

Staining Associated with Oxhorn Bucida (“Black Olive”) Trees (*Bucida buceras*): The Caterpillar and Eriophyid Mite Connection

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Oxhorn bucida (*Bucida buceras* L.), also known as black olive, is used as a shade tree in southern Florida landscapes and street plantings. One negative aspect associated with this tree is a rusty staining of driveways and other objects beneath the canopy. This report documents that the objectionable staining is not caused so much by the normal fruit or foliage, but rather is the result of a series of arthropod infestations. Observations reveal the dark staining is associated with frass from a noctuid caterpillar, *Characoma nilotica*, which feeds on the foliage and flowers and also bores into the string bean-like galls caused by an eriophyid mite, *Eriophyes buceras* Cromroy.

The “black olive” tree (*Bucida buceras*) is low maintenance, fairly wind and salt tolerant, and originally from the Greater Antilles and Leeward Islands. It grows 40 to 50 ft high and 35 to 50 ft wide. *Bucida buceras* is commonly used as a shade tree in many neighborhoods and along many city streets in south Florida. The ‘Shady Lady’ is a cultivar with a finer texture due to its smaller leaves and more constrained growth. It eventually reaches about 25 ft tall and 16 ft wide. However, the “black olive” tree has a more appropriate common name, oxhorn bucida; this name was used in earlier literature (Morton, 1981; West and Arnold, 1956).

The Fruit

The “black olive” moniker has always been puzzling to me. When I first moved to Naples, I rode around with one of the landscapers to learn more about southwest Florida horticulture. He exclaimed, “And there’s a black olive tree. It can be a problem because of the fruit staining.” (Fig. 1). I immediately thought of the black or European olive tree (*Olea europea* L.: Oleaceae) that is used in California. However, the southern Florida “black olive” doesn’t have fruit I would want in my salad. It isn’t even in the olive family; it is in the Combretaceae family. The fruit isn’t black and it isn’t juicy. The oxhorn bucida fruit is properly termed either a nutlet or a coriaceous drupe crowned with a persistent calyx, according to Dick Weaver (Florida Division of Plant Industry, personal communication, May 2008). This fruit description confusion may have started when, according to one report, some early plant collectors assigned the fruit of a nearby native plant *Kopsia pruniformis* to *Bucida buceras*. (Murray Corman, Garden of Delights, June 2008, personal communication).

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The Gall Mite

The oxhorn name came about because of a curious structure, a 4- to 12-inch-long, string bean-like gall (Figs. 2 and 3), which develops from the fruit cluster. The gall is induced by the feeding of an eriophyid mite, *Eriophyes buceras* (Fig. 4 and see video clip at: <<http://www.fshs.org/Proceedings/Password%20Protected/2008%20vol.%20121/Bucida%20Gall%20Eriophyid%20Mites.mpg>>. Sometimes the gall is straight and sometimes it curls and resembles, to some, an oxhorn. From my observations, these galls are not as abundant on the ‘Shady Lady’ cultivar as on the *Bucida buceras* species.

The Caterpillar and the Stain

Tannins or other phenolic (phenylpropanoid derived) compounds are most likely a component in *Bucida* leaves, bark,



Fig. 1. This rusty stain heads toward a parking lot drain on 11 July 2008. The stain is due, primarily, to oxhorn bucida caterpillar (*Characoma nilotica*) frass dropping from a nearby tree. Photo: Mike Malloy.



Fig. 2. The dark, rust stain on this sidewalk is associated with the string bean-like gall (center of picture) caused by eriophyid mites. *Characoma nilotica* larvae tunnel into the galls and their subsequent frass droppings cause the majority of the stain. Note there is no objectionable stain near the oxhorn buccida fruit (nutlets) in the crack of the sidewalk.



Fig. 3. This string bean-like fruit gall [note cluster of normal fruit (nutlets) at top] is caused by eriophyid mites that attack oxhorn buccida flowers or young fruit. *Characoma nilotica* caterpillars tunnel inside the galls and push the dark brown frass along with silken threads out of the gall. Due to the silk, the frass adheres to the outside of the gall.



Fig. 4. A microscope view of the myriad of eriophyid mites squirming around inside the gall as if in a mosh pit. (Also see video clip at: <<http://www.fshs.org/Proceedings/Password%20Protected/2008%20vol.%20121/Bucida%20Gall%20Eriophyid%20Mites.mpg>>)

and fruit. These tannins are well-known in other plant species such as oaks (*Quercus* species), tea (*Camellia sinensis*), and red grapes (*Vitis* spp.) and are known to cause objectionable staining especially when wet, fallen plant parts remain on light-colored surfaces.

Oxhorn buccida has one common caterpillar pest, *Characoma nilotica*. It has been called the “black olive” caterpillar, but from here on, I will try to call it the oxhorn buccida caterpillar. Another local name for this caterpillar is the “bungee” caterpillar. This came about due to its habit of rappelling around on silken webbing and getting in people’s faces. These “in-your-face” encounters are a big annoyance factor and another reason to avoid planting these trees along sidewalks and in parking lots.

The degree of staining under the trees in my neighborhood varied and was worse under some oxhorn buccida canopies than others. This variability intrigued me into taking a closer look. During my morning walks in 2007 and 2008, I observed the objectionable staining (Fig. 1) was not associated with the leaves or fruit, which may cause some slight staining. But rather, the unsightly staining, “Looks as if somebody’s old radiator blew!” (Mike Malloy, Naples lepidopterist, UF/IFAS FYN agent, June 2008, personal communication), is due to the caterpillar frass (Figs. 2, 3, 5). The oxhorn buccida caterpillar’s digestive processes apparently concentrates the tannins and/or unbinds the staining agents. The serious, turn-your-head staining occurs when the caterpillar frass collects on the sidewalks, and subsequent rain, dew, or irrigation water soaks it and the tannins are released. On a scale of 1 (very subtle) to 10 (very dark), fruit and leaf stains may rate a 2 or 3, but the caterpillar frass boosts the staining right into the 8 or 9 range. Chewing damage by a light population of caterpillars in the upper canopy may go unnoticed, but as their frass drops and dissolves in moisture on the sidewalk, the solution surrounds leaves or other debris, thus leading one to think it is the leaves or fruit exuding the staining compounds.

From previous years’ observations, I believed the caterpillars were only active on the foliage for about 6 to 7 weeks out of the year, from mid-April through early June (Caldwell, 2005). However, these caterpillars are unique. They not only feed on



Fig. 5. This oxhorn buccida tree has a severe infestation of eriophyid mite fruit galls.



Fig. 6. The gall has been cut away to show the oxhorn buccida caterpillar and frass. Photo taken 14 Aug. 2008.

the flowers and leaves, but also bore into the galls and feed inside them (Fig. 6). In 2008, early and late instar caterpillars were found inside the eriophyid mite galls in late May through mid-August. This is the first report of this caterpillar utilizing the galls as a food source.

In the past, there appeared to be only one generation of the caterpillars per year. Due to parasites and predators or, perhaps, lack of galls, the caterpillar infestations are usually light from year to year, but an outbreak may occur now and then as with most insect populations. During these outbreaks, entire trees may be defoliated or turn brown due to the extensive chewing, as in 2003, but the trees quickly re-foliate in another 4 to 6 weeks, apparently without long-term injury. The caterpillars are not known to attack this new growth; instead they prefer to tunnel inside the galls. So, if the galls are abundant, the caterpillars appear to have inconspicuous (inside the galls), repeating generations and the staining is prolonged until rains have washed the frass from the galls, which are still in the canopy. The caterpillars push the frass out of the galls along with silken threads, causing the frass to cling to the galls (Fig. 3). Some of the galls do not drop and remain in the canopy for an extended period. Thus, when it rains, frass is dislodged and tannins leak from the gall like a drippy teabag even though the caterpillars have finished their chewing and pupated.

What To Do

The severe staining should not be significant every year, nor be a season-long problem. Perhaps the highest intensity is from mid-April through late July. If rappelling larvae or staining are

problems, a spray of a selective insecticide containing *Bacillus thuringiensis* (B.t.) when the tree is in peak flower (examine the flowers to see if the caterpillars are active first) and maybe 2 weeks later, should reduce the caterpillar population. B.t. is selective for caterpillars and if any honey bees happen to be around the flowers (I've not noticed many, if any), they will not be affected. Flowering seems to vary considerably with this tree species and there even appears to be some repeated flowering some years. However, the peak flowering period is about the third to fourth week of April, although some oxhorn buccida were in flower in downtown Naples on 7 Feb. 2008. Also, some 'Shady Lady' trees were observed flowering in early Nov. 2008.

If the galls were prevented, the staining intensity would be reduced. Galls might be reduced by targeting the eriophyid mites with a horticultural mineral oil spray or with an eriophyid miticide such as abamectin (Avid® by Syngenta) as an early (before flower buds appear) canopy spray application. Another possibility is the abamectin (Vivid® II by Florida Silvics dba Tree Tech Microinjection Systems) trunk microinjection treatments. These approaches have not been tested at this point.

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