

JOINT EVENT

10th International Virology Summit
&
4th International Conference on Influenza & Zoonotic Diseases
July 02-04, 2018 | Vienna, Austria



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The quest for durable plant disease resistance

Recessive strain-specific resistance to a number of plant viruses in the *Potyvirus* genus (largest genus of plant viruses) has been found to be based on mutations in the eukaryotic translation initiation factor 4E (*eIF4E*) and its isoform *eIF(iso)4E*. *Potyvirus* isolates have been found to overcome most of these resistances. The VPg (viral protein genome-linked) of *potyviruses* is attached to the 5' end of the +ve sense ssRNA viral genome and has been shown to bind to *eIF4E* and / or *eIF(iso)4E* host plant proteins in yeast two-hybrid assays. In this talk I will present some of our research on the *Potyvirus Turnip mosaic virus* (TuMV) and our quest for durable resistance to this virus. Following screens of a large number of lines of a number of brassica species, we eventually found broad-spectrum resistance to TuMV in an accession of Chinese cabbage (*Brassica rapa* var. *pekinensis*). Initial genetic analysis indicated the resistance was controlled by one recessive and one dominant gene. In the absence of whole genome sequence, triplication in the *B. rapa* genome and the difficulty in transforming this species, identification of the resistance genes was challenging. Transformation of candidates for the recessive allele from a TuMV-susceptible *B. rapa* line into a knockout line of *Arabidopsis thaliana* proved misleading. Eventually we did identify the genes involved in the resistance and the novel mechanism was patented. Syngenta are introgressing the resistance into commercial plant varieties using marker-assisted selection and anticipate commercial release of F1 hybrid lines in 2019. The broad-spectrum nature and the mechanism of the resistance indicate that it could be durable. In an attempt to manage the resistance we are working on further sources of broad-spectrum TuMV resistance to reduce the selection pressure for resistance breaking virus isolates.

Biography

Prof Walsh's group work on plant - virus interactions. He has published in excess of 270 research articles, 55 of which are in refereed scientific journals. He is particularly interested in natural plant resistance to viruses and has strong links with those who use the outcomes of his research and are involved in delivering them to the end users. The major thrust of this research is to identify, understand and exploit broad-spectrum, durable resistance to plant viruses. His group has had a number of major international (Spain, Germany, Holland, Sweden, Canada, China, Japan) and industry collaborations that have resulted in joint grants and joint publications. He is a past president of the International Working Group on Legume and Vegetable Viruses.

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