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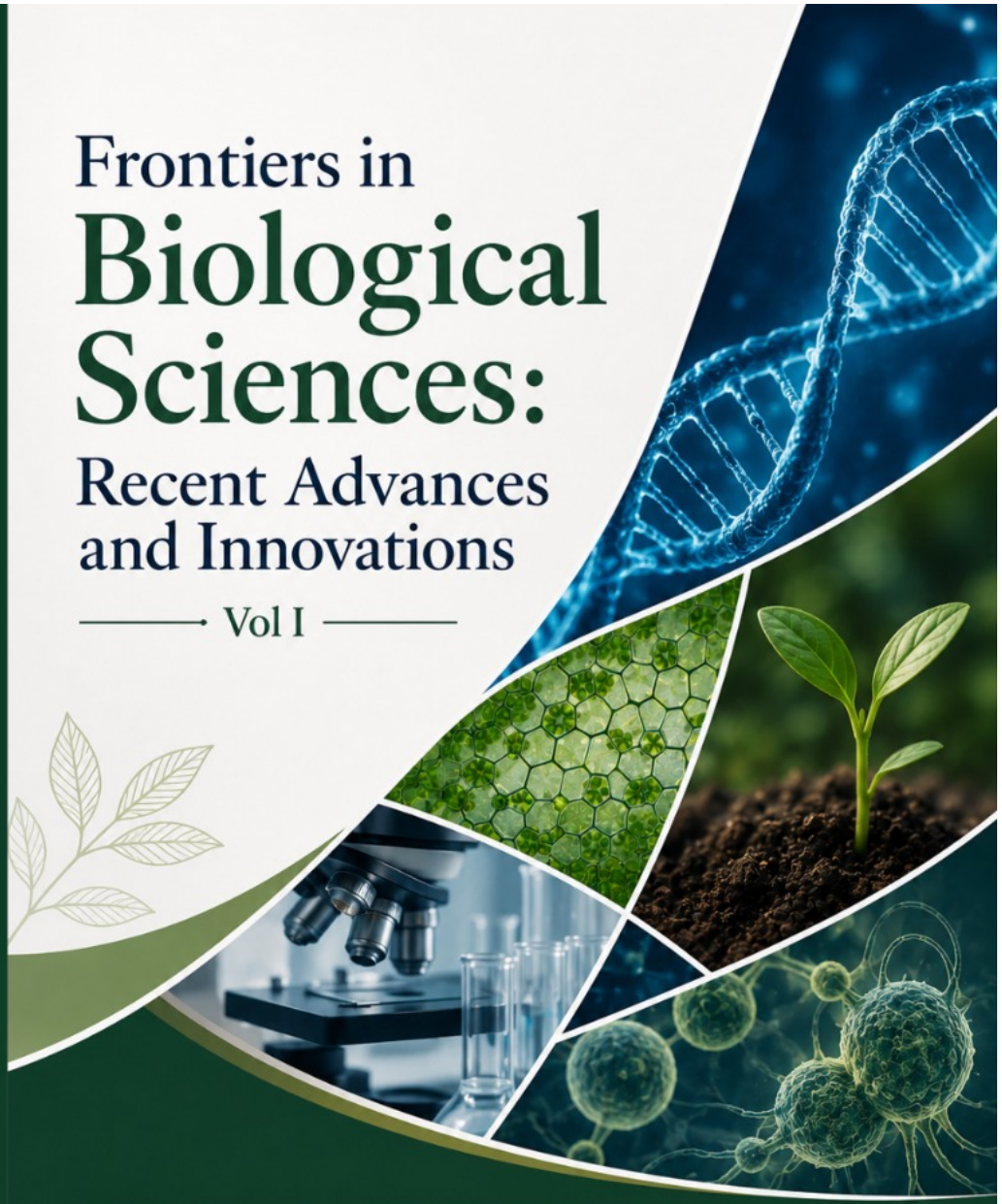

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Virus-Induced Gene Silencing (VIGS): A powerful genetic silencing tool for plants

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Abstract

Virus-induced gene silencing (VIGS) is an RNA-mediated reverse genetics technique that has proven to be instrumental for understanding gene function. VIGS utilizes the plant's post-transcriptional gene silencing (PTGS) machinery to suppress the endogenous gene expression, preventing systemic viral infections. The identification of various VIGS vectors has revealed the functions of genes in cellular signaling, disease resistance, abiotic stress, and secondary metabolite biosynthesis. As a functional genomics tool in plant biology, VIGS is used for genotype identification, breeding, and genetic generation. It has also led to significant advances in creating heritable epigenetic alterations, paving the way for transgene-free genetically modified plants. However, this strategy comes with risks, including viral resistance and transient effects. VIGS may be combined with other functional genomic approaches for agricultural breeding research. For a VIGS system to be effective, it must meet the following requirements: proper viral vector development, an appropriate inoculation technique, optimal inoculum type and concentration, positive controls, and proper plant care. This chapter discusses the mechanism, applications and limitations of the VIGS.