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Abstract

RNAi-Mediated Management of Whitefly *Bemisia tabaci* by Oral Delivery of Double-stranded RNAs †

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Abstract: The whitefly, *Bemisia tabaci* (Hemiptera: Aleyrodidae) is a significant global pest of economically important vegetable, fibre, and ornamental crops. Whiteflies directly damage the plants by piercing and sucking essential nutrients, indirectly through honeydew secretion and by transmitting more than 200 plant viruses that cause millions of dollars in produce losses per year. Whitefly management is mostly reliant on the heavy use of chemical insecticides. However, this ultimately leads to increasing resistance development, detrimental effects on beneficial insects and biomagnification of ecologically harmful chemicals in the environment. Responding to consumer demands for more selective, less toxic, non-GM insect control strategies, RNA interference (RNAi) has emerged as a potential game-changing solution. The RNA interference (RNAi) is a homology-dependent mechanism of gene silencing that represents a feasible and sustainable technology for the management of insect pests. In the present study, twenty-two whitefly genes were selected based on their essential function in the insect and tested in artificial diet bioassays for mortality and gene silencing efficacy. The nine most effective dsRNA constructs showed moderate-to-high whitefly mortality as compared to negative controls six days post-feeding. qPCR analysis further demonstrated significant knockdown of target gene mRNA expression. Additionally, uptake and spread of fluorescently labelled dsRNA was evident beyond the midgut of the whitefly supporting the systemic spreading of RNAi effectors. Taken together, the oral delivery of dsRNA shows effective RNAi mediated gene silencing of target genes and offers a viable approach for the development of dsRNA biopesticides against hemipteran pest.

Keywords: *Bemisia tabaci*; plant viruses; RNAi; dsRNA

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