Research Grant Progress Report 2025

Title: Survey of Eriophyid mites on Caneberries in the Southeast

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Overall Goal: To better understand the risk of eriophyid mites on caneberries grown in the Southeast by determining which species of mites are present, the distribution of known pest species, and where they occur in plant canopies at different phenological stages.

Objectives:

1. Identify eriophyid mite species found on blackberry and raspberry plantings in the Southeast and determine the distribution of known eriophyid pests, such as redberry mite, *Acalitus essigi*, dry berry mite, *Phyllocoptes gracilis,* and *P. parviflora*, a known vector of blackberry leaf mottle virus.

2. Determine where eriophyid mites establish on caneberry plants at different crop phenological stages, including dormancy/bud break, flowering, fruit maturation, and post-harvest, to help inform control and monitoring strategies.

Justification and Description

Caneberries, including blackberry and raspberry, are important specialty crops in the southeastern region. These crops are impacted by a myriad of arthropod pests while having relatively few pest management options available. Recent shifts in climate and pest management strategies have promoted many additional arthropod pests such as mites. Mites in the family Eriophyidae are commonly found in caneberry production systems but are not well understood in the Southeastern region (Cato personal observations). Eriophyid mites are vectors of several important plant viruses in Rosaceae, including rose rosette vectored by *P. fructiphilus* and many others (Stenger et al. 2016).

Eriophyid mites have recently been implicated in the transmission of blackberry leaf mottle-associated emaravirus (BLMaV) (*Emaravirus rubi*) and raspberry leaf blotch emaravirus (RLBV) (*Emaravirus idaeobati*), two viruses, along with others, that are known to lead to Blackberry yellow vein disease (McGavin et al. 2012, Hassan et al. 2017). Until recently, blackberry yellow vein disease was thought to only result from several viruses present in plants at the same time, but recently *P. parviflora* was found to transmit BLMaV to 'Ouachita' blackberry and cause yellow vein disease symptoms with no other viruses present. This finding implicates a new vector of a common issue observed in the Southeast and confirms that eriophyid mites commonly found on cultivated and wild blackberry in the Southeast are important pests ignored until now.

Currently, it is not well understood how eriophyid mites contribute to virus issues experienced by caneberry growers in the Southeast. In fact, growers have no idea what eriophyid mites are present on their farms and whether suppressing them is possible or valuable. The objective of this study is to survey eriophyid mite species across the Southeast on blackberry and raspberry to determine what species are present on plants, including known pests such as redberry mite, *Acalitus essigi*, dryberry mite, *Phyllocoptes gracilis*, and *Phyllocoptes parviflora*, a known vector of blackberry leaf mottle virus. We also plan to determine where in plant canopies these species reside during different phenological stages of blackberry to help identify future control and monitoring strategies. We believe this is a first and necessary step to determining needs for an IPM program that could limit virus in caneberry plantings.

Methods

Beginning in April of 2025, commercial blackberry and raspberry plantings were sampled in Arkansas. Multiple farms and research stations were sampled throughout the growing season, although not all locations were sampled at each timing (Table 1). At each sampling location, at least 50 leaflets or other forms of plant material were sampled from each unique plant canopy location available at different crop stages. In 2025 two separate methods were used to quantify eriophyid mites present and collect mites. First, ten leaflets from samples were examined with a dissecting microscope to quantify eriophyid mites, then leaflets were returned to whole samples. Next, leaflets or other plant material from samples were shaken in a jar containing 70% ethanol to dislodge eriophyid mites present. Ethanol samples were then poured into a petri dish, and mites were quantified using a dissecting microscope. Success and time spent using visual leaf observation vs. just the wash was assessed to determine methods in 2026 for sampling across several states.

Table 1. Eriophyid Mite Samples taken from Caneberry Plantings in Several Arkansas Locations in 2025.

Date	Farm Location (AR County)	Samples Taken
4/2/25	Johnson, Washington	Lower and upper floricane leaflets
4/22/25	White	Lower, upper floricane leaflets, unopened buds, flowers, green/red fruit (except 4/22), lower and upper primocane leaflets (4/22 only emerging tips)
5/1/25	Hempstead	
5/6/25	White	
5/14/25	Hempstead	
5/28/25	Johnson	
6/4/25	Hempstead	Lower, upper floricane leaflets, green/red fruit, ripe fruit, lower and lateral primocane leaflets
6/17/25	Hempstead, Johnson	
6/25/25	Hempstead, Johnson	
7/9/25	Hempstead, Johnson	Lower and lateral primocane leaflets
7/16/25	Hempstead	
10/21/25	Johnson	
10/30/25	Johnson	

Captured eriophyid mites and any predatory mites collected were preserved in ethanol separately for each site, and sampling location within sites. Mites within each sample will be broadly examined using a compound microscope to look for morphological differences that may indicate distinct species, and several representatives from each morpho-group in each field will be slide-mounted for preservation and morphological identification to species using a phase-contrast microscope. In addition, representatives that appear to be in the *Phyllocoptes* genus will be saved for future sequencing to species

based on established molecular markers (Druciarek et al. 2024). Mites will be staged for identification using Eukitt® Mounting Medium in early 2026.

2025 Results

Identification of collected mites is ongoing and will be reported at meetings in early 2026 as well as through blogs and other forms of media. In 2025 eriophyid mites were first observed on the upper regions of blackberry floricanes as early as April 22nd in low numbers via a 50 leaflet wash, and were not observed with visual leaflet observations (Table 2). By April 28th, eriophyid mites were observed on upper and lower floricane leaflets, upper and lower primocane leaflets, flower buds, and opened flowers. In fact, eriophyid mites were observed on every plant canopy location where samples were taken when considering the ethanol wash, whereas no eriophyid mites were found using visual leaf observations for the upper primocane leaflet samples prior to sampling from lateral growth.

Ethanol washes were found to effectively detect eriophyid mite presence, even when no mites were observed through visual observation with a dissecting microscope (Table 2). However, larger densities of eriophyid mites were often estimated by visual observations compared to ethanol washing, indicating not all mites are dislodging when shaking (Table 2; Figure 1). Differences in detection are likely related to smaller samples being visually observed, with only 10 leaflets being observed visually whereas 50 were shaken with ethanol. Due to the large amount of time necessary to visually examine leaflets, this method is likely not useful for quick detection of present eriophyid mites, whereas ethanol washes appear to give an accurate snapshot of present mites. In fact, samples could easily include more leaflets, buds, etc. with ethanol washes to detect eriophyid mites at lower densities.

Eriophyid mites were observed on sampled blackberry canopy locations but were found to be in the highest densities on primocanes (Table 2). Eriophyid mite density prior to fruiting was low and mites did not seem to congregate on any single portion of the plant. During fruiting most mites were found primarily on floricanes, and after floricanes were removed post-harvest, eriophyid mite densities drastically increased and were primarily found in the upper portions of primocane canopies on lateral growth. More data will be necessary with replication to compare density at different canopy locations.

Future Plans

Identification of mites at each sampling date and from different canopy locations will further explain the results of data from 2025. In 2026 we plan to pull samples in replication in Arkansas using only mite washes to allow for more samples with labor constraints. Along with mite identification this will allow us to paint a picture of where specific mite species

are in the canopy that may be vectoring plant diseases. We also plan to coordinate with collaborators from across the Southeast in 2026 to take at least 2 samples from each state to compare captured species from across the region. Identifcation of 2025 samples will inform this strategy. Lastly, only two samples were taken from raspberry in 2025 and we plant to sample raspberry plantings throughout 2026 to compare to blackberry data.

Table 2. Average Eriophyid Mites per Blackberry Leaflet Sampled from Several Blackberry Canopy Locations and Estimated by Direct Leaflet Observation or using an Ethanol Wash in 2025.

Sample Week	4/2	4/21	4/28	5/5	5/12	5/26	6/2	6/16	6/23	7/7	7/14	10/20	10/27
Canopy Location	***Leaflet Samples Directly Observed with Microscope***												
Floricane Upper	0	0	0.02	0	0	0	0.65	0.45	0.7	.	.	.	.
Floricane Lower	0	0	0.14	0	0.1	0	1.1	0.2	0.4	.	.	.	.
Primocane Lower	.	.	0	0	0	0	0.15	0.05	0.1	0.5	0.3	20.4	6.3
Primocane Upper	.	0	0	0	.	0	.	.	.	.	.	.	.
Primocane Laterals	.	.	.	.	.	.	0.05	0	0.2	1.25	0.5	8.6	1.4
	Ethanol Wash (50 Leaflets, buds, flowers, or fruit)												
Floricane Upper	0	0.02	0.2	0	0.4	0	1.71	0.66	1.05	.	.	.	.
Floricane Lower	0	0	0.26	0	0.42	0	2.34	0.44	2.41	.	.	.	.
Primocane Lower	.	.	0.24	0.02	0.02	0.02	0.54	0.42	1.49	1.23	0.42	10.38	11.334
Primocane Upper	.	0	0.34	0.04	0.04	0	.	.	.	.	.	.	.
Primocane Laterals	.	.	.	.	.	.	0.18	0.06	0.28	0.32	0.06	4.67	3.0534
Flower Buds	.	0	0.04	0.04	0.16	0	.	.	.	.	.	.	.
Flowers	.	0	0.02	0.02	0.04	0.04	.	.	.	.	.	.	.
Green/Red Fruit	.	.	0.08	0	0.06	0	0.09	0.04	0.05	.	.	.	.
Ripe Fruit	.	.	.	.	.	.	0.03	0.01	0.07	.	.	.	.

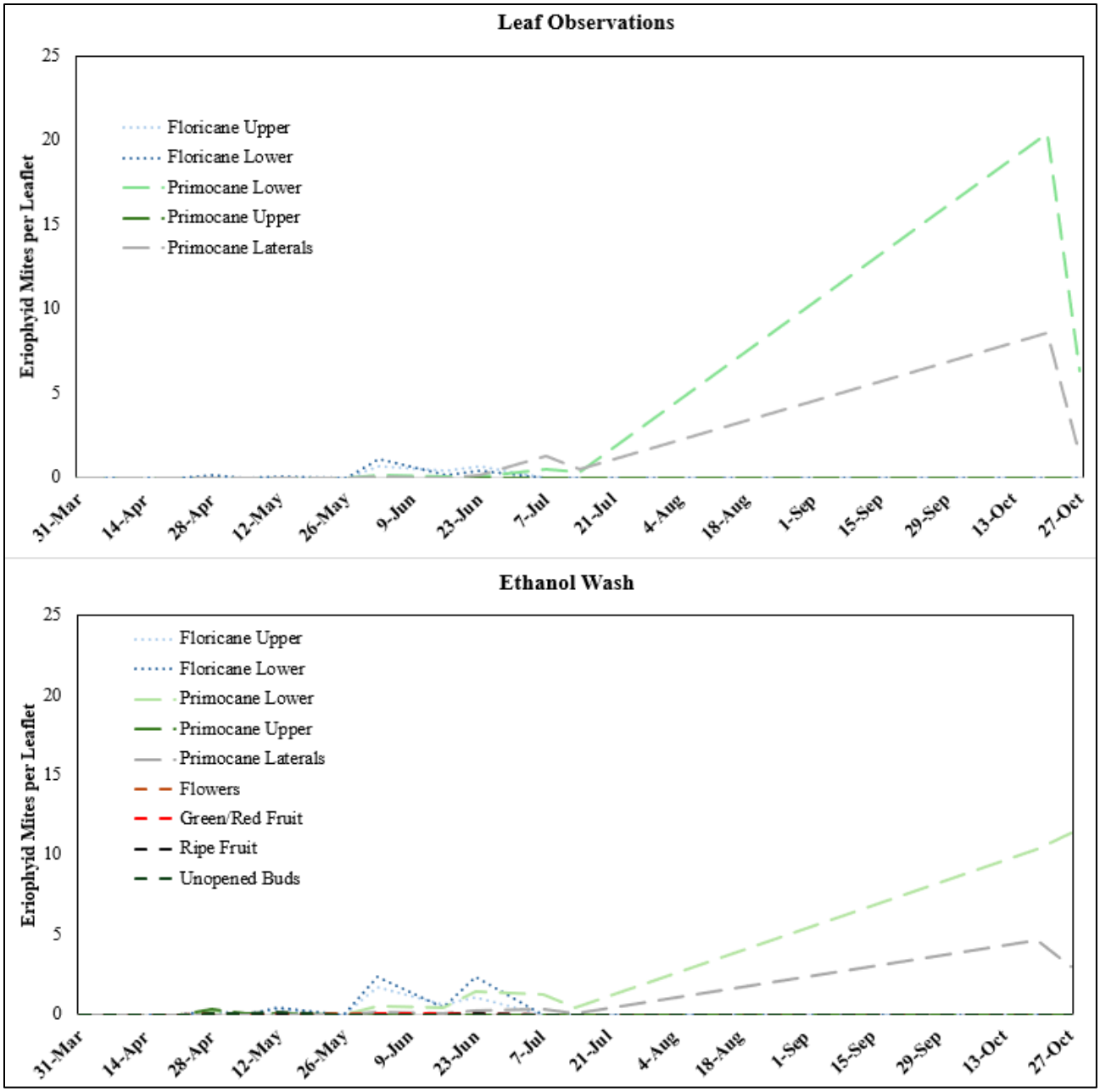

Figure 1. Eriophyid mite capture per leaflet from blackberry plant material samples in 2025 and quantified by observing ten leaves (top Graph) and using an ethanol wash (bottom graph).

Literature Cited

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