

# New generation plant breeding

The European Court of Justice is to rule on whether crops developed using so-called “New Breeding Techniques” like CRISPR/Cas are the same as those achieved through traditional plant breeding

## TRADITIONAL BREEDING

Crops with improved characteristics produced by cross breeding plants with desired gene



Gene has 50-50 chance of being passed to offspring. Desired gene will take multiple generations to spread

## RECOMBINANT DNA

Combines genes from different species

### Bacteria

*Bacterial chromosome*

**1. Plasmid:** Circular DNA molecule is removed from cell. This acts as **vector** to carry gene

*Chromosome*



*Gene*

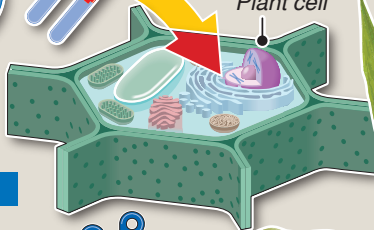
**2.** DNA containing gene for desired trait is removed from chromosome. **Restriction enzyme** cuts gene from DNA



**3. Vector:** Restriction enzyme cleaves plasmid. Second enzyme – **DNA ligase** – pastes gene into DNA molecule, making **recombinant vector**

**4.** Vector inserts gene into chromosomes of plant cells

*Plant cell*



## NEW BREEDING TECHNIQUES

Plant with desired gene has gene pasted into all its chromosomes. Gene is transmitted to nearly all offspring

**CRISPR/Cas9\*:** Precise gene-editing cuts DNA at specified sequence and enables introduction of replacement sequence



\*Clustered Regularly Interspaced Short Palindromic Repeats. Cas9 is a cleaving protein