

TRACKING MOVEMENT OF *MELOIDOGYNE* SPP AND *R. RENIFORMIS* IN A PLASTICULTURE SYSTEM

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Introduction

Soil fumigation and in-row treatments of nematicides have been the common protocol for pre-and in-season management of plant parasitic nematodes (PPN's) in vegetable production. One issue not addressed in this practice is the depth at which the highest concentration of nematodes occur in the soil. In the United States, application of these nematicidal compounds is commonly accomplished using 30 cm shanks. Current fumigants whether drip or shank applied do not move well laterally or downward and proper coverage is limited to the bed center. Application at 30 cm provides a zone of protection for young transplants but may not be targeting the largest concentration of nematodes or providing season-long control. Research in cotton and strawberry has demonstrated high populations of PPN's at depth and better management and yield from a deeper nematicidal application. The purpose of this research was to track the seasonal movement of two PPN's (*Meloidogyne* spp. and *Rotylenchulus reniformis*) in a 120 cm vertical soil profile through a 90 day watermelon (*Citrullus lanatus*) cropping season.

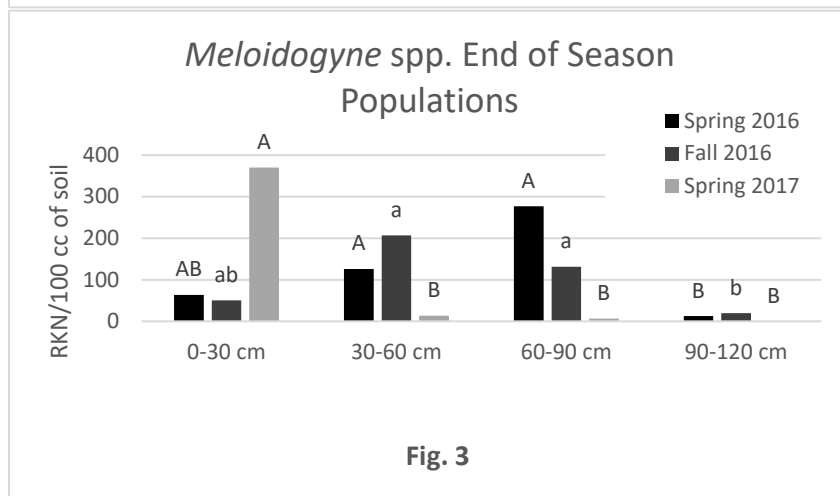
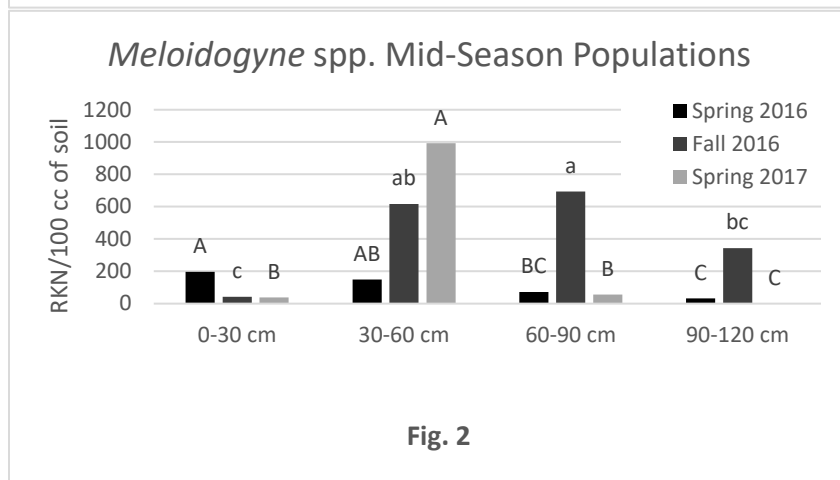
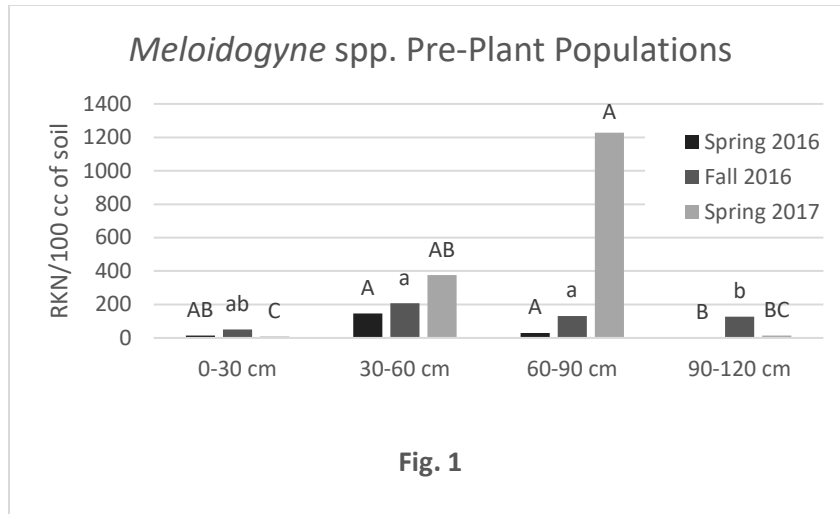
Materials and Methods

Experiments were conducted in the fall of 2016 and spring seasons of 2016 and 2017 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 both spring seasons and white-on-black mulch in the fall. 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. Seedlings of the hybrid rootstock 'Carnivor' (*Cucurbita maxima* x *C. moschata*) were spaced 91 cm within the row and were used during all experiments. Seedlings were transplanted on 4/22/16, 8/19/16, and 5/19/17. In all seasons, three 120 cm long, 5 cm diameter core samples were taken from each rep using a Geoprobe system. Cores were collected on three

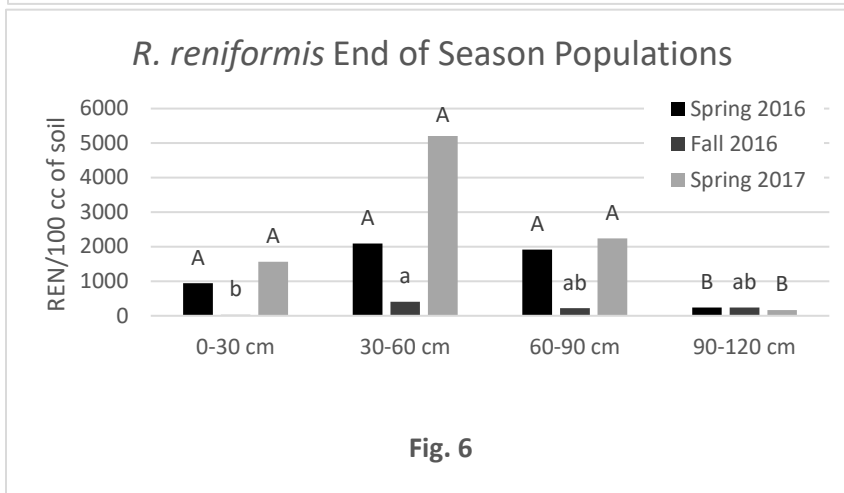
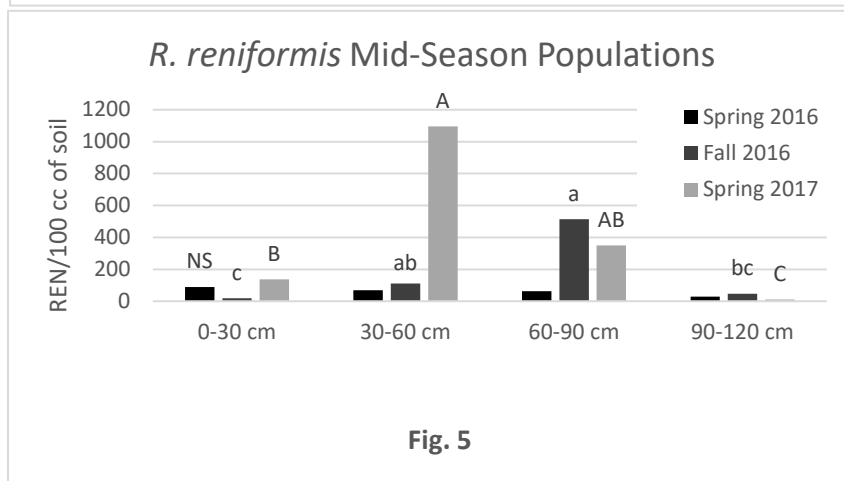
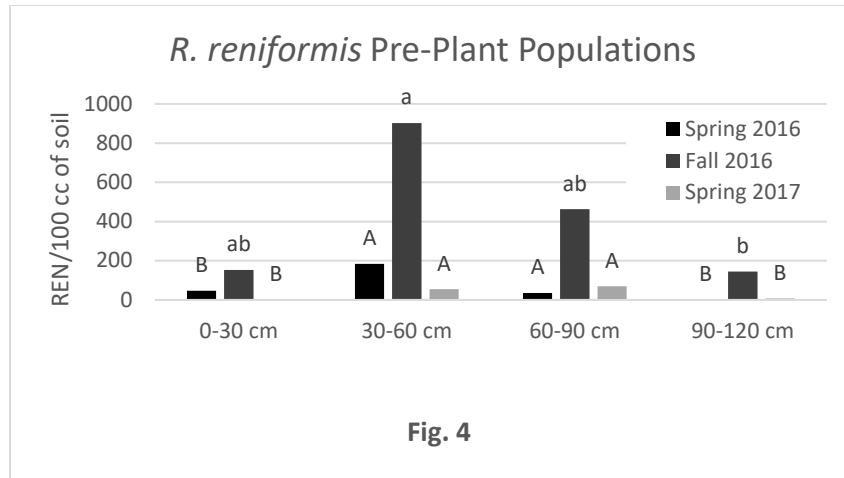
different sampling intervals: pre-plant (0 days after planting (DAP)), mid-season (45 DAP), and season's end (90 DAP). Soil cores were segmented into 30 cm sections (0-30 cm, 30-60 cm, 60-90 cm, 90-120 cm) then sub-sampled. Nematodes were extracted from 100 cc of soil using the Baermann funnel technique then counted. Populations of *Meloidogyne* spp. and *R. reniformis* were then separated by species and depth. Population data was log transformed then analyzed using Fisher's LSD Test with a p-value of 0.05 in the SAS program.

Results

The results show that concentrations of both *Meloidogyne* spp. and *R. reniformis* were present in the 30-60 cm or 60-90 cm range at the pre-plant (0 DAP) sampling date and were statistically similar and in some cases higher compared to the 0-30 cm depth in all three experiments. The same held true for season's end (90 DAP). Mid-season (45 DAP) populations showed a mix of the aforementioned stratification or a more homogenous distribution. Both spring seasons saw an exponential growth in *R. reniformis* populations between 0 and 90 DAP sampling dates. Current alternative fumigants have lower diffusive properties than methyl bromide and do not provide the same level of soil coverage. This experiment demonstrates that an equivalent or greater number of *Meloidogyne* spp. reside at 30-60 or 60-90 cm depths compared to 0-30 cm at planting which would likely be out of reach for currently used fumigants and application techniques. This data further illustrates the need to target current fumigants with limited soil mobility to the areas where pest organisms reside.



Meloidogyne spp. (RKN) population data during spring and fall of 2016 and spring of 2017 from experiments conducted in Quincy, FL. Means are to be compared within season. (Fig. 1) RKN populations 0 DAP, (Fig. 2) RKN populations 45 DAP (Fig. 3) RKN populations 90 DAP.



R. reniformis (REN) population data during spring and fall of 2016 and spring of 2017 from experiments conducted in Quincy, FL. Means are to be compared within season. (Fig. 1) REN populations 0 DAP, (Fig. 2) REN populations 45 DAP (Fig. 3) REN populations 90 DAP.