USE OF MAJESTENE IN FLORIDA STRAWBERRY FOR STING NEMATODE CONTROL.

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In Florida, the Sting nematode (*Belonolaimus longicaudatus*) infests an estimated 40% of strawberry acreage. Any loss of nematode control from preplant fumigant treatment typically results in a higher incidence of plant stunting in the field. In most years, plant stunting is expressed relatively early in the season, with ultimate strawberry plant size and fruit yield functionally determined by cumulative impacts of nematode feeding and population change equating to nematode concentration x time products over the season. With the loss of methyl bromide for soil fumigant use in 2012, crop losses due to higher incidence and severity have increased with Sting nematode. The problem must be resolved preplant because no post plant chemical options are available to resolve the problem and rescue the crop. In this regard, Florida strawberry growers have longed for a post plant nematicide to control Sting nematode and increase strawberry crop productivity.

Majestene ™, a new bacterial based bionematicide was evaluated as a post plant crop rescue treatment against the Sting nematode in six commercial strawberry fields in Dover, FL. Fields were selected based on their diversity and similarity of nematode induced stunting of plants in rows adjacent to untreated check rows. Treatments consisted of either one or two mid-season Majestene applications for a total rate of 9.4 to 40 L/ha. Each treatment was replicated six times at each field site and compared with an adjacent untreated plant row. Field sizes ranged from 2 to 10 hectares. All applications used the drip irrigation system, utilizing either 1 or 2 drip lines per bed, to deliver Majestene over a 30 to 64 minute injection period followed by a 20 to 30 minute irrigation flush. Nominal flow rates for individual drip emitters were 0.6 and 1.4 L/hr at 10 psi for one and two drip tapes respectively. Soil samples for Sting nematode population density determinations were taken prior to Majestene chemigation treatment and 8 weeks post treatment. Strawberry plant canopy diameters were measured prior to Majestene treatment in each infested field. The average of two separate bidirectional measurements was permanently recorded to the plastic mulch covering the raised strawberry plant bed so as to provide record of initial canopy size prior to treatment. Plant canopy measurements were reacquired from the same premeasured plants 6 to 8 weeks after Majestene treatment in each field. Positive or negative changes in canopy

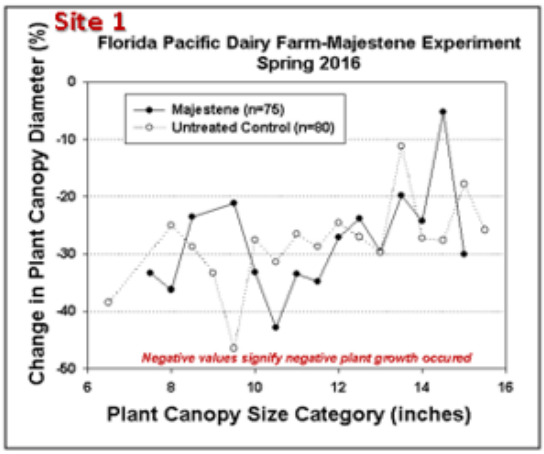
diameter were compiled from 75 to 90 individual plants from each treatment and in each field.

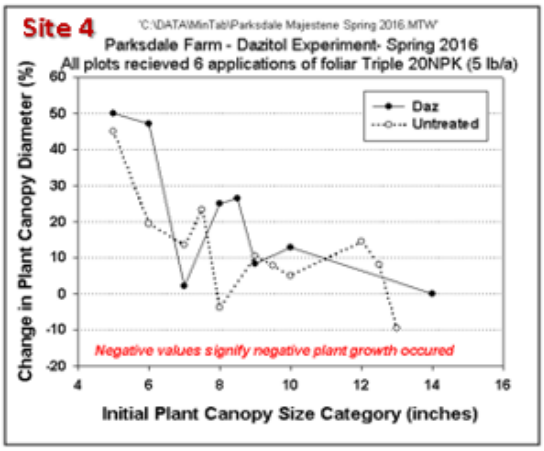
In general, Majestene provided no apparent benefit to Sting nematode control at any of the six field sites (Figure 2). No significant improvement to plant growth and canopy size associated with Majestene treatment was observed at any field site (Figure 1). In general, the smaller the initial plant size the more negative the change in plant growth, suggesting the difficulty in rescuing a severely stunted plant. Plant canopy size did increase in one field, independent of Majestene application, following repeated foliar applications (1.12 kg/ha) of 20-20-20 NPK fertilizer. This work suggests the need for additional, more defining research to quantify the dose response relationship for different nematode species, optimal concentration and injection period within the irrigation stream, and to clarify appropriate times within the cropping season in which efficacy and plant growth benefit to infected plants can be effectively achieved.

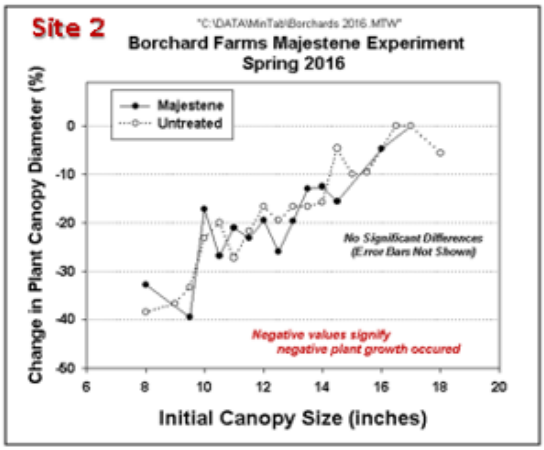
Key Points:

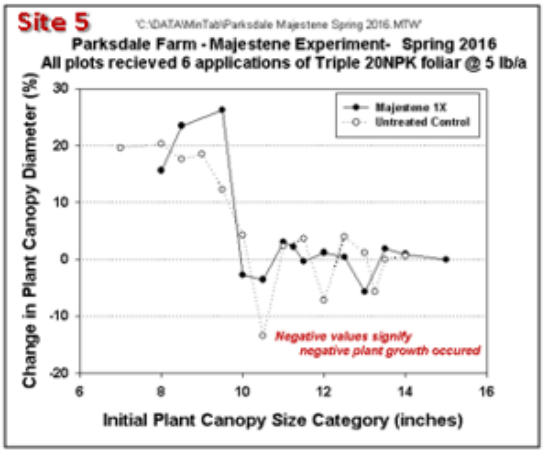
- Compared to the untreated control, Sting nematode soil population densities remained relatively unchanged from pretreatment levels following chemigational treatments of Majestene at rates of 1 to 2 gallons per acre, applied in either 1 or 2 sequential applications through either 1 or two drip tapes per bed. Even though soil samples for population density determinations were acquired from the strawberry plant rooting zone from the plant side proximal to the drip tape, it is possible that the relatively short injection periods of 30 to 60 minutes used in these field studies did not allow for significant lateral movement of the advancing water from individual drip emitters. This suggests that chemigation protocols to maximize bed coverage of the irrigation applied chemical must be considered to optimize post plant nematode control.
- Compared to the untreated control, strawberry plant canopy diameter generally continued to decline from pretreatment levels following chemigational treatments of Majestene at rates of 1 to 2 gallons per acre, applied in either 1 or 2 sequential applications through either 1 or two drip tapes per bed. In general, greater rates of plant growth decline were strongly correlated with plant size at the time of initial Majestene treatment. No meaningful differences in strawberry plant growth or redevelopment were observed between most Majestene treatments unless supplemental foliar fertilizer applications were made to the crop.
- Additional research is required to confirm nematicidal efficacy of Majestene under more controlled laboratory and environmental conditions by studying the dose–response relationship of Majestene, i.e., increased dosage (concentration) of Majestene to percentage mortality within a known population of nematodes in soil or water.

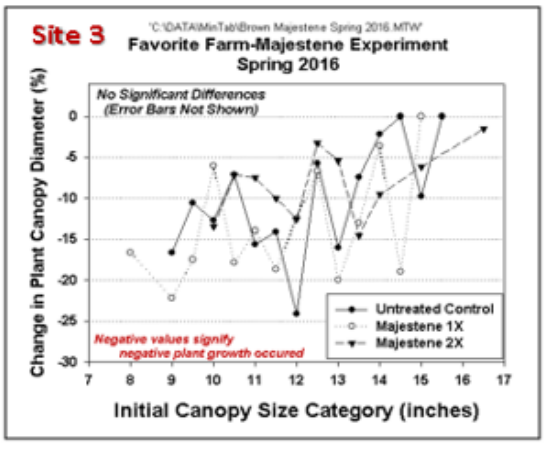
Figure 1. Average change in strawberry plant canopy size diameter (inches) measured in six Sting nematode infested fields, six to eight weeks after chemigational treatment of Majestene ® (1 to 2 gpa) via one or two drip tapes per bed and compared with an untreated control. Changes in plant canopy diameter are based on repeated measures of 65 to 86 individual plants within control and Majestene® treated rows at each field site.











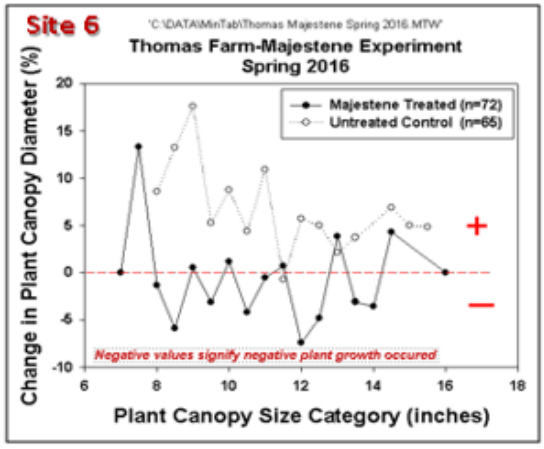
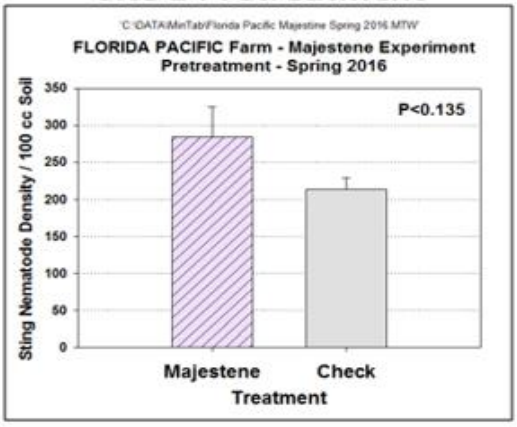
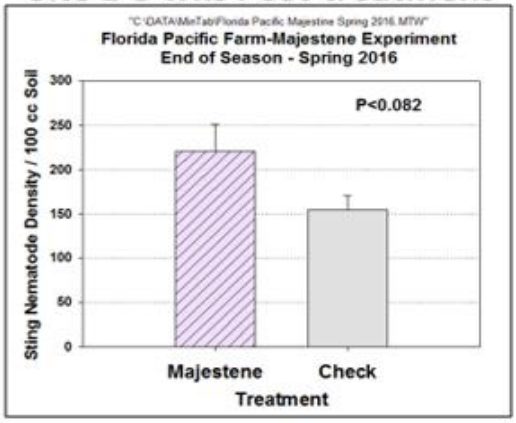


Figure 2. Sting nematode soil population densities (per 100cc soil) pretreatment and eight weeks after chemigational treatment of Majestene ® (1 to 2 gpa) via one or two drip tapes per bed and compared with an untreated control in 3 nematode infested strawberry fields. Means and standard errors are averages of 5 replicate plant rows (300 ft) per treatment.

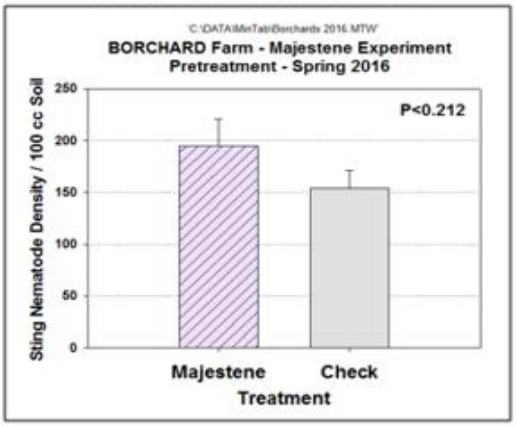
Site 1 Pretreatment



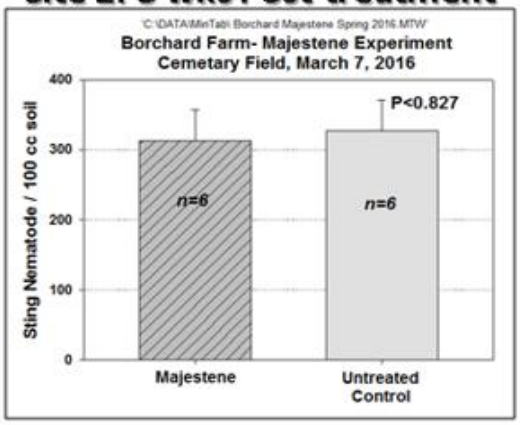
Site 1-8 wks Post-treatment



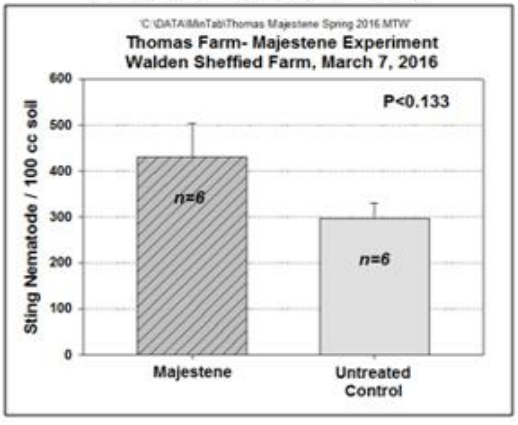
Site 2 Pretreatment



Site 2: 8 wks Post-treatment



Site 3 Pretreatment



Site 3: 8 wks Post-treatment