

Investigating the Causal Agent of Bud Galls on Florida Ornamental Plants

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ABSTRACT

Since 2009, pest control professionals in north-central Florida have observed severe bud gall damage on multiple landscape ornamental species, most commonly ligustrum and loropetalum. Galling causes severe aesthetic damage and reduced growth, which is often irreversible despite receiving multiple pesticide applications. The only method for correcting damage is pruning it off and making foliar pesticide applications, which is expensive, has mixed success, and often leads to replanting. Recently, pest control companies are losing accounts due to entire landscapes becoming severely damaged.

This project’s objective was to identify the causal agent of this bud galling and develop management recommendations for its control. To address this, we surveyed symptomatic plant material from ornamental shrubs or small trees in residential and commercial landscapes throughout Florida. Although this work is still underway, we have made progress towards identifying the pest, causal agent, and ways to more effectively manage it. Symptomatic plant tissue has been collected from six Florida counties and surveyed for eriophyid mite species. For each sample, we recorded the geographic location, host plant species (and cultivar, when possible), presence of eriophyid mites, and the identification of the mites. A subset of mites collected from each sample were sent to FDACS-DPI for identification.

In 2018, eriophyid mites have been detected on 17 of 27 symptomatic plant tissue samples submitted to PI Dale’s lab. All eriophyid mites that have been identified are in the genus, *Aceria*, and those identified to species have been *Aceria ligustri*, a specialist on ligustrum not previously documented as a plant pest. In all cases, identified mites are not known to cause plant damage, but are commonly found associated with the host plant. Therefore, the next steps of this research, which are underway, will include analyzing the molecular makeup of the symptomatic plant tissue and mites to determine if there are any known plant pathogens or viruses associated with the galling damage. We have also conducted preliminary trials to determine if symptomatic plant tissue will cause symptoms on asymptomatic plant tissue.

These trials have resulted in no transfer of symptoms, although more trials need to be conducted. We have actively incorporated this work into UF/IFAS Extension events by educating county faculty and green industry professionals. Using the results of this project, we will develop management recommendations that can be disseminated via web-based outlets, presentations, and publications for landscape professionals and UF/IFAS Extension county faculty.

OBJECTIVES

- Objective 1. Determine the causal agent of the undiagnosed ornamental plant bud galling.**
- Objective 2. Determine if eriophyid mites collected from symptomatic plants cause galling damage to asymptomatic plants.**
- Objective 3. Integrate this project into UF/IFAS Extension programming.**

METHODS

Thus far, this project has been tightly integrated into UF/IFAS Extension programming efforts (Obj. 3). All plant material submitted for evaluation was initiated through seminars, workshops, and trainings where county faculty and green industry professionals learned about the project and research efforts. PIs Dale, Harlow, and Ali have presented information about this project and the galling damage to green industry professionals and county extension faculty. To further this effort, PIs Dale and Harlow created a poster display, which has been presented at multiple extension workshops (Figure 1). In all cases, we provided a protocol and request for industry professionals to submit samples to PI Dale’s lab when symptomatic material was detected in the field.

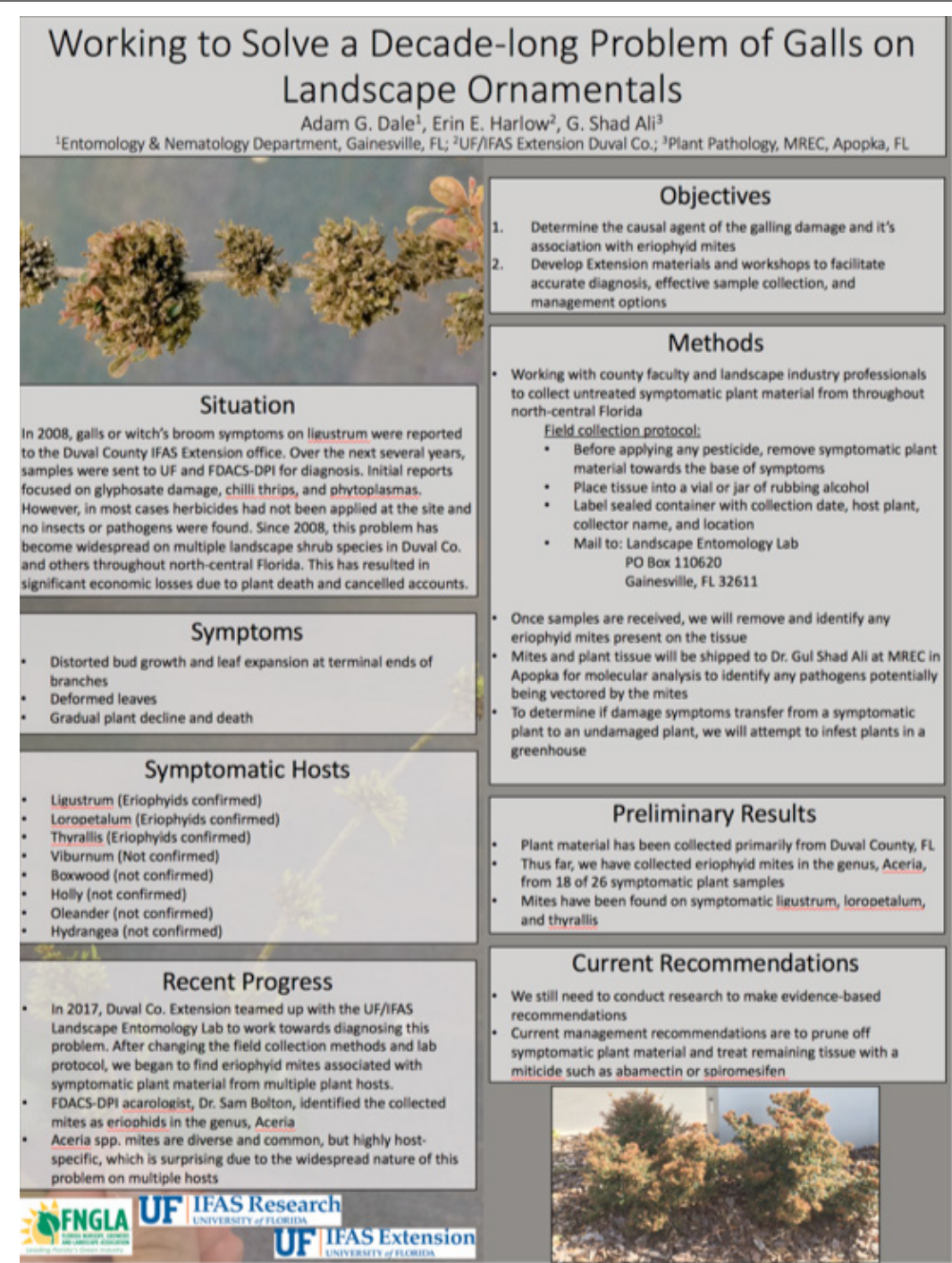


Fig. 1. Poster presented by PIs at multiple UF/IFAS Extension workshops to recruit sample submissions from around Florida.

Specifically, we requested county extension faculty, master gardeners, and green industry professionals to:

1. Before applying any pesticide, remove symptomatic plant material towards the base of gall symptoms.
2. Place tissue into a vial or jar of rubbing alcohol.
3. Label sealed container with collection date, host plant, collector’s name, and location.
4. Mail to: Landscape Entomology Lab
PO Box 110620
Gainesville, FL 32611

Once we received plant samples, we removed the plant tissue, labeled it, and placed it into a -80 °C freezer to be preserved for molecular analysis. Using the ethanol that plant material was submerged in, we thoroughly examined the liquid for the presence of eriophyid mites. Whenever we detected an eriophyid mite, it was placed into a separate vial of 90% ethanol. Half of the collected mites from each sample were sent to FDACS-DPI for identification and the other half were preserved for molecular analysis.

RESULTS

In sum, we received 27 samples of symptomatic ornamental plant tissue from six Florida counties as far north as Nassau County, south to Miami-Dade County, and west to Hillsborough County (Table 1). Samples were submitted by County Extension faculty, pest control professionals, and homeowners. In all cases the submitting individual claimed that no pesticides had been applied to the site in the past 3 months.

Of all symptomatic plant material submitted, 63% had eriophyid mites present at some level of abundance. Most samples did not have extraordinarily high levels of mite infestations, although some did. Symptomatic plant material was submitted on five different ornamental plant species and mites were detected on four of those (Table 2), although damage and mites are anecdotally reported on several others. The most commonly submitted plant species was *Ligustrum japonica*, which prior to this study was reportedly the most heavily affected ornamental species in Florida. Ligustrum was regularly infested with *Aceria sp.* Eriophyid mites, most likely *Aceria ligustri*.

We submitted all eriophyid mites collected from symptomatic plant tissue to the Florida Department of Agriculture and Consumer Services, Division of Plant Industry for identification by their expert acarologist (Fig. 2). All submitted specimens have been identified to the genus, *Aceria*, which is a common group of eriophyid mites that typically specialize on a single host plant. Eriophyid mite identification is highly difficult and therefore we identified most to genus. However, within a single genus, eriophyid species become highly specialized on their host plant. In one sample, the FDACS-DPI acarologist identified the mites from one symptomatic plant to the species, *Aceria ligustri*. This mite is a specialist on *Ligustrum japonica* and is not known to commonly cause damage. Moreover, the damage that they are documented to cause does not match the galling symptoms we are observing. Instead, the only documented report of damage caused by the ligustrum specialist, *Aceria ligustri*, was in Iran and appeared as leaf curling and bronzing or rust damage.

Aceria spp. mites are ubiquitous on their various host plants in Florida landscapes, however, they are not known to cause plant damage. Therefore, we find it unlikely that they are the direct causal agent of the galling damage commonly found in Florida landscapes. However, it remains possible that these species are vectoring a pathogen previously unknown as an associate. Therefore, our ongoing work will investigate if any known plant pathogens or viruses can be detected within the mites or within the symptomatic plant tissue.

Table 1. Symptomatic plant samples submitted for evaluation

FL County	Host Plant	Number of submissions	Eriophyid infestation rate
Duval	Ligustrum	10	0.80
Duval	Thyrallis	2	0.50
Duval	Loroptellum	2	1.00
Duval	Pittosporum	1	1.00
Nassau	Ligustrum	2	0.50
Orange	Ligustrum	1	1.00
Orange	Loroptellum	1	0.00
Miami-Dade	Buttonwood	1	0.00
St. Johns	Ligustrum	1	1.00
Hillsborough	Ligustrum	6	0.50
Totals		27	0.63

Table 2. Mite infestation rate by symptomatic host plant species

Host Plant	Submissions	Infestation Rate
Ligustrum	20	0.76
Loropetallum	3	0.66
Thyrallis	2	0.50
Pittosporum	1	1
Buttonwood	1	0



Fig. 2. Symptomatic Ligustrum plant material submitted for evaluation and surveyed for eriophyid mites.

CONCLUSIONS

Thus far, our investigation has uncovered inconsistent results to support the association between eriophyid mites and the commonly seen gall damage to ornamental plants. We cannot yet rule out mites as the causal agent; however, we do not have enough evidence to support causality. Because multiple factors may cause the galling symptoms on many ornamental plant species, it is likely that a combination of factors are at play. For example, non-target herbicide damage (e.g., glyphosate) can cause very similar symptoms on plant foliage. This is confounded by claims of no herbicide applications in several of the site where damage has been collected. Therefore, the next steps of this project will play a vital role in confirming the connection between mite infestation and galling damage. We currently have enough samples to conduct molecular analysis to detect any known plant pathogens or viruses, which will be done in October 2018. Our current management recommendations are to prune off symptomatic plant material, when possible, and scout for eriophyid mites within plant tissue following our protocol. If mites are detected, a foliar application of a miticide (e.g., spyromesifen or abamectin) can effectively reduce mite infestations. Plants typically recover after pruning and treatment, producing asymptomatic new growth.