

Abstract

Maize dwarf mosaic virus (MDMV) and *Bermuda grass southern mosaic virus* (BgSMV) is the most important cereal Poryviruses in Iran. The results of the study on serology, sequencing, range of host and vector showed that BgSMV is very similar to MDMV, but cannot infect Johnsongrass and is not transmitted by *Rhopalosiphum maidis*. Comparison of their genomes showed an additional stretch of 90 nucleotides in the BgSMV coat protein but not in MDMV. To investigation of 90 nucleotides function, we made the recombinant virus constructs with and without the 90 nucleotides using SOEing PCR. The constructs prepared without cloning in expression vectors. Positive samples by MDMV and BgSMV identified using Indirect-ELISA and then RT-PCR was done. To the preparation of the constructs, we used 7 primers that the sequence of T7 promoter and poly (A) tail was designed in forward and reverse primers respectively and then using the *in vitro* transcription reaction recombinant mRNAs was made. So, the function of 90 nucleotides on the interaction of the host and recombinant viruses and its relation to the non-pathogenicity in the Johnsongrass and the non-transmission of the virus by *R. maidis* were investigated. The copy numbers of wild-type and recombinant viruses were determined in Absolute Real time PCR. Expression of some key genes in susceptible and tolerant maize genotypes to MDMV and BgSMV was studied and genes expression profile of Johnsongrass to MDMV and BgSMV as a compatible and incompatible respectively at the time points of 1, 9, 24 and 72 hours after inoculation with both viruses using Real Time PCR with 8 pair specific primers amplifying the genes related to plant defense and physiology. was investigated as well. The Johnsongrass plants inoculated by the wild-type MDMV and recombinant BgSMV (-90) showed mosaic symptoms after 16 and 23 days respectively whereas the same plants inoculated by the wild-type BgSMV and recombinant MDMV (+90) didn't show any symptoms until three months after inoculation. The absolute RT-PCR results detected a significantly high copy of BgSMV (-90) and MDMV as compared with BgSMV, MDMV (+90) in the same milligram tissue of Johnsongrass. Also, *R. maidis* could transfer only wild-type MDMV and BgSMV (-90) from inoculated to healthy plants. By analyzing the expression of the genes, it was identified that in infected maize by MDMV and BgSMV, the transcript levels of the *Peroxiredoxin*, *GLP*, *SAM*, *NPR1* and *Chlorophyll a-b binding* genes were significantly higher in the tolerant than susceptible plants at the entire duration of the experiment. In the Johnsongrass plants inoculated by BgSMV, some of the genes related to plant defense responses including *NPR1*, *Peroxiredoxin* and *SAM* exposed higher expression level than the Johnsongrass plants inoculated by MDMV. It was understood that *NPR1* and *MT-LP* were important genes in maize tolerance by 3-way analysis and genes clustering.

Key words: MDMV, BgSMV, Recombinant construct, SOEing PCR, Gene Expression



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**Study of biological and molecular characteristics of recombinant
construct of Maize dwarf mosaic virus (MDMV) including 90
nucleotides region of coat protein gene of Bermuda grass southern
mosaic virus (BgSMV)**

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