

Functional Characterization of a Bidirectional Promoter from *Wheat Dwarf India Virus* (WDIV) using an *Agrobacterium*-mediated Transformation in Wheat and *Arabidopsis*

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Abstract—Wheat dwarf India virus is a single stranded (ss) circular leafhopper transmitted mastrevirus (family; Geminiviridae) that infects wheat in India. Transcription of WDIV genes is controlled by the cis-regulatory element known as large intergenic region (LIR). LIR acts as a promoter that regulates the replication of viral genome as well as transcription of WDIV genes in both virion-sense (V) and complementary-sense (C). The complementary-sense and virion-sense transcriptional regulatory components are located in the opposite orientations of the large intergenic region, therefore considered as bidirectional promoter. We studied regulation of putative WDIV promoter by cloning β -glucuronidase (GUS) reporter gene in both orientations, up- and downstream of LIR, in a plant transformation vector. *Agrobacterium* mediated transient and stable transformation in *Triticum aestivum* calli and *Arabidopsis thaliana*, respectively, revealed the functional activity of C and V-sense promoter through histochemical staining in GUS transformed tissues. Further, real-time PCR and fluorometric assay of GUS were used to measure the activity of WDIV C-sense and V-sense promoter. Presence of cis-regulatory elements (CREs) and basic conserved elements were also found within the bidirectional promoters of WDIV. The present study will be helpful in understanding the transcriptional regulation of WDIV gene products in monocot and dicot plants.

Keywords: Mastrevirus, Bidirectional Promoter, β -glucuronidase, Transcription