



NEW GENOMIC TECHNIQUES IN A NUTSHELL

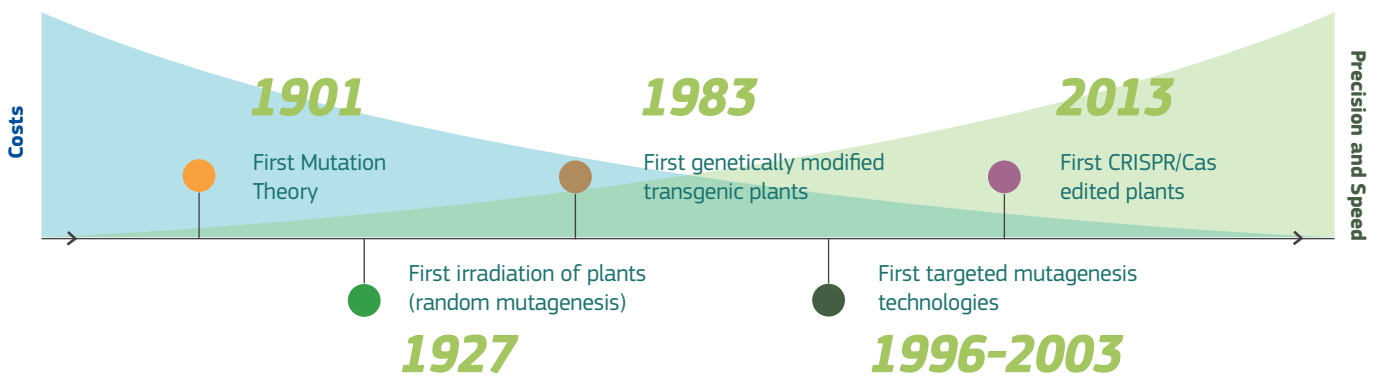
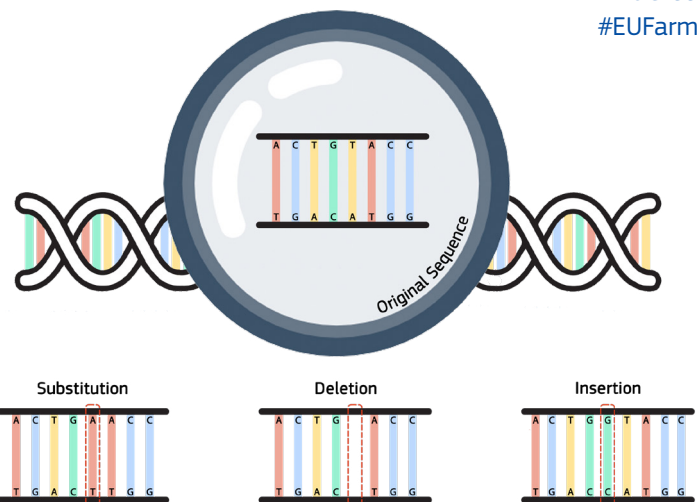
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#EUGreenDeal
#EUFarm2Fork

GENOMES AND MUTATIONS

DNA is the genetic material (genome) of all living organisms. It carries the information necessary for their development and reproduction. Changes in the DNA sequence of an organism are called **mutations**.

Mutations occur naturally in all living organisms, including plants. Since the origin of agriculture, humans have selected, combined or introduced genetic variation to improve plant varieties. Over the years, advances in breeding have improved its precision and speed while decreasing costs.

For a detailed description please see the [Explanatory Note](#) from the Scientific Advice Mechanism High-Level Group.



GENETIC MODIFICATION TECHNIQUES IN PLANTS

- Random mutagenesis** techniques are used in conventional breeding to increase the rate of mutations in a random manner, without insertion of any foreign genetic material.
- Targeted mutagenesis** techniques lead to mutation(s) in precise and predictable regions of the genome, without insertion of any foreign genetic material.
- Cisgenesis techniques** involve the insertion of new genetic material, only from a sexually compatible (crossable) organism.
- Transgenesis techniques** involve the insertion of genetic material from a sexually incompatible (non-crossable) organism.



NEW GENOMIC TECHNIQUES

Targeted mutagenesis and cisgenesis are considered new genomic techniques (NGTs) and are the subject matter of the Commission legislative proposal on NGTs. These techniques allow researchers to target precise and predictable regions of the genome whilst avoiding random mutations (targeted mutagenesis). They also allow the insertion of genetic material from a sexually compatible (crossable) organism (cisgenesis).

For a detailed description see the Joint Research Centre [state-of-the-art review](#).

GMO framework

Exempted from GMO framework

Random mutagenesis

Many new varieties with intended and unintended mutations

NGT proposal

Targeted mutagenesis

Cisgenesis techniques

Outside NGT proposal

Transgenesis techniques



Are NGT plants safe for humans and the environment?

- 🌿
 NGTs can produce a wide diversity of plants, with changes ranging from limited to more extensive ones, which lead to a variety of safety profiles
- 🌿
 Some plants obtained by NGTs have the same safety profile as conventionally bred plants
- 🌿
 NGTs like targeted mutagenesis and cisgenesis lead to fewer unintended modifications than conventional breeding techniques