Induced genetic variation: Innovation opportunities & challenges from a South African perspective

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Abstract

A wide and evolving array of more precise and efficient techniques, aimed at changing genomes and/or modulating gene expression, have been developed recently. These so-called new breeding technologies (NBTs) have enabled the introduction of purposefully designed genetic variation into populations not previously feasible, and lead to enthusiastic speculations on the potential of these techniques in breeding programs and other biotechnology applications. However, it has also led to intense international discussions on their possible ethical, regulatory, and safety implications. In these discussions the conceptual and technical similarities and overlaps between these techniques and GM technology, often imposes a loaded "GMO-frame". This often leads to the inaccurate clustering of distinct techniques, genetic outcomes, and/or risk implications, which impedes evidence-based decision making and the required alignment within and between regulatory frameworks.

The relative accuracy, efficiency, simplicity, and low cost of some NBTs hold great potential for bio-innovation across multiple sectors, particularly within a developing world context, which to date has not been able to realize significant value from genetics-based technologies. Moreover, fit-for-purpose regulatory frameworks, based on scientific risk analysis, will ensure safe and sustainable research, development, and innovation using these NBTs. The renewed international debate on the regulation of genetic-based innovations should therefore be used as an opportunity to re-establish sound parameters for science-based risk regulation, including a contextually appropriate trigger for such additional regulation.

This paper will examine the contextually relevant history, principles, and perspectives related to the, yet unresolved, NBT governance framework in South Africa, discuss the status, and propose a framework that balances sound risk analysis principles with public confidence considerations. The implementation of such fit-for-purpose regulatory frameworks across Africa will promote bio-innovation in support of national and regional bioeconomies, climate resilience, and international competitiveness.

Key words: induced genetic variation, new breeding technologies, bio-innovation, fit-for-purpose regulation