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Plant resistance is one of the best strategies to control pathogens for an environmentally friendly agriculture. Resistances are of two types: monogenic or polygenic, the latter frequently controlled by resistance quantitative trait loci (rQTL). However, both resistance types face pathogen adaptation, leading frequently to a complete breakdown. Pathogen adaptation may also have an impact on the plant tolerance, which is the ability of the plant to reduce the damages caused by pathogen infection. Studies of viral molecular mechanisms linked with resistance breakdown are frequent for monogenic resistance but scarce for adaptation to rQTL.

The main objectives of the current study are to (i) evaluate the adaptation of experimentally-evolved PVY strains on pepper lines containing various combinations of rQTL and tolerance QTL, (ii) determine tolerance changes induced by this adaptation, (iii) analyse mutations appeared during experimental evolution.

Two PVY strains were experimentally evolved for 9 months corresponding to 9 successive passages on 5 doubled haploid lines, each containing one specific combination of rQTL and tolerance QTL. Following the experimental evolution, quantitative ELISA and fresh weight measurements were performed to compare the fitness and virulence of ancestral and evolved strains. Significant adaptation was only recorded for one specific treatment (strain-pepper line combination). Two evolved strains from another treatment showed a fitness decrease compared to the ancestral strain. Sequencing and mutation validation of both adapted and maladapted strains is yet to be performed to understand the molecular mechanisms behind adaptation to pepper rQTL.