O 114. CRISPRCAS/9 SYSTEM IN COMBATING PLANT PATHOGENIC BACTERIA

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ABSTRACT: Editing genes to generate mutations is widely used tool in creating plant varieties resistant to pathogens that otherwise take a lot of time to be developed using conventional breeding methods. Recently developed methods for gene modification includes transcription activator-like effector nucleases (TALENs), zinc finger nucleases (ZFNs), and clustered regularly interspaced short palindrome repeats (CRISPR)/Cas9 (nuclease). Trending amongst scientists today is the Crispr/Cas9 technique due to its simple engineering, cost effectiveness, multiplexing, wide range target sites and ability of cas9 nuclease to induce double stranded breaks. It is basically a defense mechanism found in bacteria and most archea against bacteriophages. Using this method, scientists have successfully targeted the host genome at specific sites obtaining enhanced resistance against pathogenic bacteria such as *Pseudomonas syringae* pv. *tomato* by editing *SlDMR6-1* gene in tomato, *Xanthomonas oryzae* pv. *oryzae* by targeting *OsSWEET13* gene in rice, *Xanthomonas citri* subsp. *citri* by targeting the promoter region of *CsLOB1* (s) genes in Duncan grapefruit and in Wanjincheng orange (*Citrus sinensis* Osbeck) without noticeable difference in growth and development of the plants. Furthermore, to enhance resistance in apple against *Erwinia amylovora*, researchers have done successful molecular analysis of targeting *DIPM-1*, *DIPM-2*, and *DIPM-4* genes in apple protoplasts using Crispr/Cas9 ribonucleoproteins approach instead of plasmid-mediated delivery to overcome off-target mutations. More work is required in this field by focusing different gene editing strategies using Crispr/Cas9 technology such as identify and editing other promoter regions or resistant and susceptible genes keeping in mind of its possible field applications without negative effects on the plant development.

Keywords: crispr/cas9, resistance, gene editing, plant pathogenic bacteria