EFFECTS OF SEED TREATMENTS TO MANAGE NEMATODES AS AN ALTERNATIVE TO METHYL BROMIDE ON CANTALUOPE

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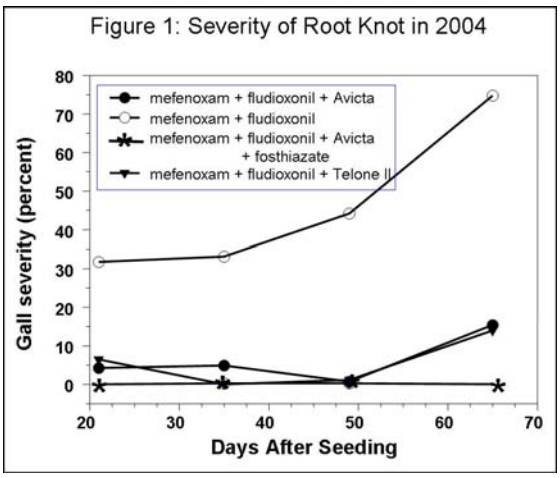
INTRODUCTION: Methyl bromide is used in over 75% of the cucurbit crops (summer squash, musk melon, cucumbers) produced in the Southeastern US (GA, SC, NC, VA) with expanding interest in these States and those to the north. Cucurbits are economically important crops in North Carolina. Constraints to cucurbit production in NC include root knot nematodes, weeds and soilborne diseases. Fumigation with methyl bromide has been the primary tool to manage these pests to maximize yields and quality. Cucurbits are highly susceptible to nematodes in the absence of methyl bromide and effective alternative solutions must be identified to help reduce nematode populations or root damage. Root knot (*Meloidogyne arenaria* and *M. incognita*) nematodes are quite common in the Southeastern US and cause serious damage to cucurbit roots, rendering plants more vulnerable to secondary root rot and wilt pathogens. We initiated a project to determine the potential for seed treatments as a component of an IPM strategy to manage root knot nematodes.

MATERIALS AND METHODS: The experiment was established on a commercial vegetable farm that had a history of root knot pressure (*M. arenaria*). The trial was conducted using standard plasticulture beds and plots were managed according to industry standards including irrigation scheduling, drip fertigation and pest management practices. MB was not included in this study. Rather, with a focus on nematodes only, Telone II was shank applied at an in-row rate of 10.0 gal/acre as a fumigant and weeds were managed by hand-pulling. Soil temperature and moisture levels were ideal at application. Soil cores were collected from each plot to assess nematode population levels. Two seeds per hole were direct seeded then thinned to one after emergence. The main nematicide seed treatment evaluated was Avicta™ 400 FS (Syngenta Crop Protection, Greensboro, NC) also registered on cotton as Avicta™ 500 FS. The experiment was set up as a randomized complete block design with 3 replications in 2004 and 4 in 2005. In 2004, seeds were direct seeded or seeded in transplant trays the same day and the transplants field set 3 wks later. Also in 2004, the grower-applied Telone II treatment was not randomized with the seed/transplant treatments, but included in adjacent beds; a fosthiazate (Nemathorin™, Syngenta) treatment applied to beds was randomized with the seed treatments. In 2005 all plots were properly randomized and the design was a factorial experiment that included several seed treatment factors, however, only Avicta 400 FS main effects are in this summary report as interactions among main factors were not significant. Four to five whole plant samples to rate root gall severity, root vigor, vine length, root and shoot dry weight and yield were collected on a biweekly basis.

RESULTS: Multiple parameters were measured including leaf parameters (total plant leaf area, leaf fresh weights and dry weights), root parameters (root length, root fresh weights, and root vigor), root gall incidence and severity, and yield. In general, the main effect of direct seeded plants resulted in increased plant growth measurements compared to the transplant treatments in 2004 and Telone II had the largest and most consistent beneficial impact on measured plant parameters in 2005 (data not shown).

Root Knot Severity. In 2004, gall formation occurred rapidly and severely, even within 3 weeks after direct seeding the crop in the field (Figure 1). Plants originating from seed treatment controls (fungicides only, mefenoxam + fludioxonil; Syngenta) had a consistently high root gall severity within 21 days after seeding (Figure 1). Avicta 400 FS suppressed root gall severity and offered similar protection as compared to cantaloupes that were direct seeded into Telone II treated soil (Figure 1). Addition of fosthiazate offered an (numerically not statistically) incremental advantage (Figure 1). The use of Avicta 400 FS on seed for transplants set 3 wks later did not offer an advantage with regard to nematode control compared to transplants originating from seed not treated with the nematicide (data not shown).



In 2005, root knot severity was high within 27 days in plots not fumigated or treated with Avicta 400 FS. Avicta 400 FS significantly reduced root knot severity compared to the appropriate controls (mefenoxam + fludioxonil only, Figure 2A). Numerically, Telone II had the greatest impact on suppressing gall severity followed by the Avicta 400 FS seed treatments (Figure 2B) – but these differences were not significantly different than some of the controls (e.g. no fungicides) when a multiple separation of means was conducted (not shown).