

Conventional and molecular marker-assisted selection and pyramiding of genes for multiple disease resistance in tomato

Abstract

Tomato (*Solanum lycopersicum* L.) is widely grown in the tropics but production is subject to high losses from diseases. AVRDC—The World Vegetable Center initiated a program to develop fresh market tomato lines resistant to begomoviruses causing tomato yellow leaf curl disease, *Phytophthora infestans* causing late blight, *Ralstonia solanacearum* causing bacterial wilt, *Stemphyllium* spp. causing gray leaf spot, *Fusarium oxysporum* f. sp. *lycopersici* race 2, and *Tobacco mosaic virus*. This work provides greenhouse, field, molecular marker, and laboratory protocols used in the screening and selection process that were applied to segregating populations during generation advance over three years to develop five multiple disease resistant F₇ fresh market tomato lines. Resistance of the five lines to the abovementioned diseases was confirmed in subsequent evaluations. Average yields of the five lines exceeded 100 t/ha under optimal temperatures in a dry season trial, but yields were reduced in a second trial under higher temperatures and rainfall. Seed of three multiple disease resistant F_{7:8} lines is available from AVRDC (<http://avrdc.org/seed/improved-lines/>); these lines have potential for release as inbred line cultivars, hybrid parental lines, or breeding stock.