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Screening of corn genotypes with introgressed Wsm loci for resistance to the potyviruses Johnsongrass mosaic virus (JGMV) and Sorghum mosaic virus (SrMV)

Research Scholar

Md. Ashraful Haque, OARDC - Department of Plant Pathology (Bangladesh)
Mark W. Jones, Co-Researcher
Margaret G. Redinbaugh, Co-Researcher
Lucy R. Stewart, Faculty Mentor

Biography

Md. Ashraful Haque was born in Bangladesh. He obtained his master's degree from Bangladesh Agricultural University, Mymensingh, where he has been working as an Associate Professor in the department of Genetics and Plant Breeding. He earned his Ph.D. degree in 2009 from Tokyo University of Agriculture and Technology, majoring in biochemistry and biotechnology. Currently he is on study leave and working as a visiting scholar at the Ohio Agricultural Research and Development Center (OARDC) in the Plant Pathology Department on plant molecular virology.

What is the issue or problem addressed in your research?

Maize dwarf mosaic disease is one of the most important viral diseases of maize throughout the world. It is caused by a set of related viruses in the family Potyviridae, genus Potyvirus, including Maize dwarf mosaic virus (MDMV), Sugarcane mosaic virus (SCMV), Johnsongrass mosaic virus (JGMV) and Sorghum mosaic virus (SrMV). Resistance to Wheat streak mosaic virus (WSMV) is conferred by three loci (Wsm1, Wsm2, Wsm3) from the maize inbred line Pa405. Previous work has shown that these loci also confer resistance to the potyviruses MDMV and SCMV, but it was not known whether they conferred resistance to JGMV or SrMV.

What methodology did you use in your research?

Near isogenic lines (NILs) carrying one or two of the genes introgressed into the susceptible line Oh28 and F1 progeny from NILx Oh28 (Jones et al., 2011) were tested for their response to JGMV and SrMV. Healthy plants were inoculated thrice by leaf rub inoculation with JGMV or SrMV (Louie, 1986). Plants were scored for symptom appearance at 7, 10, and 13 dpi. At 14 dpi, tissue from the emerging non-inoculated leaves was examined for the presence of virus using a tissue blot immunoassay (TBIA; Jones et al., 2011).

What are the purpose/rationale and implications of your research?

Our goals were to determine whether Wsm loci are effective in conferring resistance to JGMV and SrMV, and to better understand the interactions among Wsm loci. The results indicate Wsm1 provides complete dominant resistance to JGMV, while Wsm2 and/or Wsm3 provide little or no resistance. Screening of the genotypes against SrMV is ongoing. It might be possible that different linked genes are responsible for resistance to the four maize dwarf mosaic disease-causing potyviruses at the Wsm1 locus, or, the same genes at Wsm loci respond differentially to each of the potyviruses.