Genome editing more efficiently targets desirable traits in crops

A novel strategy to enhance genome editing promises to increase the efficiency of making genetic improvements in a wide range of organisms, a new study suggests.

The results could help boost applications such as developing better crops and treating genetic diseases in humans, researchers said.

The new strategy is aimed at improving an increasingly popular technique that grew from the recent discovery of a bacterial immune system known as CRISPR-Cas9, according to the study's corresponding author, Yinong Yang, associate professor of plant pathology, Penn State College of Agricultural Sciences.

CRISPR stands for clustered regularly interspaced short palindromic repeats. Yang explained that CRISPR regions of the bacterial genome contain strands of repeating DNA, separated by "spacers" that match the DNA sequences of viruses that have attacked the bacterium or its ancestors.

If attacked again by the same virus, this system allows a bacterium to "remember" and defend against the attacker. The bacterium generates a strand of CRISPR RNA containing a specific spacer sequence that, coupled with a DNA-cutting enzyme known as CRISPR-associated protein nuclease (Cas9), targets the invader and destroys it by slicing its DNA.

By creating synthetic CRISPR RNA called guide RNA (gRNA) that matches a specific DNA sequence in an organism, scientists can deliver the Cas9 enzyme precisely to the target gene that they want to disable or modify. The process holds promise for precision breeding of crops with desirable traits—such as disease resistance or drought tolerance—and for gene therapy to correct genetic defects that cause human diseases such as sickle-cell anemia and cystic fibrosis.

Read full, original article: Researcher develops novel strategy to improve crops and treat diseases