EFFICACY OF PIC-CLOR 60 AND ABOVE-GROUND FUNGICIDES FOR FUSARIUM WILT MANAGEMENT IN WATERMELON

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Watermelon (Citrullus lanatus (Thunb.) Matsum. & Nakai) is a major vegetable crop worldwide, planted on approximately 3.25 million acres in 2018 (data.un.org). More than 18 thousand of those acres were harvested in the state of Georgia in 2018 alone, worth about $124 million dollars (GA Farm Gate Value Report). The soil-borne pathogen Fusarium oxysporum f. sp. niveum (FON) is the most devastating pest of watermelons, causing yield losses up to 80% in many southeastern United States fields. FON affects the health of the plant, causing wilt and in many cases plant mortality, by clogging the vascular tissue via the watermelon rhizome (Fig 4D). Due to the destructiveness of FON and the lack of current IPM methods our study sought to assess the efficacy of: 1) a premix of chloropicrin and Telone II (Pic-clor 60) at different rates, 2) a novel application method (soil-applied) for the labeled fungicides pydiflumetofen (Miravis) and prothioconazole (Proline), 3) a biocontrol mix, and 4) any interactions between tested fumigant and fungicides in the management of FON.

Materials & Methods

These trials were conducted in the spring-summer of 2019 and 2020 on the Crisp County Watermelon Research Park (31.957060, -83.811858). A split-plot layout separate fumigated (main effect) from nonfumigated beds (sub-plot factors included fungicide and nontreated check) with treatments following a randomized block design (Fig 4C). Fumigant, Pic-clor 60 was shanked into the ground at the time of bed formation. In 2019 Pic-clor 60 was applied at a rate of 200 lbs/A across all fumigated plots. Whereas, to evaluate the efficacy of different rates in 2020 the fumigant was applied at 250 lbs/A and 300 lbs/A. Plots were 20' long, with 10' buffer between treatments and seedless plants were set at 2' spacings (Fig 4B). Three post-plant above-ground fungicide applications began both years, once at plant, followed up with two other applications at two-week intervals. Prothioconazole and pydiflumetofen were run through the drip tape of each plot via CO_2 injection in 2019 and 2020 (Fig 4A). Rates of Proline and Miravis both years were 5.7 fl/oz and 8.55 fl oz/A, respectively. Whereas the biocontrol agent, mixture of Bacillus bacteria and endomycorrhizal fungi (as AveoEZ+EndoMaxx) was administered to watermelon plants only in 2019 via drench at plant and through drip for remaining applications at a rate of 0.62 fl oz/A. Field disease ratings were taken through season and stem cross-sections were used post harvest for vascular discoloration ratings.

Fig. 1

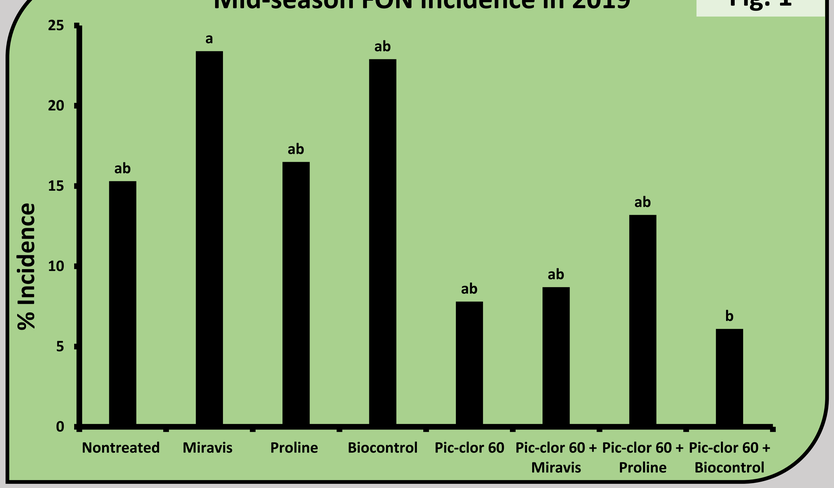

Fig. 2

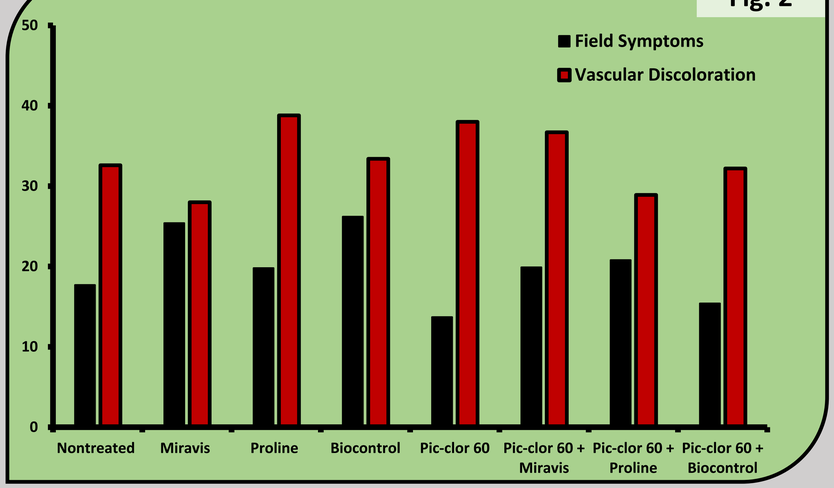

Fig. 3

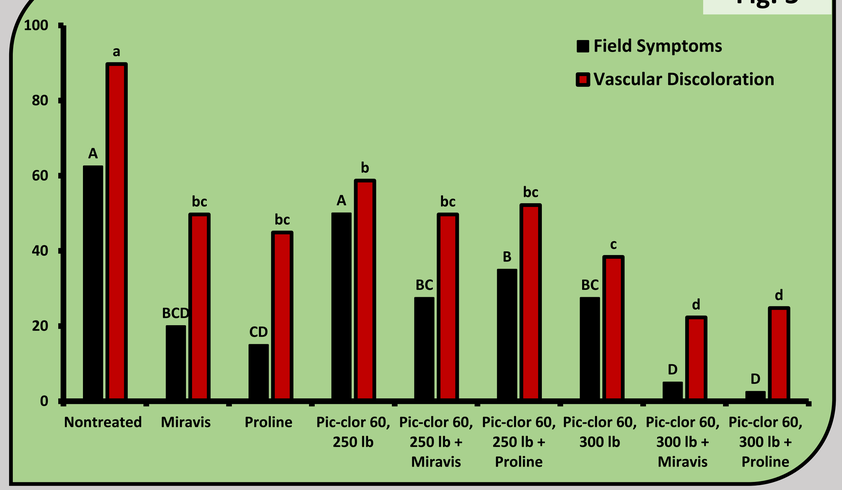


Fig. 4A


Fig. 4B

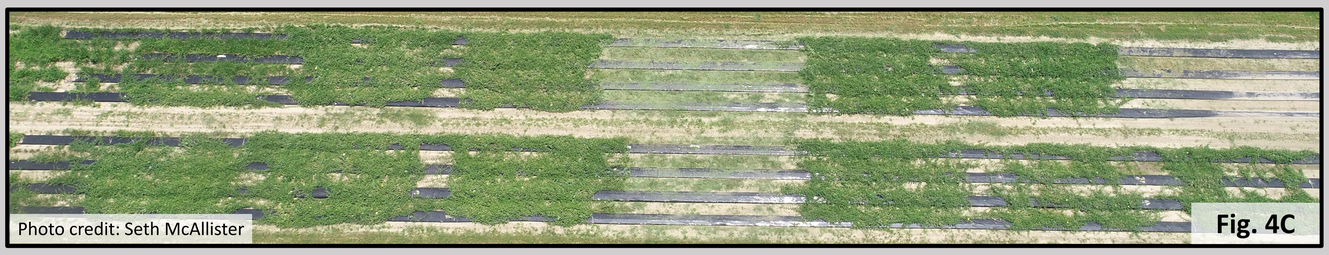
Photo credit: Seth McAllister

Fig. 4C

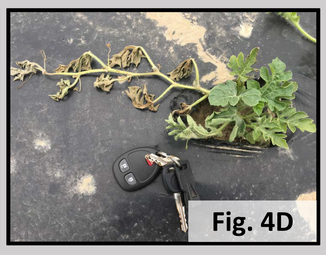
Fig. 4D


Fig. 4E

Discussion

Results from 2019 show that end of season disease incidence was not significantly affected regardless of treatment (Fig 2), though Pic-clor 60 at 200lbs/A + biocontrol did have significantly lower FON infection than Miravis alone in midseason ratings (Fig 1). The following year did see a rate response in the fumigated plots where concentration of fumigant used was inversely proportional to disease incidence. In 2020 all treatments significantly lowered FON incidence via field symptoms when compared to nontreated check except for Pic-clor 60 alone at 250lbs/A (Fig 3). Our results from 2020 align with previous conclusions that prothioconazole is effective at reducing FON incidence in watermelons and that pydiflumetofen can be just as efficacious. The rate response we observed comparing the 2019 data to 2020 indicates that producers should use Pic-clor 60 at at-least a rate of 250lb/A with an additional either Miravis or Proline application, if label is expanded to accommodate such soil-applied recommendations.

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