Global Plant Council

Statement on the Role of Genome Editing in Plant Sciences and Agriculture

Executive Summary:

The advent of gene editing as a plant breeding method presents important opportunities for making very precise changes in genomes to obtain desired traits or remove undesirable traits. As with all newly developed plants, plants with genetic changes obtained through genome editing are subject to existing plant-variety development systems. In as far as those genetic changes are indistinguishable from what can be obtained using conventional strategies, we recommend the resulting plants are subject only to existing systems for variety development. Only when genetic changes go well beyond what can be obtained with conventional breeding strategies might the resulting plants also be subject to biosafety (e.g. GMO) regulations.

Background:

Plant breeding is a crucial component of global efforts aimed at addressing the challenges of producing sufficient food, feed, fibre, and biomass for a growing worldwide community, under the pressures of climate change and available arable land, and with less environmental impact[1].

Plant breeding has been practiced for over 5,000 years with advances in the last 150 years being underpinned by a series of scientific developments, such as the formulation of the 'rules of inheritance' in the 19th century, and the development of breeding techniques such as embryo-rescue to facilitate interspecific crosses, the development of inbreds and their hybrids, and radiation and chemically induced mutagenesis. This was followed in the second half of the 20th century by unravelling the 'genetic code', the discovery and utilization of natural processes of 'cutting and pasting genes' from one organism into another (e.g. genetic modification/engineering), and the development of molecular screening techniques such as marker-assisted selection.

A relatively recent development in this continuum is the discovery and utilization of natural processes that allow for even more precise modifications to genomes, with results that mimic and be indistinguishable from the spontaneous mutations and genetic rearrangements that occur in all species. These so-called 'genome editing' techniques can, for example, 'knock out' genes in plants that cause allergenicity.

[1] E.g. Sustainable Development Goal nr 2.

Over the last few years, there have been many discussions as to which plants developed using genome editing techniques fall under current biosafety/GMO regulations[2].

The Global Plant Council (GPC; see Annex 1) welcomes these discussions, as they remind us of the reasons why biosafety/GMO regulations were established, i.e. not because these modern techniques are considered inherently risky, but because they can result in novel genetic combinations that go beyond what can be achieved by mating and recombination, and with which there may be limited familiarity.

Our recommendation:

Plants developed using genome editing that result in genetic changes that are indistinguishable from what can be obtained using conventional breeding strategies (e.g. deletions, base-pair changes and the exchange of genes between sexually compatible species), should be treated with the same plant-by-plant method of evaluating new varieties as conventionally produced plants, i.e. should only be subject to the existing systems for variety development. Only when such genetic changes go beyond what can be obtained with conventional breeding strategies might the resulting plants also be subject to biosafety (e.g. GMO) regulations.

Looking at the future governance of plants developed using genome-editing techniques, the GPC strongly encourages governments to:

- **provide clarity** as to which plants developed using genome editing techniques fall under current biosafety/GMO regulations;
- **regularly review existing biosafety regulations** for effectiveness, proportionality, and efficiency;
- **strengthen a transparent, evidence-based implementation** of regulations that take into account current knowledge of the fluidity of genomes within any species; the spontaneous/unintended genomic changes that occur during conventional breeding processes; and, that conventional breeding techniques typically result in more unintended genomic changes than genome editing techniques,
- **consider adjustments of regulatory procedures** where this is justified by new knowledge and experience, so that in some cases authorization procedures can be replaced by notification procedures or by the requirements of compliance with technical standards that are practical, based upon sound scientific evidence, and do not impede innovation.

Signed,

Professor William Davies, Global Plant Council President, United Kingdom
Professor Barry Pogson, Global Plant Council Chair, Australia
Professor Rodrigo Gutierrez, Global Plant Council Vice-Chair, Chile
Dr Deena Errampalli, Global Plant Council Treasurer, Canada
Dr Ruth Bastow, Global Plant Council Executive Board member, United Kingdom
Professor Katherine Denby, Global Plant Council Executive Board member, United Kingdom
Professor Yusuke Saijo, Global Plant Council Executive Board member, Japan

[2] E.g.: GPC-SEB workshop "New breeding technologies in plant sciences", 7–8 July 2017: Gothenburg, Sweden.

Annex 1: About the Global Plant Council: The GPC is an alliance of 27 plant and crop science societies, organizations, and affiliates from Africa, Asia, Europe, the Pacific, and North and South America, representing over 50,000 scientists. The GPC was established to operate at the international level beyond the reach or capacity of any one of its Members. The mission of the GPC is to facilitate the development of plant science strategies and associated policies that contribute to mitigating critical global issues, including the sustainable intensification of crop production, and environmental protection to reduce world hunger and improve human health. The GPC aims to accomplish these goals by a suite of strategies, including providing resources and guidance to governments, national and international funding agencies, policy makers, and NGOs to facilitate research, policy, and legislative frameworks that foster innovation, collaboration, and positive societal, economic and environmental impacts.