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ABSTRACT

Studies were conducted during the period from 2005 to 09 at Agricultural Experiment Station (AES) of the Faculty of Agriculture, Cairo University, Giza, Egypt as a first step for a local tomato breeding program to TYLCV-resistance. Ninety-two domestic and wild tomato accessions were evaluated for TYLCV resistance under field conditions during the 2005, 2006 and 2007 fall plantings. A graft-inoculation experiment was conducted for detection of TYLCV in symptomless plants of some of the evaluated accessions and selected as best sources for resistance. Based on performance over three evaluation seasons, all of the evaluated accessions of *S. chessmaniae*, *S. chilense*, *S. chmielewskii*, *S. habrochaites*, *S. neorickii*, and *S. pennellii* and most of the evaluated accessions of *S. peruvianum* showed low TYLCV mean scores. Evaluated *S. pimpinellifolium* accessions showed a wide range of reaction to TYLCV infection. Sixteen accessions exhibited resistance to TYLCV. None of the evaluated accessions of both *S. lycopersicum* and *Solanum sp.* appeared resistant to TYLCV. Meanwhile, 2 accessions of both *S. lycopersicum* (LYC 179/83 and LYC 32/83) and *Solanum sp.* (PIs 126915 and 205017) appeared promising as some of their plants were symptomless. These plants were selected and re-evaluated. The tolerance of progenies of selected plants of accessions was reconfirmed. Grafting experiment revealed that all evaluated symptomless plants of accessions *S. pennellii* LA 716 and *S. peruvianum* LAs 107, 1474, 1677, 2157, and 2172 and PIs 128652 and 270435 were not virus carries. These accessions are considered resistant. According to the results obtained from the evaluation trials, *S. chmielewskii* LA 1317; *S. habrochaites* LA 1777 and PI 390662; a selection of *S. lycopersicum* var. *flammatum* LYC 179/83; *S. neorickii* LA 1326; *S. pimpinellifolium* PIs 211840 and 407543; and a selection of *Solanum sp.* PI 205017 were chosen to study the inheritance of TYLCV resistance. Resistance derived from *S. chmielewskii* LA 1317 was found to be controlled by 2 pairs of genes with partial dominance of resistance over susceptibility, while, resistance derived from *S. habrochaites* LA 1777 and PI 390662; *S. neorickii* LA 1326; and *S. pimpinellifolium* PIs 211840 and 407543 was found to be controlled by 3 pairs of genes with partial dominance of resistance over susceptibility. BSH estimates were 84.93, 71.30, 74.75, 75.4, 70.6 and 68.9 %, respectively. Meanwhile, resistance derived from selections of *S. lycopersicum* var. *flammatum* and *Solanum sp.* was found to be controlled by 8 and 6 pairs of genes, respectively, with partial dominance of resistance over susceptibility. BSH estimates were 60.8 and 65.6 %, respectively. Selections of *S. lycopersicum* accessions LA 3845 (P_1), LA 3846 (P_2), LYC 32/83 (P_3) and LYC 179/83 (P_4); *S. pimpinellifolium* PI 211840 (P_5) and selections of *Solanum sp.* accessions PIs 126915 (P_6) and 205017 (P_7) having high tolerance to TYLCV and accepted fruit quality characters, were selected for use in a half diallel crossing program to study the possibility of producing tolerant × tolerant F_1s. The additive gene action played the major role in the inheritance of all studied characters except fruit ascorbic acid content and fruit pH value. P_1 and P_2 proved to be general good combiners for early yield (EY), total yield (TY), average fruit weight (AFW) and fruit pH value, while P_4 proved to be a general good combiner for EY, TY and AFW. The crosses $P_1 \times P_2$, $P_1 \times P_4$, $P_2 \times P_4$ and $P_5 \times P_6$ were the best combinations for EY, TY and AFW.

Key words: Tomato, *Solanum lycopersicum* L., Tomato yellow leaf curl virus, Resistance, Tolerance, Evaluation, Inheritance, Combining ability.