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Molecular Characterization of *Tobacco rattle virus* proteins involved in pathogenicity

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CHAPTER 2

Tobacco rattle virus 29K movement protein is the elicitor of extreme and hypersensitive-like resistance in two cultivars of *Solanum tuberosum**

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ABSTRACT

Leaf infection experiments were used to analyze the host responses of *Solanum tuberosum* cultivars, known to be resistant or susceptible to natural, nematode-mediated infection of tubers and necrosis induction ("spraing") by tobacco rattle virus isolate PpK20 (TRV-PpK20). Extreme and hypersensitive-like resistance (ER and HR-like), as well as spreading veinal necrosis and systemic infection were observed. Agroinfection of leaves with a DsRed expressing TRV cDNA clone revealed ER to function on the single-cell level, inhibiting virus replication and possessing the potential to initiate a cell death response. HR-like necrosis was characterized by initial virus replication and cell-to-cell movement, before the onset of necrosis. Transient agroexpression and potato virus X (PVX)-mediated expression assays demonstrated that the 29K-PpK20 movement protein (MP) can elicit ER and HR-like cell-death. A TRV isolate, PpO85M, known to overcome the resistance to spraing in plants that are resistant to TRV-PpK20 encoded a variant 29K protein which did not elicit HR in PpK20-HR plants. Our results show that the TRV MP is the elicitor of both ER and HR-like cell-death, that no other TRV encoded proteins or RNA replication are required for its elicitor activity and that the host reactions are likely to be controlled by single dominant resistance genes.

Additional keywords: avirulence gene, gene-for-gene, resistance-breaking, *Tobravirus*

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