GENE EDITING

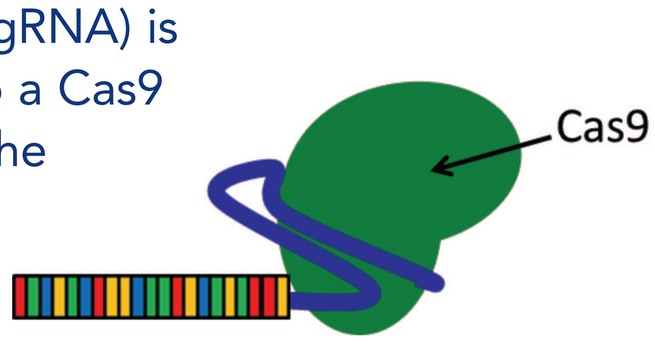
Gene editing is a new technique which allows a specific gene to be altered, but only at a very specific point, sometimes without the introduction of any new DNA. It means that plant breeders could precisely improve specific crop traits, for example disease resistance or drought resistance. This technique has been widely used in human, animal and plant cells.

focus on NIAB research

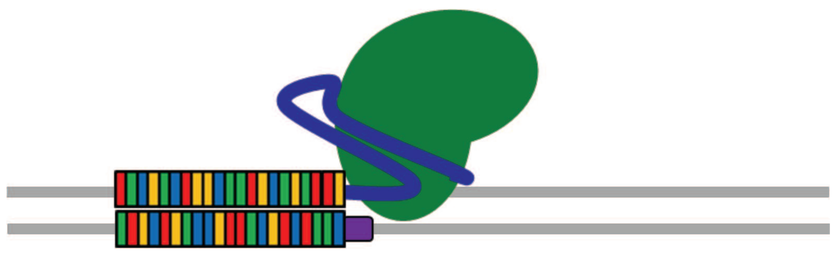
Gene editing systems are already established at NIAB for wheat, rice and barley and are being applied to projects in both rice and wheat, with work ongoing to further improve the editing capabilities. For example wheat plants have been produced which contain only the edit and no longer contain the Cas9/gRNA sequence (Figure 1).

Figure 1: Step-by-step gene editing

1. The gene sequence to be edited is chosen and a complementary sequence (gRNA) is attached to a Cas9 protein in the plant cell.

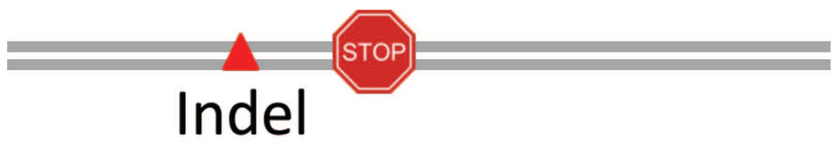


2. The Cas9 and gRNA are inserted into the plant cell. The gRNA then finds the matching sequence in the plant's DNA.



3. The Cas9 acts like a pair of scissors and cuts the DNA at the chosen target sequence.

4. The plant tries to repair the cut but sometimes this produces errors; DNA is added or removed. This can change the gene so that it is no longer active.



5. The plants are carefully examined for the edits and in the next generations plants are identified which no longer contain the Cas9 but retain the specific edit.