Grafting heirloom tomatoes for increased plant vigor and virus tolerance

Erin N. Rosskopf1, Nancy Kokalis-Burelle1, Scott Adkins1, Jason C. Hong1, Cindy McKenzie1, Jim Gibbons2, and Nancy Roe3

1 USDA-ARS, US Horticultural Research Laboratory, Fort Pierce, FL, 2 Gibbons Farms Organics, Fort Pierce, FL, and 3 Farming Systems Research, Boynton Beach, FL

In organic and transitional vegetable production, there are few options currently available to growers for virus management. Tomato yellow leaf curl virus (TYLCV, Fig 1) is a particularly difficult problem for tomato growers and can completely devastate crops; reducing yields to zero when early infection occurs. Previous work in vegetable grafting has shown promise for control of a variety of pathogens using soilborne pathogen-resistant rootstocks. Few studies have shown potential for management of viruses through the use of resistant rootstocks (Jenns and Kuc, 1979; Rivard et al, 2008; Rosskopf unpublished, Fig 2).

Although the range of AUDPC values for Tygress alone, 20.11, to 60.55 for Moskvich ungrafted plants, the variability in the field resulted in no significant differences between treatments (Fig 3A). However, in microplot studies conducted at the USDA-ARS farm, when plants were infected by viruliferous whiteflies prior to planting in the field, there were significant differences between final virus ratings for Black Prince ungrafted (87% of plants with visual symptoms) versus Black Prince grafted on Tygress (42% of plants with visual symptoms), and for Moskvich ungrafted (73%) and Moskvich grafted on Tygress (36%) (Fig 3b). Asymptomatic infection in some graft combinations was detected using tissue blot nucleic acid hybridization, which has been previously documented for TYLCV (Friedmann et al, 1998; Srinivasan et al, 2012) and interestingly, many grafted plants with severe symptoms showed virus infection of the tolerant Tygress used as the rootstock.

In the current field trial, heirloom Moskvich increased growth when grafted to Tygress (Fig 4A), but not when grafted to Matt’s Wild Cherry, which is also resistant to TYLCV (B). Similarly, Purple Calabash grew very vigorously when grafted to Tygress, but Black Prince did not. The interaction between each heirloom and rootstock appears to be quite different and should be tested for each grower’s needs.

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References


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