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Editorial

Crispr-Cas9: A New Era of Gene Editing in Agricultural Science

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The powerful gene editing technology: clustered regularly interspaced short palindromic repeat (CRISPR), was discovered in 2012. CRISPR is a genetic engineering method that allows for the modification of live organisms' genomes that is based on the CRISPR-Cas9 antiviral defense system used by bacteria. In comparison to earlier gene editing methods, it is easier, less expensive, and more accurate. It also has a variety of practical applications, including developing crops and treating genetic disorders.

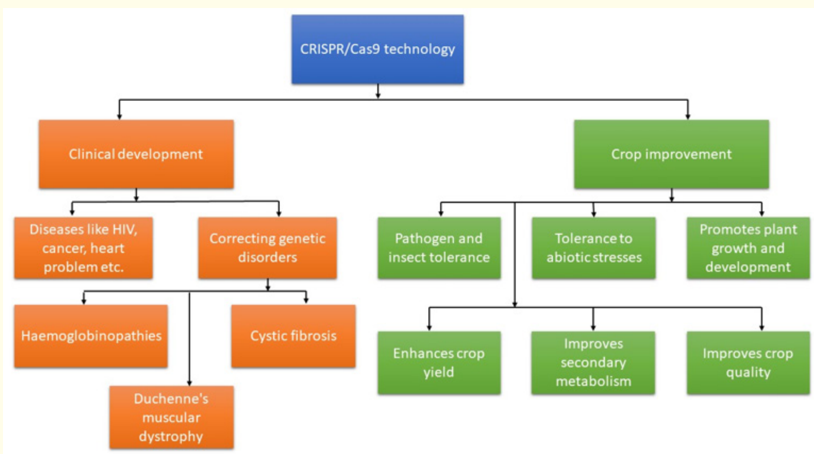

Figure 1: Role of CRISPR-Cas9.

Modern agricultural technology always tries to produce more crops on existing land. Climate change is the main concern in the present world. Due to climate change, the temperature is increasing day by day throughout the world. This impact falls on the agriculture sector. Different types of stress, such as drought, waterlogging, salinity, and extreme cold or hot weather. The growing population requires more food production in this type of environment. Using this method, it is now possible to modify the genome sequence of various crops. As a result, the crops become salinity, drought, or waterlogging resistant. Now those stresses cannot cause any damage to the crop. With the progress of time, new varieties are being developed using the CRISPR-Cas9 system in all crops, which are more advanced and productive than before. To improve production, quality, nutritional value, and resistance to biotic and abiotic challenges, CRISPR-Cas9 has also been applied to an increasing variety of monocot and dicot plant species.

CRISPR-Cas9 method was implemented on Brassica oleracea, Citrus sinensis, Cucumis sativus, Glycine max, Hordeum vulgare, Nicotiana tabacum, Oryza sativa, Solanum lycopersicum, Solanum tuberosum, Sorghum bicolor, Triticum aestivum, Vitis vinifera, Zea mays etc [1,2].

Pathogene like: Magnaporthe oryzae and Xanthomonas oryzae pv. oryzae (Xoo), which cause serious damage to the rice plants. Tomato, citrus, orange, cucumber and cotton can defend against pathogens, Pseudomonas syringae, Xanthomonas citri, Xanthomonas citri subsp. citri (Xcc), Cucumber vein yellowing virus, Verticillium dahliae, respectively. CRISPR-Cas9 technique knocked out the targeted genes by the agrobacterium transformation method [3-5].

CRISPR-Cas9 method edited or knocked out the targeted gene for making crops resistant to abiotic stress. The AGROS8 gene for maize and the PPa6 gene for rice are the most popular examples.

In rice, gw2, gw5, and tgw 6, negative regulators of grain weight, were knocked out using CRISPR/Cas9 technology; mutants produced as a result of genome editing have increased grain size and weight. CRISPR/Cas9-edited mutants of GASR7 increased the grain weight of wheat. CRISPR/Cas edited cis-regulatory element CLV-WUS was used to increase tomato fruit size [5].

From the above discussion, it is understood that the role of CRISPR-Cas9 in crop development is immense. In the future, the use of CRISPR-Cas9 technology in the agriculture sector will be widespread, and it is now the demand of time.

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