SCREENING FUSARIUM RESISTANT ROOTSTOCKS FOR PLANT PARASITIC NEMATODE RESISTANCE

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Introduction

The phase out of methyl bromide has directed research toward alternative methods of managing soil-borne pathogens. A limiting factor in many watermelon producing regions is Fusarium wilt caused by the soil-borne fungi *Fusarium oxysporum* f.sp. *niveum* (FON). There is no varietal resistance to FON deployed in triploid seedless watermelon. One method of managing this disease involves grafting a susceptible, high yielding scion onto a resistant rootstock. Preliminary findings have demonstrated that many *C. maxima x C. moschata* Fusarium wilt resistant rootstocks are highly susceptible to root-knot nematodes and other plant parasitic nematodes. Resistance to FON and *Meloidogyne* spp. (RKN's) has been demonstrated independently but rootstocks containing resistance to both are not yet commercially available. A concerning issue with rootstocks resistant to Fusarium wilt is that many have not been tested for their susceptibility to plant pathogenic nematodes (PPN's), more specifically the southern root-knot nematode (*Meloidogyne incognita)* and the reniform nematode (*Rotylenchulus reniformis*). Plant parasitic nematodes can reduce yield and pose the risk of causing a synergistic disease complex with FON which can predispose the resistant host to FON susceptibility. For grafting to be a commercially viable Fusarium wilt management tool, resistance to plant parasitic nematodes should also be included in the rootstock cultivar.

Materials and Methods

Experiments were conducted in the spring and fall of 2016 at the North Florida Research and Education Center in Quincy, FL. Experimental plots were arranged in a randomized complete block design with four replications. Black polyethylene mulch was used in spring and white-on-black mulch in the fall of 2016. Soil was cultivated to a depth of 25 cm prior to bed formation. Rows were spaced 2.44

meters apart, beds were 76.2 cm wide, 20.3 cm tall, and 18.3 m long. Four rootstocks were evaluated in both experiments: 'Bulldog' (USDA-ARS), 'USVL-246' (USDA-ARS), 'USVL-252' (USDA-ARS) and 'SP-6' (Syngenta seeds). In both seasons the cucurbit rootstock 'Carnivor' (Syngenta seeds) (*C. maxima* x *C. moschata*) was included as a control because of its known susceptibility to RKN. Root gall index (RGI) ratings were given on a scale of 0 - 10 and was evaluated at 30, 60 and 90 days after planting (DAP). At the 30 and 60 DAP sampling intervals three plants were collected per plot, and at 90 DAP interval five or all remaining plants were collected. RGI data were subjected to ANOVA and means separations using Fisher's LSD Test in the SAS Program. In addition to RGI, 1 g of root tissue and 100cc of soil was analyzed for each plot at 90 DAP. PPN's were extracted from soil and root samples using the Baermann funnel technique. Nematodes were separated by species and analyzed for both soil and root samples and subjected to ANOVA and Fisher's LSD Test, when appropriate, in the SAS Program.

Results

In both experiments the four selected rootstocks maintained statistical separation from the control 'Carnivor' in regards to RGI. 'Bulldog', and USVL 246, and USVL 252 had lower RKN counts in their root tissue both seasons when compared to the control. 'SP-6' and 'USVL-252' maintained separation from the control with *R. reniformis* soil data. Populations of *R. reniformis* were found in higher numbers in the soil as compared to root tissue due largely to their semi-endoparasitic life cycle. Both PPN's had higher soil numbers in the fall experiment compared to the spring. Little to no root knot symptomology was observed on the rootstock cultivars tested in these experiments implying resistance to PPN's.

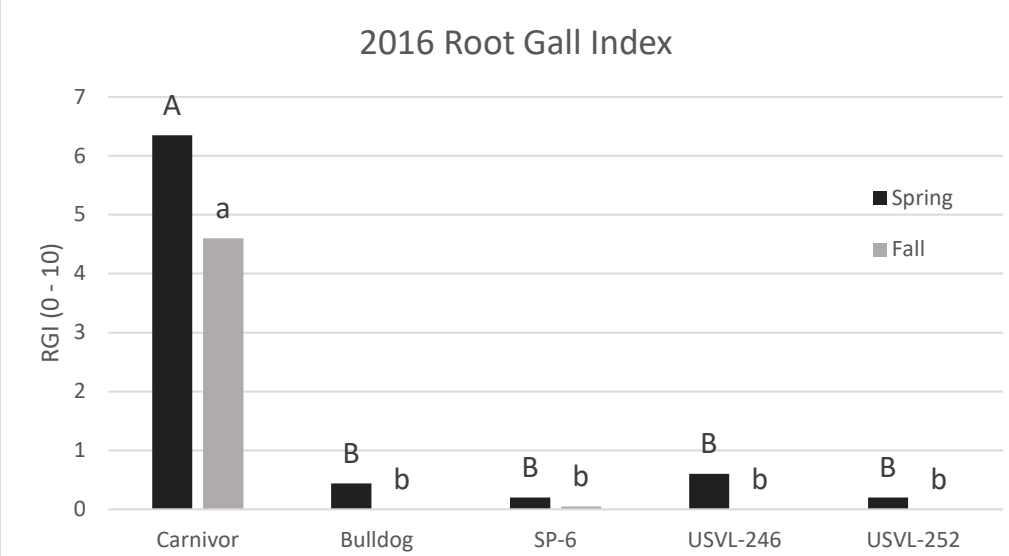

Fig. 1

(Fig. 1) Root gall index (RGI) for selected cucurbit rootstocks from research conducted during spring and fall of 2016 in Quincy, FL.

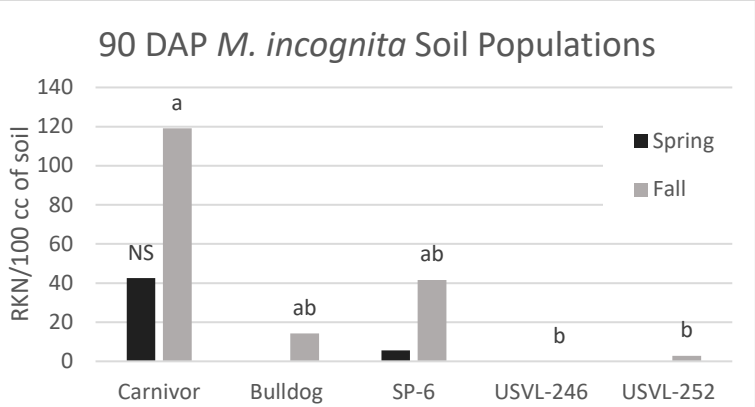

Fig. 2

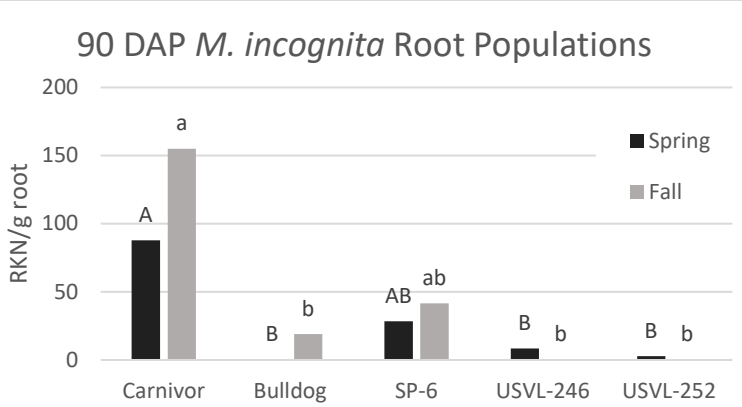

Fig. 3

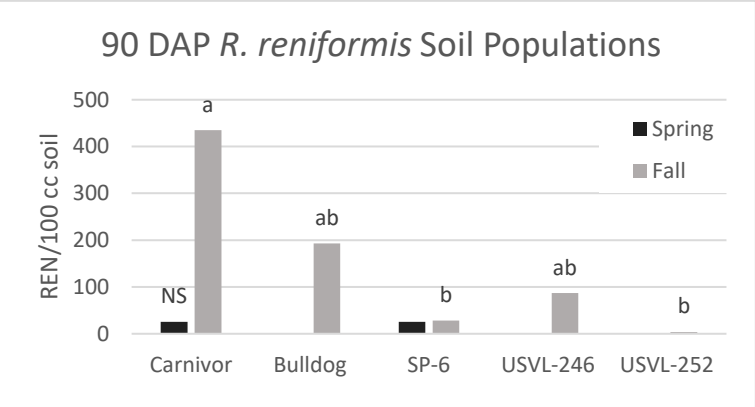

Fig. 4

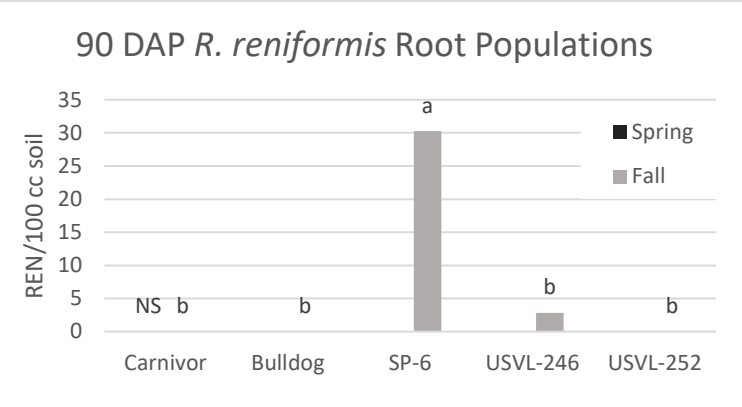

Fig. 5

Nematode populations from soil and roots of selected cucurbit rootstocks from research conducted in Quincy, FL during the spring and fall of 2016. (Fig. 2) *M. incognita* J2 populations recovered from 100 cc of soil at 90 DAP. (Fig. 3) M. *incognita* J2 populations recovered from 1 g. of root tissue at 90 DAP. (Fig. 4) Vermiform *R. reniformis* populations recovered from 100 cc of soil at 90 DAP. (Fig. 5) Vermiform *R. reniformis* populations recovered from 1 g. of root tissue at 90 DAP.