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"The Next Farm Bill: Technology & Innovation in Specialty Crops"
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Chairman Conaway, Ranking Member Peterson and members of the House Agriculture Committee, it is my pleasure to provide this testimony today on behalf of the American Seed Trade Association. Innovative, science-based solutions are fundamental to meet the growing agricultural and food needs of the United States and the world. Since the creation of the American land grant institution system and USDA's agriculture research structure, innovation has been the bedrock of American agriculture production. Since 1948, total U.S. agricultural output has more than doubled. The ability of the farm sector to feed far more people today while using less farmland than six decades ago is attributed to the ongoing innovation in agriculture research; and continuing innovation will be critical as we look for ways to sustainably feed nine billion people in the coming years.

Founded in 1883, ASTA works to enhance the development and movement of quality seed worldwide. ASTA's diverse membership consists of over 700 companies involved in seed production, distribution, plant breeding, research and related industries in North America. ASTA represents all varieties of seeds, including grasses, forages, flowers, vegetables, row crops and cereals. Many ASTA members are research-intensive companies engaged in the discovery, development and marketing of seed varieties with enhanced agronomic and end-use quality characteristics. With respect to the U.S. specialty crop sector, the U.S. vegetable seed market was $860 million in 2015, supporting a farm gate value for specialty crops of $11 billion.

The plant world contains hundreds of thousands of species with an amazing array of biological diversity. This diversity has evolved over billions of years of natural and targeted selection, and continues today using the science of plant breeding. As our knowledge of plant genetics and biology has grown over time, plant breeders have gained access to new tools, technologies and strategies to more efficiently address evolving farmer and environmental challenges, and to meet ever-changing consumer demands. Today breeders use an array of tools such as whole genome sequencing, bioinformatics, molecular marker techniques and digital imaging to assist in the breeding process. USDA research programs have played a key role in the development and deployment of these tools. Regardless of the plant breeding method used, the goal is still the same: to produce a safe, nutritious, food and feed supply and to improve fiber and biofuels through the creation of new plant varieties.

The continued development of new plant varieties is vital to consumers and the agricultural industry because of the constant challenges to meet new market requirements, consumer demands, rapidly evolving diseases and pests, and to increase the productivity and durability of existing crops. To improve crops takes multiple generations of breeding and testing lasting some 5-10 years for each new variety. Today, with an increased understanding of genetics, the capability to sequence plant genomes and the ability to link a specific gene to a specific characteristic, breeders are able to improve plants more precisely and efficiently. Breeders can now make very specific changes in existing plant genes in a way that mimics the changes that occur in nature. New, innovative plant breeding methods, like gene

editing, allow plant scientists and breeders to precisely make specific changes to a plant's DNA using a plant's own internal processes. The result can be the activation of a beneficial characteristic (such as drought tolerance or increased nutrition), deactivation of an unfavorable characteristic (such as disease sensitivity) or small changes to the DNA that reproduce a characteristic found within the plant's family (such as a disease resistant characteristic found in a wild relative).

An underlying common denominator for new innovations in plant breeding is that they can achieve the same end- result that could be achieved through more traditional plant breeding methods, but in a more precise and targeted way. This allows the plant breeder to forgo multiple cycles of plant selection from a population of thousands of individual plants and move to testing elite lines sooner. By utilizing the plant's (or its wild relative's) own genetic makeup to create genetic variability, the resulting new plant variety does not contain any "foreign" DNA from outside the plant's gene pool. While no gene edited products are available on the market today, this breeding method represents an exciting opportunity for agriculture. It can be used across all crops to produce better seeds that can thrive despite new and emerging challenges such as changing weather, plant diseases, and pests, while reducing crop inputs. In addition to farmer and environmental benefits, plant breeding innovations can bring benefits to consumers -- like produce that is better tasting and has higher nutritional content.

It is important to note that these methods are being improved and are widely available to public and smaller private breeding programs. In the specialty crop arena, researchers are evaluating gene editing methods to address costly diseases in crops like citrus, potato, grape, and lettuce.

Farm Bill Investments

Research programs authorized in the Farm Bill are critical to advancing agriculture and these programs have shown a high rate of return for the dollars invested. Federally funded U.S. agricultural research has played an important role in expanding our understanding of plant genetics leading to new crop varieties. USDA investments in genome sequencing of more than 25 agriculturally significant crops are fundamental to this work. Within the specialty crop arena, this includes genome mapping for tomato, potato, apple, strawberry, carrot, cranberry, lettuce, peach, papaya, cucumber, black raspberry, watermelon, and pineapple. Typically, this research is done by groups of USDA, university, grower and industry partners. The resulting discoveries can then be further developed for commercialization by large and small companies.

In addition, USDA-Agricultural Research Service genebanks contain invaluable sources of resistance, tolerance, and adaptation to stresses, and genes to improve the quantity, quality, and production efficiency of crops. The GRIN-Global (Germplasm Resources Information Network) information system developed by USDA provides breeders and researchers with descriptions of plant materials which can then be accessed through the National Plant Germplasm System (NPGS) genebanks. In 2015 – 16 GRIN-Global had more than 1.5 million individual web page visits and the NPGS facilitated distribution of more than 240,000 plant germplasm samples domestically and internationally. New data-mining strategies are enabling researchers to better associate specific genes with agriculturally important characteristics, and build on genetic advances in one crop to improve other crops.

Federal research dollars can be extended and multiplied through public-private partnerships.
We have selected a handful of specialty crop examples to introduce today from a myriad of projects.

Lettuce: is one of the top 10 most valuable crops grown in the U.S. with an annual market value of over $2.3 billion. The vegetable seed industry relies on public plant breeders to provide basic genetic resources, new breeding methods, and robust genetic stocks for use in commercial lettuce breeding programs. At the University of California-Davis, Dr. Richard Michelmore's lab has focused on enhancing the efficiency of lettuce production, allowing for more efficient use of agriculture inputs, and driving the development of consumer-desired characteristics. USDA's National Institute of Food and Agriculture (NIFA) contributed to Dr. Michelmore's work through the Agriculture and Food Research Initiative (AFRI) and it is further supported by the Lettuce Genome Sequencing Consortium. The investment by this private sector group, comprised of 10 vegetable seed companies in California, is allowing Dr. Michelmore and his team to expand the scope of their project.

Tomatoes: In 2016, AFRI funded a project at the Watson School of Biological Sciences at Cold Spring Harbor Laboratory (CSHL) in New York focused on improving growth and yield in tomatoes. Researchers isolated genes responsible for diminishing yield. By using CRISPR/cas9 gene editing tools, the team was able to develop tomato plants without those negative characteristics, while maintaining the plants' desirable qualities. In a separate project, CSHL scientists used gene editing to create tomato plants that flower and ripen more than two weeks faster than conventionally-bred varieties. This translates to more plantings per growing season and plants that are suitable for more northerly latitudes. The lab is collaborating with several seed companies to evaluate the agricultural potential of their findings.

Broccoli: is worth nearly a billion dollars in annual sales per year; but due to temperature conditions, production is concentrated in California. At Cornell University in New York, Dr. Thomas Björkman is working to change that. Through funding from the Farm Bill's Specialty Crop Research Initiative, his laboratory is using marker-assisted plant breeding to develop new varieties that are better suited for production on the East Coast. This initiative is supported by several ASTA member companies who are engaged in an integrated broccoli breeding program with public-sector plant breeders. Several varieties developed through this program have already been released on the market.

Leafy Greens: The Foundation for Food and Agricultural Research (FFAR), authorized in the 2014 Farm Bill, is utilizing public-private partnerships to benefit specialty crop research. FFAR recently announced the Crops of the Future Collaborative research initiative with eight partners. This project will leverage a $10 million Federal investment in pre-competitive research to hasten yield and nutrition gains in leafy greens, wheat and corn.

Imported Seed: Lastly, The National Seed Health Accreditation Pilot Program (NSHAPP) was funded from dollars designated in the Horticulture Title for Plant Disease Management and Disaster Prevention Programs (10007) –- an important funding mechanism for specialty crops. Under the goal of enhancing mitigation and rapid response, NSHAPP is developing a model for a voluntary system of testing imported seed for pathogens of phytosanitary concern that can be continuously adapted to emerging pathogens. The USDA-APHIS National Seed Health System has coordinated with the seed industry in a unique partnership to screen imported seed with diagnostic testing to prevent the introduction of previously undetectable and economically damaging seed-transmitted pathogens.

Conclusion

Farm Bill investments in a broad portfolio of long-term research are needed to sustain the global food supply. Collaboration between the public and private sector in these programs can ensure that research dollars result in beneficial new products for farmers, consumers and the environment.

It is important to note however, that the promise of U.S. research investments will not be fully realized if an overly burdensome regulatory structure impedes the broad adoption of new and evolving plant breeding methods. We urge the U.S. Government to make a clear, positive statement about the necessity of innovation in agriculture, including innovation in plant breeding. Congress should encourage USDA, FDA and EPA to have consistent, science-based policies that promote a climate of innovation, particularly for university researchers and small companies. The seed industry, and all of agriculture, is global. Therefore, in addition to domestic efforts, it's critical that the U.S. Government develop an international engagement strategy to prevent trade barriers due to non-harmonized regulations.
In summary, Congress must ensure that Executive branch actions including directives, regulatory and trade policies, and budgets foster the growth of a strong 21st century farming economy through sufficient funding of research programs and science-based decision making.

Chairman Conaway, Ranking Member Peterson and members of the House Agriculture Committee, the American Seed Trade Association and its member companies look forward to working with you to promote continued innovation to ensure a strong economy, healthy environment, and a safe and secure food supply to meet the needs of the growing population. Thank you for the opportunity to testify today.