PMA’S GLIMPSE INTO THE FUTURE:

2017 Produce and Floral Environmental Scan
Table of Contents

INTRODUCTION

CONSUMER TRENDS 2–6

1. Consumer Technology 2
2. Personalized Nutrition 3
3. Flavor 4

PRODUCTION TRENDS 7–9

1. Biotechnology Trends 7
2. Talent Challenges 8

FOOD SAFETY INNOVATIONS 10

1. Whole Genome Sequencing 10

GLOBAL TRADE 11–14

1. Cold Chain Logistics Market 11
2. Growing Demand from the Middle East 13
3. Global Food Safety Testing 14

CONCLUSION 15
Introduction

The power of the consumer cannot be overestimated. They have the ability to change industries overnight. Consumer demand drives the worldwide movement of products. Euromonitor International predicts the world’s population will reach 8.1 billion by 2025, resulting in an increased need for food at a time when we see a decline in the availability of natural resources, including farmland and water. This can only mean changes in the composition of world agricultural production areas and increased global trade.

Limited availability of land, labor and water, coupled with increasing regulatory pressures and rising consumer expectations of a safe, environmentally sustainable, socially responsible approach to food and floral production, continue to challenge the produce and floral supply chains to think differently about how they can meet increasing demand. These global challenges are accelerating the development and adoption of technologies, and rekindling a spirit of innovation in the agriculture industry.

The ability to generate, collect, analyze and share data through ever-increasing computational capacity is coinciding with, and in some cases enabling, equally impressive achievements in the worlds of biology and genetics, sensor technology, robotics, communications, and logistics. Greater computational capacity allows industry to better understand production and supply chain efficiencies that can help contain costs, ensure on-time market deliveries, reduce the risk of foodborne illnesses and reduce product shrinkage. This means making sense of data—whether from food safety systems or logistics—is key to future business models.

This report builds on the analysis of the 2016 Environmental Scan, which explored consumers’ increasing interest in health and wellness, need for convenience and desire for exciting flavors, as well as technological innovations in food safety, production and logistics in the produce and floral industries. For 2017, we highlight technological advancements that could have the most significant impact on consumer lifestyles, production trends, talent management strategies and global trade over the next five years, and their implications for the produce and floral industries. These advancements are enabled by developments in previously disjointed fields such as artificial intelligence and machine learning, robotics, nanotechnology, 3D printing, genetics, and biotechnology that are now all beginning to build on and amplify one another. This is spawning the need for more technical expertise in the industry than ever before.
Consumer Trends - The Convergence of Science, Technology, Customization, Convenience and Well-Being

Consumer demand drives global trade, spurring technology innovations that will ultimately lead to increasingly efficient business practices which require new skills for the global produce and floral industries.

Many consumers live life in a blur. They desire products that help them save time and gain a sense of control. The need to recover a sense of control influences many buying decisions in the intensifying pursuit of quality, convenience, customization and well-being. Companies and brands across all sectors are creating new products that promise to return this sense of control to consumers. These companies also recognize the need to build, or in some cases rebuild, trust by emphasizing factors such as food safety and privacy protection, as well as sustainable and ethical production of their products.

Advances in computational capacity combined with achievements in biology, genetics, sensor technology, robotics, communications and logistics are giving consumers increased control of the food they shop for and consume. Meanwhile, these same advancements are helping produce and floral companies increase control of production costs, reduce the risk of foodborne illnesses and reduce product shrinkage.

1. CONSUMER TECHNOLOGY

New technologies such as sensors and food spectrometers are giving consumers high-resolution views of the freshness of food. They precisely detect and communicate a food’s freshness to ensure consumption at the peak of flavor. Additionally, multisensory technologies that transmit qualities such as scent help consumers gauge freshness at a glance and entice them toward the freshest options.

Sensors are also changing consumers’ expectations around convenience and purchasing. A Think Tank by Adobe focused on the Internet of Things estimated that 15 percent of all purchases will be passive by 2020. Passive purchases are made without being triggered by consumers; instead products will “know” when they are running out via sensors implanted in their containers, which will trigger them to automatically reorder themselves.

Sensors and food spectrometers are being used in smart scales that allow customers to weigh produce and learn information such as how many calories the fruit or vegetable has, if it is organic, the age of the item, its nutrients and flavor, and how it was produced. In return, smart scales allow the retailer to see what information is most important to specific customers, which can help inform content for customized communications.
**Market Implications**

Consumer electronics such as smartphones and iPads will be developed with sensors that allow people to scan food to access information—whether it be about freshness, ripeness, sugar content, variety or a host of other attributes (as well as the health of houseplants). This technology will create a more educated and powerful consumer for marketers to address.

Both residential and commercial kitchens will increasingly be connected by a network of intelligent data systems. Major appliance makers are already adding sensors that will help restaurant operators and home cooks manage their inventory with more precision, which will contribute to reducing food waste.

**2. PERSONALIZED NUTRITION**

Consumers worldwide are growing more health-conscious and this is reflected in their diets. They are increasingly turning to fruits and vegetables as a tactic to improve health, creating a need for dietary information connected to their own personal needs. The steady growth of organic produce sales over the past several years is in large part attributed to consumers’ perception that organic foods are a gateway to better health. This cultural shift to a proactive approach to wellness cuts across all demographics and traditional consumer groups, and has given rise to a growing interest in personalized nutrition. Consumers are increasingly relying on their own assessments of how they feel to make decisions about their health and wellness. They also believe tracking their health data is an empowering step toward greater health, providing them with greater knowledge and control over their own bodies.

This health shift generated products like handheld spectrometers that can identify substances by using infrared light to detect the vibrations of the molecules on the foods’ surfaces. Once the item is scanned, the device transmits the data to an app that calculates the nutritional value of the food. Personalized nutrition apps are available that recommend foods to people based on their dietary needs and help them build grocery lists. Other handheld devices detect gluten, with the potential to eventually allow consumers to detect if other allergens or bacterial contaminants such as E. coli and salmonella are present.
Research increasingly suggests that each person is unique in the way they digest food, produce vitamins and metabolize nutrients. This realization has scientists and entrepreneurs scrambling to provide more effective nutritional advice based on genetic makeup, gastrointestinal bacteria, body type and chemical exposures. As a result of various research studies being conducted worldwide, analysts expect that in the future we will see a shift from nutritional recommendations being made for society as a whole to uniquely personalized diets that speak to individuals. People will increasingly come to value the personalized, functional benefits of foods, alongside taste, as part of an overall evaluation of satisfaction.

**Market Implications**

Tests that detect nutritional factors, such as whether a person is better at metabolizing fats or carbs, will gain in popularity, creating new interest in eating genetically appropriate diets. As these tests become widespread and affordable, consumers will become more interested in finding foods for their personal genetic makeup, giving them more control over their own bodies. All generations—whether an aging population managing health conditions or younger generations exploring how to age better—will look to the produce department for foods that deliver on key nutritional needs, functional benefits (e.g., energy, cognition, gastrointestinal health, etc.) and taste. Producers and retailers can stay in the forefront of consumers’ personalized nutrition solutions by helping them build strategies for eating well in ways that satisfy their need for customization, flavor discovery and convenience.

**3. FLAVOR**

For consumers worldwide, fresh produce plays a large role as they seek to balance nutrition with flavor. Yet in the past, farmers focused breeding on yields, disease resistance, appearance and shelf life, while processed foods focused on flavor. According to Euromonitor International, Americans consume about 600 million pounds of synthetic flavors every year. But globally, the number of consumers who are expressing increased demand for freshness and authentic flavor is growing. This has led some breeding programs to focus on flavor as well as yield traits. Some fruit producers are investing in proprietary variety breeding programs to develop new varieties that will have the desired flavor profiles and necessary yield qualities, while permitting packing and transport. These proprietary breeding programs are enhanced by the ability to perform whole genome sequencing, which allows for genomic selection and gene editing to accelerate breeding and variety protection.

Advancements in gene-editing technologies make it possible and relatively inexpensive to alter DNA sequences in plants. Scientists can insert, delete or replace DNA in the genome to create or enhance specific traits. Technologies such as TALEN/Fok1 and CRISPR/Cas9 allow geneticists to expedite the process of introducing or editing genes. The CRISPR system makes it possible to introduce mutations that are genetically indistinguishable from those resulting from natural breeding. RNA inhibition
(RNAi) allows scientists to selectively control the expression of individual genes. It remains to be seen how consumers and government regulation will impact the future use of these technologies in breeding. Gene editing can potentially impact the security of the world food supply. Researchers hope to use it to create hardier plants and wipe out pathogens, as well as increase flavor.

One of the more recent tools making it easier and faster for scientists to select plant traits is marker-assisted selection (MAS) which works with a section of a plant’s genome to select desirable traits. Due to advances in computational capacity and genomic sequencing technology, genomic selection (GS) is a somewhat new method that uses whole-genome prediction (WGP) models to calculate a plant’s genetic potential by estimating all marker effects simultaneously. This allows for the selection of genetically superior plants based on their genomic estimated breeding value (GEBV) in a shorter amount of time. It is considered a superior version of marker-assisted selection and is attracting the attention of breeders and geneticists.

**Market Implications**

While most consumers still favor size, durability and access over seasonality in fresh produce, the global demand for authentic and vibrant flavor will continue to grow. Fresh produce serves as a cornerstone of flavor and freshness. It taps into consumers’ desire to explore foods and food combinations with which they would otherwise not normally experiment. The expectation is that the availability of more flavorful fruits and vegetables will entice consumers to make healthier choices.
The data generated in proprietary breeding programs may lead to next generation gene-editing strategies to fine-tune flavor and texture. These new techniques might be the most effective way to grow fruits, vegetables and flowers in harsh climates, reducing yield volatility resulting from drought and disease pressure, and possibly reducing the need for chemical pesticides or improve flavor and nutrition—ultimately helping farmers increase profitability while producing more flavorful fruits and vegetables demanded by consumers.

The ease of use and low cost may make gene editing a viable option for smaller, specialty crops such as vitamin-enriched sweet oranges and non-browning mushrooms. This process may have significant implications for food producers who may be able to grow new strains of plants that exhibit specific nutritional or flavor characteristics. Whether consumers will accept genome-edited food is unknown, given their desire for food that is as close as possible to what nature intended.

Genomic selection offers the opportunity to accelerate the selection cycles, efficiently allocate resources and, as a result, generate higher yields of more flavorful produce and improved floral varieties at a faster rate. Additional yield increases through seed and agronomic research will continue to be an important aspect of farming, and are linked to the adequate management of inputs, pest management, better varieties and better farm management. This crop improvement process is not expected to cause consumer controversy, since it is essentially an advanced form of marker-assisted breeding that uses whole genome sequencing to find gene combinations that occur naturally to develop new crop varieties.
Production Trends

“Yields of important crops such as rice and wheat have now stopped rising in some intensively farmed parts of the world, a phenomenon called yield plateauing. The spread of existing best practices can no doubt bring yields elsewhere up to these plateaus. But to go beyond them will require improved technology. This will be a challenge. Farmers are famously and sensibly skeptical of change, since the cost of getting things wrong (messing up an entire season's harvest) is so high...” (The Economist, "The Future of Agriculture," 2016)

Total agtech investment dollars fell to US$1.8 billion for the first half of 2016, which represents a 20 percent decline from the same period in 2015 and a 27 percent decline from the second half of 2015. This decline in agtech investment was in line with the broader venture capital market, which also fell over the previous two consecutive halves of 2015 according to KPMG and CB Insights ("The Venture Pulse Report"). However, in spite of the overall decline, some subsectors, including the soil and crop technology, biomaterials and biochemical categories, along with precision agriculture, saw investment increases. The increase in investment was primarily driven by three trends: microbiome research, gene-editing technologies and biological inputs.

1. BIOTECHNOLOGY TRENDS

*Plant Microbiome* – Researchers are learning more and more about how complex microbial communities form and change over time. So it’s not surprising that scientists are studying plant microbes to satisfy consumer demand for alternatives to chemicals used in conventional farming to ward off insects or weeds, as well as give crops a boost in production. Distinct microbial communities live inside roots, on leaves and within flowers, and have an estimated three to six orders of magnitude greater genetic diversity than their plant hosts, according to *Scientific American*. This second genome provides plants access to nutrients and helps suppress disease. Scientists and farmers alike believe it represents the next big thing in agriculture.

Over billions of years, plants have formed partnerships with a variety of microbes that allow them to survive when environmental conditions are not ideal. These partnerships have allowed them to draw on microbial partners to overcome the myriad of challenges they face—including inadequate levels of nutrients or water, temperatures that are too high or low, or challenges from predators or pathogens. Using microbes to boost plant production or protect plants from pests is not a new idea, and past unsuccessful attempts to capitalize on plant-microbe interactions has led to skepticism about whether discoveries in this area can be applied in the real world of farmers’ fields.
However, with renewed interest in microbial ecology, new tools are opening up many environments to study. The momentum of the science combined with the need to improve worldwide agricultural productivity suggest that the approach may see greater success with adoption than previous attempts.

**Market Implications**

The potential applications of beneficial microbes in agriculture seem unlimited. But it takes large investments of time and money to screen thousands of microbes for beneficial properties and then turn them into reliable and cost-effective solutions to crop pest and disease problems in differing soil types.

Optimizing the microbial communities of plants may offer an entirely new approach to enhancing productivity because it could allow farmers to apply less chemical fertilizer, thus saving money and reducing the amount of contaminants that leach from fields into water systems. This approach is likely to appeal to consumers who have a growing interest in knowing how their food was produced and increasing concern for what they are putting in their bodies.

**2. TALENT CHALLENGES**

The world is at the beginning of a Fourth Industrial Revolution, according to the Future of Jobs Report, released by the World Economic Forum in early 2016. Developments in previously disjointed fields such as artificial intelligence and machine learning, robotics, nanotechnology, 3D printing, genetics, and biotechnology are all building on and amplifying one another. These disruptive changes will influence the global employment landscape over the coming years, resulting in a net employment impact of more than 5.1 million jobs lost from 2015–2020, with a total loss of 7.1 million jobs, most of which will be routine, white-collar office functions—and a total gain of 2 million jobs in computer, engineering, mathematics and architecture-related fields.

Two areas expected to become more important in the near future to practically every industry are data analysts and sales representatives. Data analysts are expected to make sense of, and derive insights from, volumes of data. Sales representatives are expected to translate the technical aspects of their offerings into practical, real-world solutions. Another role that many industries will need is a new type of senior leader who will successfully steer companies through the upcoming change and disruption.

The report forecasts that by 2020 more than one-third of the desired core skillsets of most occupations will be comprised of skills that are not considered crucial to the job today. Even those jobs that are less directly affected by technological advancements and have a largely stable employment outlook, such as marketing or supply chain professionals, may require very different skillsets in a few years as the ecosystems in which they operate change. Social skills such as persuasion, emotional intelligence and collaborating with and teaching others will be in higher demand across industries than narrow technical skills like programming or equipment operation.
Market Implications

Competition for computer, engineering, mathematics, science and architecture talent, as well as other strategic and specialist roles, will be strong through 2020. Produce and floral companies will need to offer attractive compensation and benefits packages in order to compete for talent against other industries. While the flow of STEM students is high, the amount going into the produce and floral industries remains low. The impact of technology will continue to shorten the shelf life of employees’ existing skillsets, which will result in companies and employees needing to continually pursue education and training to stay relevant and competitive. Produce and floral companies will need to invest in training and technology.

Companies in the produce and floral industries will need to prioritize developing talent that can shape, manage and lead change. This will require the HR function to become more strategic and help align the business, innovation and talent management strategies to maximize opportunities.
Food Safety Innovations

Consumer demand and industry’s commitment to safe food will fuel the quest to better understand invisible hazards and imperfect knowledge about foodborne risks. Food safety incidents disrupt markets and cause substantial economic losses for everyone from farm input suppliers to consumers.

1. WHOLE GENOME SEQUENCING

Recent outbreaks associated with the consumption of produce has reinforced the notion that foodborne illnesses remain a serious global challenge to public health. One longstanding problem in foodborne pathogen detection and response has been the ability to rapidly identify the source of the contamination. Whole genome sequencing (WGS) saves time during an investigation. Its use in public health surveillance and investigation programs is increasing. WGS represents an unprecedented approach for tracking pathogens because its data is much more detailed and it is:

A. Making correlations not possible before
B. Finding problems not suspected before
C. Doing it much faster than before

Using WGS to detect strains of pathogens contributes to a surge in reported food safety outbreaks. Moreover, that number is expected to grow exponentially, according to the FDA and CDC. The ability to detect foodborne disease outbreaks is expected to continue to improve, as both the cost and time required to sequence a bacterial genome are declining, with the cost estimated at US$50–$100 per isolate and a time frame of less than five days.

The application of whole genome sequencing constitutes a major leap forward in technology for local and global public health laboratories. In the U.S., FDA uses the GenomeTrakr to collect WGS data from foodborne disease-causing bacteria and upload them to a publically accessible database managed at the National Center for Biotechnology Information (NCBI) with the National Institutes of Health. The NCBI is a member of the International Nucleotide Sequence Database Collaboration along with the European Molecular Biology Laboratory (EMBL) in Europe and DDBJ in Asia. All three DNA databases sync their data nightly, creating a truly global database. The key feature of this network is that the draft genomes are globally shared so that new genetic clusters, or matches, can be identified as they are emerging, providing timely information to support ongoing investigations. The goal of the collaboration is to further enhance and expand this network by growing and harmonizing databases nationally and internationally.
**Market Implications**

The increased use of WGS is expected to help the CDC and FDA focus their efforts early in an investigation of food safety outbreaks to more quickly identify the pathogen causing illness, where it came from and the mode of transmission—allowing for a quicker response and resolution, and potentially helping reduce foodborne illnesses and deaths over the long term.

As the cost of sequencing continues to decrease and the amount of sequence data generated increases, new models for data storage and analysis are increasingly important. Innovations in computational technologies and approaches, especially the rise of cloud computing, provide promising avenues for handling the vast amounts of sequence data being generated. Countries that historically have not had detection capabilities can now leap ahead and use the technology to begin tracking food safety issues.

The ability to share whole genome sequence data is expected to lead to major changes in global health monitoring, but only with international agreement on standardized databases for reporting and analyzing the sequence data, as well as on the numerous legal and ethical issues surrounding the issue.

**Global Trade**

Global trade is an inevitable part of the world in the 21st century. It brings lower prices and more choices for consumers around the world, as well as opportunities to the entire produce supply chain.

1. **COLD CHAIN LOGISTICS MARKET**

   India is one of the fastest-growing major economies in the world, having overtaken China in 2015. The IMF forecasts India’s GDP to grow at 7.5 percent through 2019, driven by its sustained political stability and a growing middle class, as well as the government’s efforts to implement economic reforms, boost foreign investment and increase spending on infrastructure.

   Robust economic growth and rising household incomes in India are expected to increase consumer spending to US$3.6 trillion by 2020, with most of it on food, housing, consumer durables, transport and communications. Fresh food sales in India have been growing at a steady pace over recent years, as a result of an increasing population, increasing urbanization with steady incomes, central government schemes, improved access through traditional grocery retailers and foodservice outlets, and growing consumer demand for fresh food as a healthy option. Consumers are willing to spend extra money for higher quality fresh food in urban India, which is expected to support continued sales...
of fresh food in the future. Total volume sales of fruits and vegetables in India are expected to grow at a compound annual growth rate (CAGR) of 4–5 percent, with sales set to reach 230 million tons in 2020, up from 186 million tons in 2015.

India’s agriculture commissioner does not intend to increase supply through imports because he believes the country has achieved self-sufficiency. India produces 255 million tons of fruits and vegetables according to its National Horticulture Board, but loses an average of 18 percent annually postharvest. Most of the postharvest losses are due to inadequate cold storage facilities and inefficient handling. In an effort to meet expected demand, India’s government plans to use several government programs to support its goal of increasing production levels and decreasing postharvest losses to 320 million tons by 2018.

Increased demand for cold chain logistics is one of the major trends that is expected to contribute to the growth of the global cold chain market in the next few years. Growth in the global cold chain market is primarily driven by increased global consumer demand for quality and the need to reduce food waste in India and across the globe. The cold chain equipment market is a vital entity that is projected to see strong growth through 2020 as a result of increased demand for food globally, especially in emerging countries. The storage equipment segment dominates the cold chain equipment market, accounting for more than 50 percent of the global market in 2014. As well, the segment is expected to continue to see increased sales during the coming years, due to the growing need for storage equipment to fulfill the increasing demand for food that requires temperature control to extend its shelf life. Asia-Pacific is expected to be one of the fastest-growing regional markets for the cold chain equipment market through 2020 as a result of the increased use of cold chain management in India and China.

**Market Implications**

Opportunities exist for service providers in the agriculture industry to increase access to better postharvest infrastructure and technology, in order to reduce losses in the produce and floral supply chains and reduce food insecurity. India’s central government and some state governments plan to build 30 major cold storage facilities that will be operational by 2020. These will benefit farmers by helping stabilize the prices of produce commodities and reduce losses. Additionally, the government will continue subsidies for drip irrigation and organic farming, according to Euromonitor International.
Demand for organic fruits and vegetables is increasing across India as a result of growing consumer interest in health and wellness, increasing availability in urban areas, and promotion by the state and central government. While organic produce currently accounts for a small percentage of volume share, India’s central government is planning to make the entire northeast of India a hub for organic farming, which will drive investment across this region in the coming years.

Although Asia-Pacific represents a significant opportunity for produce consumption as a result of its huge and growing population, relatively strong economic growth and an ongoing transition from traditional to modern trade, in some markets foreign investment has been deterred by red tape, regulation and long-term uncertainty, according to the “Internationalization of Retail” report.

2. GROWING DEMAND FROM THE MIDDLE EAST

According to The Economist, the growing populations of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the UAE, also called the Gulf Cooperation Council (GCC), point to increased dependence on imported food staples. Food imports are projected to grow to US$53.1 billion by 2020. Major factors driving the GCC market include growing domestic and expat population, rising health consciousness among the population, changing tastes and preferences, and growing disposable income leading to higher consumption of nutritional foods as part of a stable diet. The United Nation’s figures reveal the population of GCC countries jumped by 18.9 percent in the last five years. In countries like Saudi Arabia the birth rate has topped 20 percent consistently in recent years. According to a report published by the Economist Intelligence Unit, by 2020 the GCC population is forecast to reach 53.5m, a 30 percent increase over the level in 2000.

Falling groundwater and aquifer levels in the Arabian Peninsula, limited rainfall, arid climate, overreliance on imports and rising soil salinity are affecting the fruits and vegetables market. The region’s dependence on desalinated water means that meeting more of its food needs through domestic production is not an option in the long term. Gulf-owned farming projects in North Africa, sub-Saharan Africa, Central Asia, Southern Asia and Eastern Europe provide considerable gains for both sides. Based on estimates by the International Food Policy Research Institute, Africa needs US$37 billion per year in agricultural investment.

Market Implications

Six out of the top ten countries for prevalence of diabetes are in the Middle East, according to the International Diabetes Federation, while obesity rates in the region are among the highest in the world.

But consumers and regulators alike are becoming more aware of issues around healthy eating, offering opportunity to increase the consumption of produce in the region. Multinationals are well placed to capitalize on the increasing concern over health and wellness issues.
3. GLOBAL FOOD SAFETY TESTING

This market is projected to reach approximately US$16.41 billion by 2020, at a compound annual growth rate of 7.4 percent from 2015 to 2020, according to the research report “Food Safety Testing Market by Contaminant, Technology, Food Type and Region—Global Trends & Forecast 2020.” While the North American governments have spent billions of dollars to contain pathogen-induced outbreaks, the market is forecast to experience rapid growth in developing regions such as Asia-Pacific, Africa/Middle East, Eastern Europe, and Central and South America. Global increases in outbreaks of foodborne illnesses and implementation of stringent food safety regulations are driving the increased demand for food safety testing throughout the world. Trade has been, and will continue to be, responsible for the growth of the food safety testing market in developing countries, since they need to meet the food safety standards of the importing country.

Market Implications

The rapid technology segment is projected to grow at the highest compounded annual growth rate, which will be driven by the advancement of testing technologies and increased demand for rapid results. Asia-Pacific is projected to be the fastest-growing region in the food safety testing market, as a result of increased trade of produce supply and the rising demand for food safety from consumers, producers and regulators. Within the region, the food safety testing market is forecast to grow the most in China (CAGR of 9.9 percent from 2015 to 2020), which is being driven by the establishment of even stricter food safety laws that were brought into effect in 2015, as a result of the increasing:

- Number of foodborne illness outbreaks
- Intensity of food scandals and cases of adulteration and frauds
- Demand and supply of food products in China
Conclusion

Satisfying the needs of the consumer is not just a corporate initiative. It is an industry-wide endeavor to ensure consumers are receiving safe products when and where they want them. Produce and floral producers will be able to satisfy consumers’ increasing demand for fresh, flavorful, safe, high-quality products through new technologies, new models of production and new approaches to creating value, as well as stronger networks of collaboration.

Collaboration throughout the supply chain is crucial in today’s environment, where the pace of change and the adoption of disruptive technologies are faster than ever before. At the end of the day, providing consumers with safe and quality products requires advances in seed and growing technologies, production automation, software and data collection, and a host of other disciplines like physics, biology and engineering. This is spawning the need for more technical expertise in the industry than ever before.