RESISTANT ROOTSTOCKS FOR MANAGING ROOT-KNOT NEMATODES IN GRAFTED WATERMELON

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Root-knot nematodes (RKN) are a re-emerging destructive pest of watermelon due in part to the loss of methyl bromide for pre-plant soil fumigation in vegetable crops. The loss of methyl bromide for pre-plant soil fumigation has stimulated great interest in searching for alternatives methods for controlling RKN in cucurbit crops including watermelon. The development of RKN-resistant varieties would provide an environmentally safe, economical solution for managing RKN in watermelon. However, the development of resistant varieties can be a lengthy process (often 10+ years) because resistance genes from wild species must be incorporated into cultivated watermelon while retaining all of the desirable traits found in current varieties. Grafting of cultivated watermelon (both seeded and seedless) onto resistant rootstocks can provide a more rapid solution to managing RKN than development of resistant cultivars. Grafting has been used in Asia since the 1920's for disease management in cucurbit crops such as watermelon and melon.

We have developed RKVL (Root-Knot Vegetable Lab) germplasm lines of wild watermelon (*Citrullus lanatus* var. *citroides*) with resistance to root-knot nematodes (*Meloidogyne* spp.) (U.S. Vegetable Laboratory, USDA, ARS, Charleston, SC). The RKVL resistant wild watermelon lines were compared to commercial cucurbit rootstock cultivars and wild tinda (*Praecitrullus fistulosus*) as rootstocks for grafted seedless triploid watermelon 'Tri-X 313' (*C. lanatus* var. *lanatus*) in a field infested with the southern root-knot nematode (*Meloidogyne incognita*) in Charleston, SC over two years. In both years, RKN infection was severe in 'Emphasis' bottle gourd, 'Strong Tosa' hybrid squash, and wild tinda rootstocks with galling of root systems ranging from 86% to 100%. In Year 1, the RKVL wild watermelon rootstocks exhibited lower ($P \leq 0.05$) percentages of root galling (9 to 16%) than non-grafted 'Tri-X 313' (41%), 'Emphasis' (86%), 'Strong Tosa' (100%), and the wild tinda rootstocks (91 to 100%). The grafted wild watermelon rootstock RKVL 318 produced more ($P \leq 0.05$) fruit (12 per plot) than all other entries (mean = 5 per plot), and it produced a heavier ($P \leq 0.05$) fruit yield (29.5 kg per plot) than all entries except self-grafted 'Tri-X 313' (21.5 kg per plot). In Year 2, one-half of the plots were fumigated with 350 lbs/A methyl bromide (50%): chloropicrin (50%) prior to planting. In the untreated control plots, the RKVL wild watermelon rootstocks showed resistance to RKN with root galling percentages ranging from 11% for RKVL 316 to 56% for RKVL 301. Fruit yields in the untreated plots were 21.9, 25.6, and 19.9 kg/plot for RKVL 301, RKVL 316, and RKVL 318, respectively. Yields were greater ($P<0.05$) for

the three RKVL rootstocks than for ‘Strong Tosa’ (3.0 kg) and ‘Ojakkyo’ wild watermelon rootstock (2.8 kg) in the untreated plots. Yields of watermelon grafted on ‘Strong Tosa’ were nearly 7X greater ($P<0.05$) in the methyl bromide treated plots than in the untreated plots. In contrast, yields of watermelon grafted on RKVL 316 and RKVL 318 were similar in both treatments and yield of watermelon grafted on RKVL 301 was greater ($P<0.05$) in the untreated plots than in the methyl bromide treated plots. The three RKVL wild watermelon rootstock lines exhibited resistance to RKN. RKVL 316 had low root galling and produced the heaviest fruit yield and greatest numbers of fruit of any rootstock evaluated in Year 2. The RKVL wild watermelon lines should be useful sources of RKN-resistance for rootstocks for grafted watermelon.

Summary points:

- RKVL wild watermelon rootstocks are resistant to root-knot nematodes.
- Seedless watermelon grafted on RKVL rootstocks produced greater fruit yields ($P<0.05$) than watermelon grafted on cucurbit rootstocks ‘Strong Tosa’ (hybrid squash), ‘Emphasis’ (bottle gourd), and wild tinda (*Praecitrullus fistulosus*).
- Fruit yields of watermelon grafted on RKVL rootstocks and grown in untreated plots were equal to or greater than those in methyl bromide treated plots.