genetics. "That is exactly why supporting the foundation through a donation to be used for the curriculum program seemed like a great fit. It's an opportunity for us to teach how broad an impact seed-derived products have on our daily lives."

Purdue University researchers have confirmed the long-held hypothesis that **sorghum** deters insects from feeding on its leaves by releasing hydrogen cyanide. Mitch Tuinstra and Brian Dilkes found that insects preferred the leaves of a mutant sorghum plant with an abnormally slow release of cyanide to those of a wild-type sorghum plant with a normal cyanide-release rate. Fall armyworms fed on the leaves of the mutant sorghum even though the leaves contained similar levels of dhurrin—the chemical compound responsible for synthesizing hydrogen cyanide—as those in normal sorghum plants. "This study separates for the first time the accumulation of dhurrin from the release of hydrogen cyanide," said Dilkes, assistant professor of horticulture and landscape architecture. Tuinstra and Dilkes identified a sorghum mutant with an exceptionally slow cyanide-release rate. They located the gene responsible

for the defect by using next-generation sequencing. The sequencing technique allowed Tuinstra and Dilkes to identify the single nucleotide within the sorghum genome of 790 million base pairs that slowed the release of cyanide in the mutant plant. After cloning the mutant, the researchers tested insect feeding preference by releasing fall armyworms onto mutant and normal sorghum plants. Though both types of sorghum contained normal levels of dhurrin, the insects avoided the normal sorghum plants, settling and feeding on the leaves of the mutant sorghum instead. While the mutant contains the compounds necessary to generate cyanide, it cannot release cyanide quickly enough to ward off pests, Tuinstra said.



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We Didn't Start the Fire, But We're Smack Dab in the Middle of It—The Erosion of Consumer Trust



The past five decades have seen a dramatic shift in consumer attitudes about agriculture and food. Things look different than they did years ago and nostalgia for yesteryear is strong. “Why can’t we just go back to the way things were?”

As our systems have changed, consumers have grown leery and the idea that we continue to incorporate new technology is scary to many. We continue to see an erosion of the historical trust and respect that farmers and food producers once enjoyed as consumers view much of today’s food production with skepticism—and they’re not fans of “Big Food.”

But the loss of trust didn’t happen overnight. The trend can be traced back to the ‘60s—a time of dramatic social and political upheaval in the U.S.

Robert Kennedy Jr. and Martin Luther King were both assassinated in 1968, the same year protestors were attacked by police at the Democratic National Convention in Chicago. The Vietnam War was raging as opposition to the war rapidly escalated back home.

The frequency and visibility of violations of public trust by government, military, business and religious institutions has been consistent enough over the last 50 years to feed broad public skepticism about whether or not institutions are worthy of trust.

The lyrics of the Billy Joel song “We Didn’t Start the Fire” consist of rapid allusions to more than 100 compelling people and significant events that had taken place during his lifetime, a list that includes human failures, tragedies and corruption contributing to disillusionment and mistrust of institutions. Such a list, dating back to the pivotal 1960s, is easy to compile: Watergate, Three Mile Island, Exxon Valdez, Jim Bakker, Iran-Contra, Worldcom, Enron, the BP oil spill, John Edwards, Tiger Woods, Joe Paterno, Congressional gridlock, and government shutdowns just to name a few.

What does this have to do with agriculture and the food system? Over the same timeframe, they’ve become more consolidated and integrated. The Top 20 food retailers now sell two-thirds of the groceries. Three companies control 89 percent of soft drink sales. Four packers produce 85 percent of the beef, and a handful of companies control much of the global seed market.

Agriculture has applied technology that makes farming look drastically different than it did 50 years ago. Seed has been

developed that is resistant to herbicide to increase productivity and improve the environment. Farm machinery as big as houses uses GPS systems to navigate farm fields with ease and efficiency. Livestock and poultry are raised indoors—and on a scale that would boggle the minds of our grandparents.

Consumers are scratching their heads: “What happened?” There’s a growing belief that today’s food system has become an institution, coupled with a cultural suspicion that “Big Food” is out of touch with the values of consumers and likely to put profit ahead of public interest.

No, we didn’t start the fire, but we certainly can take steps to douse the flames of skepticism—but it won’t happen overnight.

Consumer attitudes can shift very quickly, but long-term changes in public perception occur over time. That means we need to be more transparent and more proactive about engaging—addressing concerns and answering questions. At the same time, we need to be patient, diligent and committed to building public support for the technology that’s changing what we do and how we do it.

Building trust boils down to doing a better job of connecting the dots between technology and specific benefits to society, such as resistance to diseases and pests which helps keep healthy food affordable, reduced use of natural resources like land and water, and potentially more direct consumer benefits like longer shelf life or enhanced nutrition.

Agriculture and the food system need to update their approach to building trust. We’ve largely relied on science to guide our actions. Public approval is not based on science alone.

Consumers aren’t interested in the science if they don’t first believe that we share their values—that we’re doing the right things for the right reasons and that our actions benefit society as much as they contribute to the bottom line.

A peer-reviewed and published trust model from the Center for Food Integrity proves that demonstrating we share the same values as the public is three- to five times more important in building trust than demonstrating technical competency through science. In short, people don’t really care how good you are at doing something until you’ve proven you have their best interests at heart.

For more information on the Center for Food Integrity consumer research, log on to www.foodintegrity.org/research.

Charlie Arnot, CEO, The Center for Food Integrity

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