Enhancing Tolerance to Zebra Chip Disease in Transgenic Potato by Expression of a New Family of Antimicrobial Genes

Kelvin T. Chiong, Olivia A. De Hoyos, Aditya C. Kamesh, T. Erik Mirkov*
Texas A&M AgriLife Research, Weslaco, TX 78596
**Corresponding author: e-mirkov@tamu.edu*

Zebra Chip (ZC) disease, associated with the bacterium *Candidatus* Liberibacter solanacearum (Lso) and vectored by the potato psyllid, *Bactericera cockerelli* (Sulc), has become a serious threat to the potato chipping industry. To date, there are only a few registered insecticides that are effective against the potato psyllid, but not much research has been done on fighting the causal bacterium. Strategies to improve tolerance to ZC have included the genetic manipulation of potato at the molecular level. This study evaluates the tolerance to ZC by introducing a new family of antimicrobial genes into an important commercial potato chipping variety, Atlantic, by *Agrobacterium*-mediated transformation. Expression vectors were constructed to harbor multiple genes under the control of different promoters. Histochemical staining for the *β-glucuronidase* gene was used to screen for transgenic potato plants. Northern blot hybridization with probes specific to the antimicrobial genes was adopted to assess the level of gene expression in transgenic potatoes. The effectiveness of the introduced antimicrobial genes was evaluated by exposing the transgenic plants to Lso positive potato psyllids. Plant health observations were collected and PCR analysis was conducted after 14 days and 24 days of exposure to the psyllids. Preliminary data showed that several of the transgenic potatoes remained Lso free after 24 days of exposure to the psyllids.