

Examples of Biotechnology tools used globally in plant breeding

Induced mutation breeding used since 1939 to produce over 3200 **new varieties** of many crops including rice (824), wheat (274), maize (96), beans (57), tomato (20), potato (16), etc.



Somatic/protoplast fusion was used first in the 19th Century in Germany to produce Triticale from wheat and rye. It has been used to **produce hybrids** of oats and maize; tomato and potato; disease resistant potato and cold tolerant tomato hybrids.

Molecular marker-assisted breeding is used to **speed up** the breeding process for many crops e.g. cassava using DNA analysis and bioinformatics.



Tissue culture techniques have been used for over 30 years for **rapid production of disease-free and uniform clones** of plants e.g. banana, oil palm in a method known as micropropagation. Embryo rescue is used to **prevent abortion** of young embryos for crops such as bananas and NERICA rice.

Genetic engineering is used produce transgenic/genetically modified (GM) plants containing **unique characteristics**. Over 30 years, many GM crops have been produced with resistance to diseases or insects e.g. banana, tolerance to herbicide or drought e.g. maize, and enhanced nutrient content e.g. rice.



Products of *New Breeding Techniques* such as *Genome Editing* are rapidly coming up.