Development and application of CRISPR/Cas in grapevine

Zhenchang Liang[1,2,3*], Chong Ren[1,2,3]

[1] *State Key Laboratory of Plant Diversity and Specialty Crops, Institute of Botany, the Chinese Academy of Sciences, Beijing 100093, PR China*
[2] *Beijing Key Laboratory of Grape Sciences and Enology, Beijing 100093, PR China*
[3] *China National Botanical Garden, Beijing 100093, PR China*

[*] *Corresponding author: zl249@ibcas.ac.cn*

Abstract (250 words)

The development and application of CRISPR (clustered regularly interspaced short palindromic repeats)/Cas (CRISPR-associated protein) technologies have revolutionized genome editing in plants due to its simplicity, high efficiency, and versatility. As an economically important fruit crop worldwide, grapevine genome editing using CRISPR/Cas technologies has also been reported these years. Here we introduce the development briefly of the most popular CRISPR/Cas9 system and also the state-of-the-art CRISPR technologies developed so far. Moreover, we summarize CRISPR/Cas9-mediated applications for gene functional study and trait improvement in grapevine. Optimization of CRISPR/Cas9 system, as well as the other CRISPR/Cas systems including CRISPR/LbCas12a and base editor in grapevine genome editing, is also discussed. In addition, we discuss the challenges and future perspectives for precision genome editing in grapevine, expecting to present a roadmap for the future applications of CRISPR technology in this species.

Keywords: grapevine, genome editing, CRISPR/Cas, challenges, future perspectives.