Performance of Grafted Tomatoes in Open Field Trials at Two Locations in Florida

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Soil fumigation has been an essential component of open-field fresh market tomato production systems since the 1960's. Farming without soil fumigants has remained a challenge, in part because commercially acceptable tomato cultivars produced through conventional breeding lack resistance to many soilborne plant pathogens. This "balance" between acceptable marketable produce and disease resistance is a common problem in almost all fruit crops where scions that produce superior product are grown on rootstocks that possess disease resistance, pest resistance, adaption to specific soil conditions, or a combination of all. Therefore, the objective of the study was to evaluate the performance of tomato rootstocks in open field conditions (Pineda fine sand) under commercial production conditions. . Replicated studies consisted of a raised bed, plastic mulched production system with drip irrigation and fertigation at two production sites located in St. Lucie County, FL. The experimental design at site one consisted of a randomized complete block design with 6 blocks with 10 treatments consisting of 2 scions ('Biltmore 'and 'FL-47') grafted on 3 rootstocks ('Aloha', 'Multifort' and 'H-7997'- 50 plants per treatment block). Controls consisted of ungrafted and self-grafted scions. No fumigation treatment was applied to either site prior to planting. Site 2 was a randomized complete block design also with 8 blocks and 11 treatments consisting of a 'FL-47' scion and the following rootstocks 'Anchor-T' , 'Multifort ','61-071 RZ', 'BHN 833', 'Big Power', 'Vigostar 12' 'H-7997', 'Imperial 643', 'self-graft and non-graft. An additional treatment using a rooted 'Multifort' was also included in the site 2 study. Each treatment consisted of 14 plants in each block.

At site one plant vigor as judged by overall plant growth as measured by plant height was significantly different for 'Biltmore' on 'Multifort' and ungrafted 'FL-47' then that of 'FL-47' on 'H-7997'. The severity of root galling from *Meloidogyne* spp. was greatest on self grafted and non grafted 'FL-47'. 'Biltmore' grafted onto 'Multifort' and 'Aloha' and 'FL-47' grafted onto 'Aloha' had no visual root galling, indicating that damage from *Meloidogyne* spp was minimal on those rootstock/scion combinations. Nematode egg counts within root systems were greatest on the ungrafted 'Biltmore'. However, egg masses were not found when 'Biltmore' was grafted onto 'Multifort' and 'Aloha' rootstocks. No root galling was observed when 'FL-47' was grafted onto 'Aloha'. Presence of wilting/decline typically associated root diseases was not observed in any of the treatments. Additionally, there was no observed difference in Bacterial spot in any of the rootstock scion combinations.

At site 2 nematode damage was not noted in any of the treatments even though the presence of J2 rootknot nematodes were found in the in the initial survey of the plots. Plant loss due to adverse conditions and extremes in temperature were significantly greater in rootstock ‘Anchor T’ at site 2 than ‘Big Power’ with a 3x chance of losing plants to field conditions at time of planting.

There was no difference in any of the other treatments at site 2 even under conditions of low temperatures and high wind velocity. The experiment at site 2 was prematurely terminated due to adverse weather conditions (i.e. hard freezes) and the high rates of foliar disease including target spot, bacterial spot and. There was, however, observed treatment differences in plant performance to the fore mentioned environmental and biological stresses based on the visual rating scale. ‘Multifort’ had the least amount of visual damage, statistically, of all the rootstocks tested when compared to self grafted and not grafted controls.