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GENETIC STUDIES ON ROOT PHENOLS CONTENT AS A DEFENSE MECHANISM AGAINST ROOT KNOT NEMATODE IN TOMATO

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ABSTRACT

Six tomato genotypes, *viz.*, cvs. Edkawi, Super Marmande, Ronita, Nemared, and Anahu and line PI 376072 were used in making non-reciprocal diallel crosses. Plants of the parental genotypes and their F_1 populations were evaluated in the greenhouse for resistance to the root knot nematode (race 1), using three different criteria, *viz.*, number of galls, number of eggs, and reproduction factor. In addition the degree of resistance was determined using gall index (GI) and reproduction factor (R-factor). In the field, plants of the parental genotypes and related F_1 crosses were evaluated under the conditions of artificial inoculation with root knot nematode and nematode free soil to determine plant yield, yield loss, and level of root phenols content. Number of galls, number of eggs, and reproduction factor were found to be dependable criteria in evaluating tomato germplasm for root knot nematode resistance. Using GI and R-factor, the parental cultivars Ronita, Nemared, and Anahu showed high degree of resistance, while the parental genotypes Edkawi, Super Marmande, and PI376072 showed susceptibility. Following the same methodology, the F_1 hybrids Ronita X Nemared, Ronita X Anahu, PI376072 X Nemared, and Nemared X Anahu showed high degree of resistance. Yield loss percentage was found to be more accurate and efficient than total yield in evaluating the performance of the different tomato genotypes under the condition of infection with root knot nematode. Both the healthy and inoculated plants of the parental cultivars Ronita, Nemared, and Anahu, which were found to be resistant to the root knot nematode, had higher root phenols contents than that of cultivars Super Marmande and Edkawi, which were found to be susceptible, indicating the importance of root phenols content as a defense mechanism against root nematode. Significant mean square for both general (GCA) and specific (SCA) combining ability were detected indicating the involvement of both additive and dominance type of gene interactions in the inheritance of root knot phenols content. For the inoculated plants GCA/SCA ratio was > 1(2.73), indicating that the additive type of gene interaction was more important than the dominance type in the inheritance of the plant ability to activate the defense mechanism of root phenols content upon infection with root knot nematode. However, for the healthy plants, the GCA/SCA ratio was < 1(0.63) which indicated that the non-additive gene interaction was more important than the additive type in the inheritance of root phenols content in the uninfected plants. Under the condition of artificial inoculation with root knot nematode, only cultivars Ronita and Anahu had desirable significant positive general combining effects gi which were 18.57 and 14.54, respectively. In addition, cv. Ronita had the highest general combining ability effect gi