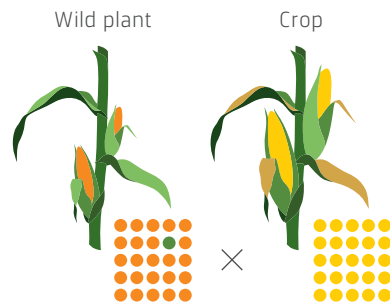
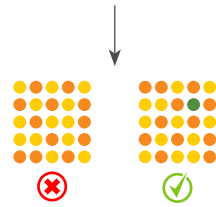


### Cross breeding

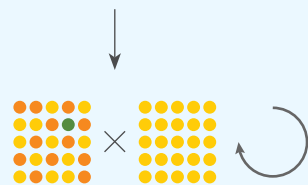
- Genetic material**
- Wild plant
  - Crop
  - Other organism
- Change**
- Desired
  - Not desired



A desired trait (e.g. resistance to disease) from crops or wild progenitors, or a related species, is crossbred into an existing variety.



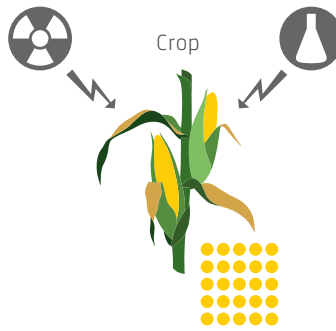
The genetic materials of the parental plants mix and create random, new combinations of desired and undesired characteristics in the progeny.



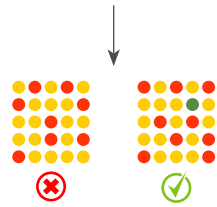
The selected progeny is then further optimised through multiple backcrossings with the original variety.



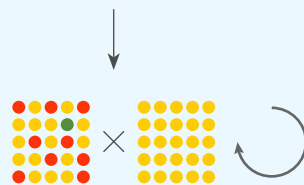
### Mutation breeding



Radiation or treatment with chemicals are used to induce random mutations in the genetic material of a crop.



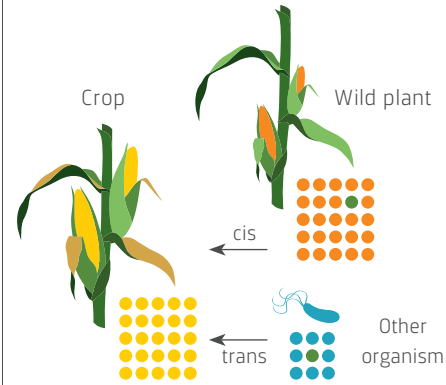
Alongside the randomly created and desired mutations, countless other undesired changes are also introduced in the genome.



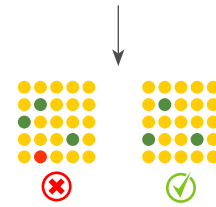
These undesired mutations are then removed from the selected progeny through multiple backcrossings and the progeny is further optimised.



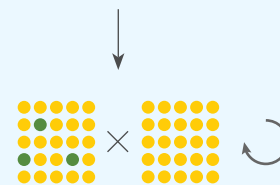
### Classical genetic engineering



One or more genes from a plant of the same species (cisgenic) or a different species (transgenic) are introduced into an existing variety using genetic engineering methods.



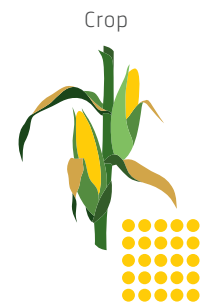
The new genes are integrated once or several times at a random position in the genome, which can sometimes result in undesired changes.



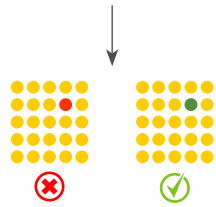
The selected progeny is then optimised through additional crossings.



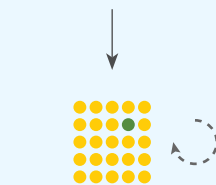
### Genome editing



The genetic material of a variety is modified using genome editing tools. Selected genes can be randomly mutated, specifically changed or inserted as a whole.



The desired changes take place at a specific, previously determined location in the genome. This results only in rare cases in additional undesired changes.



The selected progeny must only be optimised through additional crossings in certain cases.

