Proposal Category: Research

Title: Determining the Impact of Early and Late Summer Broad Mite Infestations and Evaluating New Products for Potential Registration.

Name, Mailing and Email Address of Principal Investigator(s):

PI

Dr. Aaron Cato
Horticulture IPM Specialist
University of Arkansas Cooperative Extension Service
2301 S. University, Little Rock, AR, 72204
479-249-7352
acato@uaex.edu

Cooperators

Dr. Hannah Burrack
Entomology Professor & Extension Specialist
NC State University
100 Derieux Place (Gardner Hall), Raleigh, NC, 27695
919-513-4344
hjburrac@ncsu.edu

Dr. Amanda McWhirt
Horticulture Production Specialist
University of Arkansas Cooperative Extension Service
2301 S. University, Little Rock, AR 72204
501-400-6374
amcwhirt@uaex.edu

Abstract

Late summer broad mite infestations are becoming commonplace in blackberry across the southeast. It is not currently understood how damage to first-year canes at this timing could affect production in the following year. Additionally, only a small number of miticide applications are possible with currently labeled products, meaning that control of both early and late-summer infestations could be complicated. This study aims to better understand damage by both early and late-summer infestations of broad mites by comparing damaged and undamaged plots, and to generate data on currently unregistered pesticides against broad mites to support expanded labels in the Southeastern US. A trial was established in 2020 at the Clarksville Fruit Research Station to determine the effect of a broad mite infestation in early July on 1st-year canes. Four replications of the following treatments were established on 4 plant plots with 2-plant buffers: an uninfested control with weekly miticide sprays, a standard control with 1 miticide application when damage symptomology was first observed, and untreated plots where no broad mite control is utilized. Broad mite numbers in all treatments crashed after initial sprays began and no differences in damage were observed. These issues are likely associated with miticide sprays on adjacent plantings and a trial for 2021 is planned to be completed off-station to achieve better results. Plots from 2020 will be observed through harvest in 2021, and a miticide efficacy trial is also planned for 2021.

Introduction

Broad mite, *Polyphagotarsonemus latus* (Banks), was first reported as a pest of blackberry in the United States in 2007 and was further realized as a serious threat to commercial blackberry production in 2014. In 2019, serious late-summer broad mite infestations were observed in Arkansas and other states across the Southeast (NC, SC, and VA). Many of these infestations were far more serious than previously observed across much of Arkansas. Some plants exhibited heightened forms of the typical broad mite symptomology; extreme leaf distortion and curling, stacking of nodes on all canes of a plant, and even tip die-back (growth at cane tips becomes necrotic). Infestations of broad mite were not yet recorded to occur this late in the season, and the overall population dynamics and effect on crop are still not well understood.

Currently Agri-Mek (abamectin) and Magister (new in 2020) are the only registered and effective products for use in southeastern commercial blackberry production for broad mite. The combination of these products allows three total applications across a growing season with all applications warranting a 7-day pre harvest interval. Considering the potential for both early and late season infestations, and that infestations were observed in 2019 and 2020 during primocane fruit harvest, an increased variety of control options with lower PHI's are needed.

We proposed to assess the impact of yield by both early and late-summer broad mite infestations in AR and NC, and screen additional unregistered miticides in AR and NC to support expanded labels in southeastern commercial blackberry production.

Objectives

1. To determine the impact on yield of both early-summer and late-summer broad mite (*Polyphagotarsonemus latus*) infestations in AR and NC.

2. To generate data on currently unregistered pesticides against broad mites to support expanded labels in the Southeastern US.

Materials and Methods

Yield Impact Trial

A field trial was established at the University of Arkansas Fruit Research Station in Clarksville, Arkansas on Jul/20/2020. Plots were setup on a single row of "Ouachita" blackberries post-harvest and before second-year canes were pruned from the blackberry plants. Treatments were replicated 4 times each and were as follows: **uninfested control** where broad mite is controlled when first observed on leaves, a **standard control plot** where blackberry plants are sprayed once low levels of symptomology are observed, and **untreated plots** where no broad mite control is utilized. Plots consisted of 4 plants and a buffer of at least 2 plants was left between each plot (Figure 1).

Broad mite infestation numbers were monitored at least weekly by pulling 10 leaves per plot and quantifying the number of adult mites and eggs. Plots were monitored before treatments

were initiated until eggs and adults were no longer observed in the Fall (Figure 2). Observations from sampling across the entire station indicated an active infestation occurring in early-July (Figure 3).

This trial was initiated when broad mite adults and eggs were first observed on plants (Figure 3). Agri-Mek at 3.5 fl oz/acre + 1% non-ionic surfactant was applied at an output of 40 GPA using a single nozzle hand boom when treatments required control. These applications were initiated for the uninfested control on Jul 20,2020 and these plots received weekly applications of Agri-Mek until Oct/1/2020. Standard control plots received one application of Agri-mek on Aug/12/2020 when broad mite damage symptomology was first observed. The untreated plots received no Agri-Mek sprays. It is important to note that all surrounding blackberry plantings at the Clarksville Fruit Station were sprayed with the same rate of Agri-Mek on Jul/23/2020 and Sep/23/2020 to suppress infestations present in breeding and production trials.

Miticide Alternative Trial

Plans were made to initiate a miticide trial in Searcy, AR on a block of "Ouachita" blackberries scheduled to be pulled out the following year using several miticides with potential efficacy (Table 1). A positive control of 3.5 oz of Agri-Mek and a negative untreated control was planned along with the pesticides listed below.

Table 1. Pesticides with potential use in controlling broad mite infestations in Blackberry.

Trade Name (Active Ingredient)	Rate Range	Pre Harvest Interval
Portal (fenpyroximate)	32 fl oz	1 day
Oberon (spiromesifen)	12 – 16 fl oz	3 days
Assail (Acetamiprid)	4 – 6.9 oz	1 day
Nealta (cyflumetofen)	13.7 fl oz	1 day
Kanemite (Acequinocyl)	31 fl oz	1 day
Magister (Fenazaquin)	32-36 fl oz	7 days
Zeal (Etoxazole)	2-3 fl oz	7 days

Results and Discussion

Yield Impact Trial

Broad mite infestations in blackberry were observed to begin increasing in early July, likely 1-2 weeks earlier than in 2019 (Figure 3). Treatments were initiated once broad mites were found across the Clarksville Fruit Station. Leaf samples from the day the trial was initiated indicated that plots were averaging just over threshold at the time of the first application on Jul/20/2020 (Figure 2). All plots, including untreated plots, exhibited a large decrease in broad mite numbers after this initial application. Broad mite damage symptoms were not observed until Aug/12/20 and were only light-moderate in intensity and frequency. Due to the low intensity and frequency of damage from broad mite, no difference in the spray treatments could be

discerned. These plots will be observed through harvest in 2021 to determine potential impacts.

The lack of damage from broad mite on these plots is likely due to the large crash in broad mite numbers across the entire Clarksville Fruit Station on Jul/27/2020 after an application of Agri-Mek on all other blackberry plantings (Figure 3). These widespread applications likely limited movement of hitchhiking mites around the station and hurt the overall infestation potential. It is also possible that a larger buffer is needed between sprayed plots within this trial. With only 2 plants between each plot, mites could be moving from plot-to-plot and contacting spray material. Drift is also a reasonable concern with 2 plant buffers, however, mites were still observed in unsprayed plots when no other mites were observed across sprayed portions of the station.

Plans for 2020 include further replication of this trial but it will be moved away from sprayed portions of the Clarksville Fruit Station. We also plan on increasing buffers to lower the chance of unintentional impact in our unsprayed plots. We believe that the combination of these two changes will lead to increased success in obtaining meaningful results in our sprayed and unsprayed treatments, which is key to observing differences in broad mite damage.

Miticide Alternative Trial

The miticide alternative trial was not successfully initiated in 2020. We were limited on the potential places for this trial due to the nature of using off-label products and prioritized the 1-row that we had available for the yield-impact trial. We were able to find blackberries on a grower field that was scheduled to be pulled out in the Fall for this trial, but no broad mites were ever observed in this block. In 2021, new blackberries will be established that can receive off-label applications, which should allow the execution of this trial.

Figure 1. Ouachita blackberries where the yield impact trial was established. This picture shows the plot layout of 4 plants per plot with a 2-plant buffer.

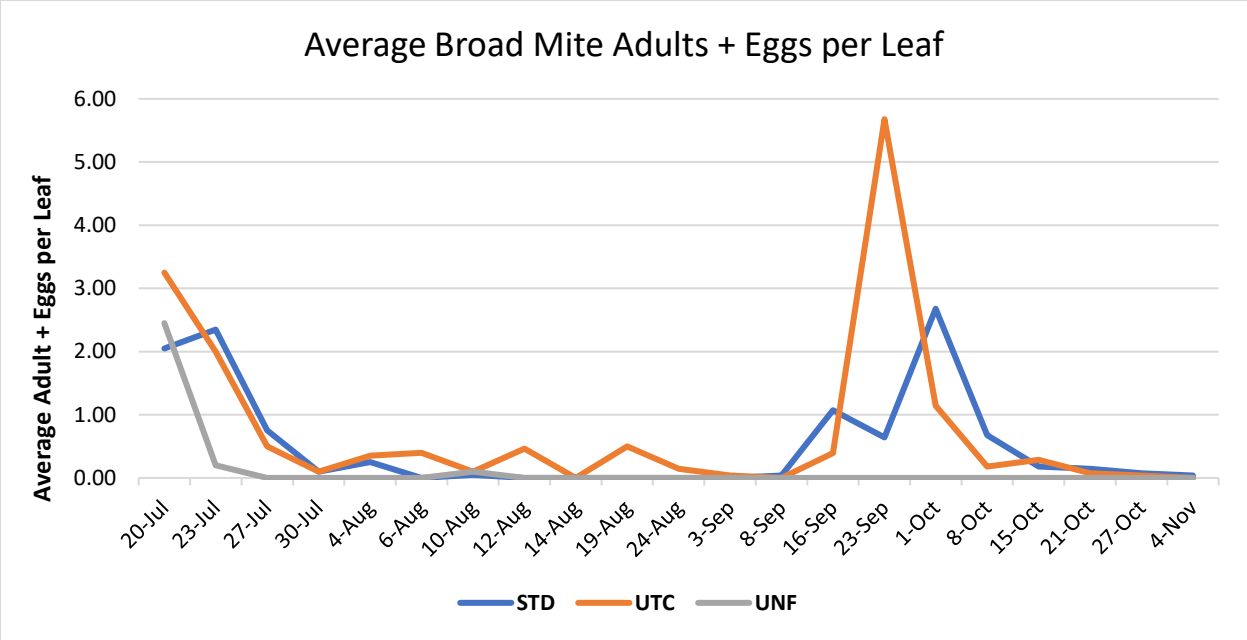

Figure 2. Average number of broad mite adults + eggs observed per leaf in the three established treatments.

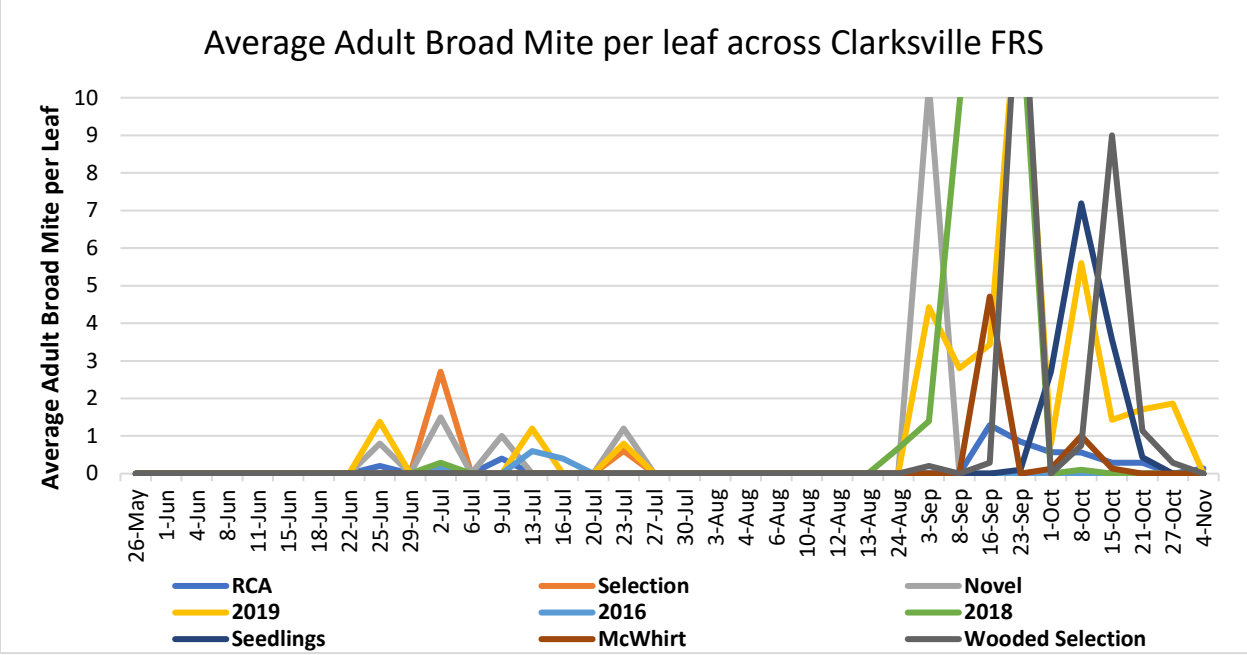

Figure 3. Observed adult broad mites across 9 sampled locations on the Clarksville Fruit Station. The locations labeled “2018” and “2019” are adjacent to the row of blackberries used in this trial.