GENE EDITING FACTS

To achieve our vision of "a world where the best quality seed is accessible to all, supporting sustainable agriculture and food security", ISF believes that science and innovation must continue to flourish. The latest plant breeding methods can accelerate the improvement of seed varieties for the benefit of agriculture and consumers globally.

Gene editing is built on scientific advances and a better understanding of natural processes

Over the years, scientists and breeders have continued to learn more about innovations in plant breeding to help solve global challenges. Evolving breeding methods offer plant breeders more precision and efficiency than ever before. Newer methods like gene editing are built on the mechanisms used in more traditional plant breeding methods, or those found in nature, often making the results similar to traditionally bred plants.

THE NATURE OF GENETICS

All plants and animals are comprised of cells with genes made from DNA—the blueprint for life. Changes to these genes can come about in a variety of ways—both spontaneously and targeted. Evolution, a fundamental feature of life, is dependent on the creation of genetic variation driven by genetic changes. These changes are a constant process that allow organisms, like plants, to adapt to changing environments. Leveraging the ever-increasing knowledge about the genetic makeup of plants, scientists and breeders make this process more efficient by using more precise gene editing methods.

"Evolving breeding methods offer plant breeders more precision and efficiency than ever before."

When plant breeding first started millennia ago, farmers and plant breeders knew little about genetics. And while we still don't know all the functions of genes, our understanding continues to increase. Today, we have a vast and continuously growing amount of information available that allows scientists and breeders to make more informed choices in the breeding and selection of plants to address global issues, including climate change and hunger.[1]

THE LIMITATIONS OF DETECTION

Gene editing is not a single tool but a versatile set of tools that allows scientists and breeders to work within the existing genetic diversity, also known as the breeders' gene pool. This is what differentiates plants developed with the use of gene editing from GMOs (genetically modified organisms).

Detection methods look for specific DNA sequences, called genetic signatures, which are added to the genome when developing a GMO. Given that the breeding results obtained by most gene editing methods could be replicated by nature or achieved by earlier breeding methods, these genetic signatures are not present in most gene edited plants.

"Gene editing is not a single tool but a versatile set of tools that allows scientists and breeders to work within the existing genetic diversity..."

THE BOTTOM LINE

Leveraging science for a better agriculture

The use of gene editing to develop new plant varieties is a promising and growing field. Of most interest are those gene editing applications that lead to DNA changes that could also occur in nature or from more traditional breeding methods. Because of this, genetic changes resulting from gene editing cannot reliably be differentiated from the same changes that can occur by traditional breeding or spontaneously in nature.[2]

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1. Zhu, H., et al. (2020). Applications of CRISPR–Cas in agriculture and plant biotechnology. *Nat Rev Mol Cell Biol*, 21, 661–677. https://doi.org/10.1038/s41580-020-00288-92
2. Detection of food and feed plant products obtained by new mutagenesis techniques. European Network of GMO laboratories. https://gmo-crl.jrc.ec.europa.eu/doc/JRC116289-GE-report-ENGL.pdf