

# PROMOTING INNOVATION IN SEED AND CROP DEVELOPMENT

## Plant Breeding: Meeting Agricultural Challenges



Through advancements in agriculture and the development of new crop varieties, humans have historically strived to meet the needs of a continuously growing population and to develop a safe, reliable and sustainable food supply. As our world's population grows from today's seven billion people to an estimated nine billion by the middle of this century, agriculture is faced with the continued challenge of meeting the rapidly growing demand for food, feed, fiber and fuel.

Plant breeders provide the genetic resources to address the increasing demand for a wide variety of nutritious and high quality products, while also supporting efficient and sustainable agricultural practices that preserve our environment's natural resources and biodiversity. The goals of plant breeders have always been to create new variations of plant characteristics to provide solutions for quality, disease and pest resistance, to increase tolerance to environmental stress, to achieve higher yields and to meet consumer expectations.

Plant breeding depends upon genetic variability within a species and also from related species as a basis for developing new plant varieties with improved characteristics. Prior to commercial

release of a plant variety, plant breeders use well-established, intensive assessments across growing conditions to eliminate plants with undesirable characteristics, to ensure stability of the desired characteristics and to confirm performance.

Since the 1930s, in the United States, yields of staple crops such as soybeans have more than tripled and corn yields have increased fivefold, despite a decrease in available cropland area. Improved nutritional content of vegetable crops such as spinach, tomatoes, carrots and broccoli, are a direct result of plant breeders' increased understanding of the biology of plants and how their genes function to combine favorable combinations of traits.



## Fostering Innovation In Plant Breeding



Our continuously advancing understanding of plant biology and genetic diversity is providing new opportunities required for the development of plant varieties that are better adapted to meet the challenges facing agriculture today and in the future. New tools for plant breeding are essential to address the challenge of limited genetic diversity for important traits such as resistance to pests, efficient use of water and nitrogen, drought tolerance and improved nutritional content and taste.

Plant breeders are continuing to develop precise, yet flexible tools to safely increase specificity and efficiency of breeding, decrease development time and cost, and increase genetic diversity for breeding programs. Such precision breeding tools are sometimes referred to as New Breeding Techniques. These tools can be used to precisely and efficiently introduce the desired trait into a commercial variety. The efficiency, flexibility and low relative cost of these tools means they can be used by both public and commercial plant breeders including those in developing countries. They can also be used across all agriculturally important commodities as well as vegetables and specialty crops.

The scientific understanding of how plant genes function in a coordinated manner will continue to increase, as will the ability of plant breeders to develop new, more efficient and precise breeding tools as refinements of traditional breeding techniques. In most cases, the plant varieties developed using these new tools will be indistinguishable from varieties developed through classical breeding.



To a large extent, application of precision breeding tools is being stalled at the research and development stage because of uncertainty over public policy and unclear regulatory status of the new varieties. Products developed through such breeding tools may be subjected to different regulatory requirements among trading partners, potentially leading to trade impediments and enforcement issues globally. Unnecessary regulation and oversight of products derived through precision breeding tools would result in undue, costly regulatory burdens, stifle innovation and prevent the uptake of advanced, innovative breeding applications by both industry and public breeders in developing countries.

## Principles For Government Policies

- Government policies should be science and risk-based, predictable, and promote innovation and advancements in breeding.
- Government policies should acknowledge current seed regulations and standard breeding practices that establish the current high standards for seed product integrity and varietal purity to meet customer needs and the demands of the marketplace.
- Governments should not differentially regulate products developed through precision breeding tools that are similar to or indistinguishable from products resulting from more traditional breeding tools, since such similar products are not likely to pose different risks.
- Regulation and oversight, if needed, should be based on sound scientific principles and proportional to the degree to which the product presents new potential safety concerns to the environment or food/feed chain, and not based on the breeding process by which it was produced. Small changes to plant genomes, such as those occurring through traditional breeding and evolution, need to be viewed in light of the inherent diversity in plant genomes as well as the long, successful history of plant breeding and its exceptional record of safety.
- Governments should avoid creating trade barriers or disruptions due to non-harmonious policies and practices.