

# CRISPR gene-editing possible in temperature sensitive organisms, plants

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**In news-** Recently, scientists of Raman Research Institute, an autonomous institute of the Department of Science and Technology have found that CRISPR gene-editing possible in temperature sensitive organisms, plants & crop varieties.

## Key findings-

- **Indian scientists have demonstrated for the first time** that the associated Cas9 enzyme, which acts as molecular scissors to cut DNA at a location specified by a guide RNA, **can bind to and cut the target DNA at very low temperatures.**
- This work has shown the highly efficient functioning of this platform **at temperatures as low as 40C**, making it possible to edit genes in temperature sensitive organisms, plants, or crop varieties.
- **CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) are short DNA sequences found in the genome of prokaryotic organisms** such as bacteria, which are reminders of previous bacteriophage (viruses) attacks that the bacteria successfully defended against.
- **Cas9 enzyme** (part of bacteria's defence mechanism) **uses these flags to precisely target and cut any foreign DNA**, thus protecting the bacteria from future attacks by similar bacteriophages.
- The unprecedented precision of targeting the DNA sequences and then efficiently cutting them is the basis for CRISPR-Cas9 technology, which has been recently demonstrated in editing genes in cells and organisms.

- So far, most binding trials were typically performed at 37 °C.
- As a further step to advance this platform into the forefront of biomedical and analytical biotechnology, **scientists have explored temperature-dependent binding and release of cleaved products by the Cas9 enzyme.**
- They have **demonstrated that the Cas9 enzymes strongly bind to the target at very low temperatures and remains bound to the cleaved DNA products** even after the enzyme has done its job.
- Subsequently, the bound products were released in a controlled fashion using high temperature or chemical denaturant (that make proteins and DNA lose their 3-dimensional structure and become non-functional).
- Their observations on high efficiency of Cas9 binding to target at very low temperatures also **provide opportunities to edit genomes of the less explored organisms called cryophiles** with an optimal growth temperature of 15°C.

**Further reading:** <https://journalsofindia.com/crispr/>