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Policy Brief 2

SECURING POLITICAL GOODWILL FOR GENE EDITING TECHNOLOGY IN AFRICA

DEVELOPED BY: THE GENE EDITING TECHNOLOGY INITIATIVE WORKING GROUP



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TARGET AUDIENCE: POLICYMAKERS

The advent of genome editing has evoked both enthusiasm and controversy, creating regulatory and governance challenges worldwide. Special attention must be given to policies and governance, as well as contributions addressing regulatory aspects of gene editing for plants. The success of gene editing techniques cannot be guaranteed by science alone. Political influence and social acceptance significantly contribute to market performance of crops. The acceptance and application of gene editing technology requires a framework that is approved by legislation and policy of national government.

The role of policy in decision-making is crucial. It is very important that policy dialogue is encouraged between policymakers and different actors to guide decision-making on gene editing technology, especially at national levels.

SCIENCE-POLICY INTERPHASE

Engaging policymakers illuminates the policy landscape and plays vital role in supporting the application of gene editing technology. A number of frameworks can be used by policymakers to engage the public and secure their support for gene editing technology. Since the advent of recombinant DNA technology in 1973, novel tools for breeding by genetic engineering have received significant focus resulting in accelerated development of genetic engineering technology. The applications of these technologies are diversely used in medicine, pharmaceutical industries, agronomy, and food production. In spite of the remarkable success of the gene editing technology, the production of genetically modified organisms (GMOs), raised several concerns, which limited the acceptance of GMOs by policymakers.

Genome editing involves making slight changes to the existing genes in a plant or animal. Unlike genetic-engineering techniques, gene editing does not involve the insertion of foreign genetic material from other species. Genome editing technology utilizes deliberate genetic modifications like plant breeding techniques of hybridization and mutations. However, genome editing is cheaper, faster and more predictable than previous methods. These features resulted in lauding 2015 CRISPR Cas as the 'breakthrough of the year' by the journal Science. The Nobel prize winners in 2020 Emmanuelle Charpentier and Jennifer Doudna were notably two gene editing pioneers in Europe for their work on the development of Crispr-Cas9, a method for genome editing which provides the ability to search and edit specific genes with lower risk and unintended consequences to other parts of the genome. With this factual information, gene editing technology is a surefire for combating hunger by increasing crop production in Africa.



GENE EDITING TECHNOLOGY AS NATIONAL, REGIONAL AND GLOBAL PRIORITY

In the African Union (AU)-Agenda 2063, the fifth goal on “Modern Agriculture for increased productivity and production”, gene editing technology has a big role to play in achieving this goal. African countries have a good opportunity to take a part in the new challenge of worldwide efforts to adapt gene editing as legal, certified, and safe approach for food production. Several countries in the world, such as Argentina, Australia, Brazil, Canada, Chile, Japan, and the USA do not regulate gene editing varieties that have no foreign gene integration. Other countries like India, Kenya, and Nigeria are in the process of developing regulatory guidelines for the application of genome editing technology. Science-based regulatory guidelines will enhance the adoption of disease-resistant gene edited crop varieties, and therefore contribute to food security. It is important that policymakers in Africa dialogue with scientists to pursue internationally recognized framework for facilitating gene editing technology for purposes of food security.

Recommendations for policymakers’ dialogue with scientists

- **Build capacity for public discussion and debate**

Future initiatives should attempt to build capacity for public discussion about non-human genome editing and its related applications. Research on public opinion suggests that public trust in science remains high.

- **Connect public discussion to decision-making**

Identify opportunities for decision-making to include expertise that inform the public on development of new ‘rapid methodologies’ such as gene editing technology. These opportunities should focus on providing real-time information when the need arises.

- **Hold-open policy moments**

Public discussion of non-human genome editing will evolve around key moments, such as regulatory decisions or newly publicized products. It is in such moments that it is especially important, but hard, to discuss and debate new technologies. An ambitious next step would be to develop new ways necessary to hold-open discussion in real-time.

- **Engage in science-policy dialogue**

Periodically hold discussions with all key actors in gene-editing technology involved. These actors may include and not limited to politicians, academicians, researchers, regulators and the public.

PROGRESSIVE GENE EDITING TECHNOLOGY POLICIES IN AFRICA

To sustain life on earth, food production must provide an adequate supply of calories and nutrients to the whole world population. Food insecurity, that is the lack of access to an adequate food supply, threatens millions of people worldwide with malnutrition. Moreover, the problem is getting worse as the global human population is growing rapidly and is expected to reach 8.3 billion by 2030 as reported in the UN Population Facts of 2017. African policymakers must recognize the opportunities and challenges presented by gene editing technology so as to take timely decisions. The opportunities provided by gene editing technology and its applications can solve the challenge of food insecurity in Africa. Plant genome editing can play a key role in developing crops that withstand extreme climate and or pest invasion. To commercially up-scale this technology and the accompanying rapid scientific progress, policy and governance problems will have to be solved on national and international levels.

GENE EDITING TECHNOLOGY IN PURSUIT OF ECONOMIC AND FOOD SECURITY

Gene Editing Technology for increased food production

Gene editing technology has been applied, using the method of genome editing using engineered endonuclease (GEEN) systems to more than 50 different crop plants including main staple foods like rice, maize or wheat as well as economically less important crops like strawberry, peanut and cucumber. Several market-oriented traits have been produced with enhanced agronomic characteristics, improved food and feed quality, increased tolerance to abiotic stresses etc. More safe and efficient gene editing technologies are constantly evolving to enable breeders introduce single point mutations or new DNA sequences at a specific location in the plant genome. For the first time, precise modulation of traits of interest with unprecedented control and efficiency is possible. Gene editing technology can improve crop traits in a targeted manner like improving abiotic and biotic stress resistance as well as yield and nutritional values.

Regulatory status of gene editing of crops in African countries.

In Africa, gene editing technology can address a wide range of issues such as malnutrition, crop failure linked to climate change and hunger. African nations are yet to pass their own regulations for gene-edited crops. It is anticipated that gene-edited crops will, at least initially, fall under established GMO rules in most countries, although several nations have either adopted or are in the process of adopting more flexible legislation for regulating gene-edited crops and animals.

South Africa, Sudan, Nigeria, and Kenya have approved and/or have field trials for various GMO crops but none has yet adopted specific regulations of gene editing. In 2016, South Africa's Department of Science and Technology completed an expert report on the regulatory implications of new breeding techniques (NBTs) but has not announced any gene editing regulations. In 2015 Nigeria's Biosafety Act includes a framework for authorizing the release of GMOs, but does not address gene editing, although lawmakers are considering an

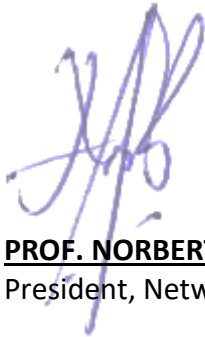


amendment on gene editing and gene drives. Kenya's National Biosafety Authority (NBA) is drafting guidelines to regulate gene-edited products. The NBA received two gene editing applications in 2018 that focused on the improvement of banana and yam.

CONCLUSION

African policymakers should be informed on the opportunities and challenges that gene editing technology present in order to taking decisions on the right moment and in a timely manner. The opportunities serve to improve food security in Africa and for which science has significant contribution. Based on Africa's increasing demographic needs, gene editing technology can guarantee sufficient food and medicines. The technology can help overcome challenges related to climate change and increased demand for food and pharmaceutical products. African Policymakers must take the lead in supporting commercialization of products of gene editing technology and provide a conducive environment for further research on this new and innovative technology for the welfare of the people of Africa.

Signed on behalf of NASAC Members:



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