

Genome Editing in Agriculture – Enabling Opportunities for Agricultural Innovation

Genome editing is considered a valuable and complementary addition to modern plant breeding practices. Increased utilisation of these innovative technologies in plant science promises to accelerate improvements in agricultural production in an efficient and sustainable way, preserving our environment and delivering benefits to both producers and consumers. The challenge, however, is to ensure that regulatory approaches provide clear guidance, are science-based to ensure safety, while simultaneously promoting innovation and utilisation of these technologies.

As a follow up to the previous virtual discussion platform on this topic, CropLife South Africa in collaboration with the USDA Foreign Agricultural Service and local SA partners, hosted the final event in its Genome Editing in Agriculture webinar series on 22 June. This event provided a platform for stakeholders in the South African agricultural sector to gain insight into how genome editing impacts innovation and breeding, as well as the economic benefits for agriculture and farmers.

The event was opened by Doug McKalip, a senior advisor at the US Department of Agriculture, who set the tone for the discussions by elaborating on how the availability of innovative genetic tools have been critical to the efficient production of vaccines during the current Covid-19 pandemic, demonstrating the responsibility of governments to adopt science-based reviews to make technologies available in a timely manner. He confirmed that climate change will be a priority under the current US administration and that biotechnology, as well as genome editing, will be an important contributor to providing sustainable solutions. He acknowledged that while genome editing holds so much potential and promise, the realisation of benefits is largely dependent on a science-based regulatory approach that provides a clear pathway for products. He concluded that collaborations between countries are important to ensure compatibility between regulatory systems so that they can work seamlessly across boundaries.

Discussions were moderated by Dr Hennie Groenewald, executive manager of Biosafety South Africa, a service platform that supports sustainable innovation for the South African bioeconomy. Presentations kicked off with Dr Martin Lema, adjunct professor in biotechnology at Quilmes University, who provided an overview of Argentina's experience with genome editing in agriculture. He shared details on the regulatory criteria and process for assessment of genome editing applications, confirming that their case-by-case mechanism determines whether a product should be regulated as a GMO or as a new conventional variety.

He acknowledged that preliminary assessments on whether to regulate or not, has encouraged innovation and research investment by an increasing number of local companies and public research institutes, resulting in more local product applications. Beyond GEd regulatory systems, he also emphasised the importance of public communication and understanding of genome editing and elaborated on how the Argentinean government has engaged the public on this issue. He concluded that within the LATAM region, many countries have adopted the Argentinean approach to genome editing and are seeing similar results with regards to local and foreign investments in innovation.

Dr Lukeshni Chetty, general manager of the South African National Seed Organisation (SANSOR), followed with a presentation on genome editing in the seed industry. She shared information about the scientific fundamentals of plant breeding and how the application of genome editing tools could assist breeders to develop varieties in less time and with greater precision.

She elaborated on the global seed trade industry, emphasising the importance of regulatory harmonisation to facilitate the movement and trade of seed. Her presentation also referred to the position of the International Seed Federation advocating for the adoption of consistent, harmonised and science-based approaches for varieties developed from innovative breeding applications. She highlighted that there are lessons to be learned from the global patchwork of regulations for GMOs that has led to asynchronous approvals of GM products, creating challenges with trade and technology availability. Outcomes of a study on perceptions of plant breeding and plant breeding

innovations revealed the knowledge gaps amongst consumers and the importance of knowing the level of understanding amongst target groups so that messages can be better communicated.

Sharing some perspectives on the importance of genome editing tools for the vegetable industry, was Dr Glendon Ascough the research director for plant breeding activities at Starke Ayres. Glendon provided an overview of the various tools used in their plant breeding programme to bring competitive products to market, confirming that these innovative tools have made the plant breeding process more accurate, efficient, quicker, and ensured better decision making. He clarified Starke Ayres's decision to exclude GMOs from its breeding programme and separating itself from the stigma and perceptions attached to GMO's. He pointed out that the current GMO definition in South Africa included gene editing and that from a developer perspective, these regulatory hurdles would be too costly and time consuming, if not addressed. He concluded that for the potential of innovative plant breeding to be realised, there needs to be a clear and differentiated definition and pathway for gene editing products that are not GMOs. Importantly, he added that regulations in South Africa should focus on the safety of the end product, not the development method, to avoid having strict regulations that stifle the innovation process.

Dr Dirk Swanevelder, a senior researcher at the Agricultural Research Council followed with an informative presentation on some of the promises and practical challenges posed by genome editing in agriculture. His presentation highlighted genome editing in crops of significance to the southern African region, as well as provided examples of gene editing in animals and the biomedical research sector. In conclusion, he stated that research in South Africa is ready to embrace genome editing, but that the absence of clear regulatory guidance defining the scope of products to be regulated, creates uncertainty and deters investments in local innovation projects. Sinelizwi Fakade, a commercial farmer from the Rocky Park Farming Group in the Eastern Cape concluded the day's presentations by sharing perspectives on how the farming sector cannot afford to ignore technologies such as biotech seed and gene editing innovations in order to meet food production targets and achieve food security. He further stated that investments in plant breeding technologies are offering farmers better solutions to protect their harvests against weeds, diseases and other pests while minimising impacts on the environment. He concluded that technology is the future and that farmers needed to embrace it.

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Note to Editor:

CropLife South Africa is a non-profit industry association that serves and represents responsible manufacturers, suppliers and distributors of sustainable crop protection and plant biotechnology solutions in South Africa. It strives to enable its members to be providers of environmentally compatible solutions that ensure sustainable, safe and affordable food production, and therefore food security.