Identification of tomato lines based on conventional and molecular tools for breeding

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Identifying elite lines is a major research priority for developing new hybrids/varieties. A total of 153 tomato lines were characterized based on horticultural traits, total soluble solids (TSS) and tomato yellow leaf curl virus (ToLCV) resistance under natural field conditions. Molecular markers were applied for ToLCV (*Ty-2* and *Ty-3*), late blight (*Ph-3*) and root-knot nematode (*Mi-1.2*) resistance genes. Based on horticultural traits such as average fruit weight, fruit yield, TSS and ToLCV resistance, promising lines were identified belonging to improved lines, jointless tomato, cherry tomato, beta-carotene-rich lines, germplasm and varieties. An improved line VRT-02 possessing dwarf plant type was found suitable for pot culture, whereas H-88-78-2 had a delayed and partial fruit ripening. Thus, the present study identified elite lines using conventional and molecular tools for tomato breeding.

Keywords: Breeding, elite lines, horticultural traits, tomato, virus.

are *Ty-1/3* (chr 6 from *Solanum chilense*), *Ty-2* (chr 11 from *Solanum habrochaites*), *Ty-4* (chr 3 from *S. chilense*), recessive gene *ty-5* (chr 4, cv. Tyking or *Solanum peruvianum*) and *Ty-6* (chr 10 from *S. chilense*). This has led to the development of resistant tomato varieties all over the world[7,8]. Second, late blight caused by the oomycetes *Phytophthora infestans* (Mont.) de Bary is another problem of tomatoes. The late blight resistance genes are *Ph-1* (chr 7, from *Solanum pimpinellifolium*), *Ph-2* (chr 10, from *S. pimpinellifolium*), *Ph-3* (chr 9, from *S. pimpinellifolium/S. habrochaites*), *Ph-4* (chr 2 from *S. habrochaites*), *Ph-5-1* (chr 1, from *S. pimpinellifolium*) and *Ph-5-2* (chr 10, from *S. pimpinellifolium*)[9]. Third, root-knot nematode (RKN, *Meloidogyne incognita*) is one of the major nematodes affecting tomato crops, which cause severe damage to the roots. Resistance breeding has been deployed in tomato breeding using resistance genes (*Mi-1* to *Mi-8*) originating from the wild species *S. peruvianum*. The known RKN resistance genes are *Mi-1* (chr 6), *Mi-2*, *Mi-3* (chr 12), *Mi-4*, *Mi-5* (chr 12), *Mi-6*, *Mi-7*, *Mi-8*, *Mi-9* (chr 6 from *S. arca-*