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Ms. Rose T. Hiskes
Valley Laboratory
The Connecticut Agricultural Experiment Station
153 Cook Hill Road, P. O. Box 248
Windsor, CT 06095

Phone: (860) 683-4977
Fax: (860) 683-4987
Rose.Hiskes@ct.gov
Website: www.portal.ct.gov/caes

Acorn Pip/Woolly Catkin Gall, *Cynipidae: Callirhytis quercusoperator*

During the summer of 2019, acorns of northern red oak in areas of Connecticut began falling early when they were still quite small. This was first observed on July 8, from Stratford. Northern red oaks in Windsor and Vernon were doing the same thing. As the season progressed, increasingly larger acorns, with the same damage, continued to fall. Some acorns did make it to maturity.

There are many insects that cause galls on oaks. Based on information from CAES entomologist, Gale Ridge, we investigated whether the gall affecting oaks in central Connecticut is the Acorn Pip/Woolly Catkin gall, *Callirhytis quercusoperator*.

galls only on northern red oak. Many pin, swamp chestnut and white oaks were inspected but no galls were found on their acorns. One confusing factor though, is that we did not see pip galls on a black oak in Windsor. Black oak is listed as a host. Affected acorns were observed in the towns of Hamden, Windsor, Vernon and Tolland.



Figure 1. Acorn Pip/woolly catkin gall. Acorns with developing pip gall. ©Linda Williams, Wisconsin DNR.



Figure 2. Open pip gall from acorn with larva removed. ©Tony Palmer. Used with permission.

Based on the following we believe it is this gall:

First, for the most part, the host range agrees with what is published for this insect. We saw the pip

Second, two of the acorn symptoms agree with the published literature. The pip galls are found along the outside of the acorn but under the cap. Also, the size of the divot left after the gall separates was 1.75 mm in a medium sized northern red oak acorn. This would be in the range for an adult of 2.2 mm.

Third, gall development happened as described in the published literature. In Hamden in early August, acorns were found with pips still in most of them. After a winter, now we see only acorns with the divots.

HISTORY: This wasp was discovered in part in Connecticut by Homer Bassett, a librarian in

Waterbury. He discovered and identified the female wasps laying eggs in oak flowers in 1864.

DESCRIPTION, DAMAGE, and LIFE CYCLE:

This insect has an incredibly complex life cycle. There are alternate generations: two generations of different lengths and sex composition that are completely different from each other in where they attack the host and what the galls look like. For



Figure 3. Northern red oak acorn where pip gall has dropped off. ©Tony Palmer. Used with permission.

years it was thought these were two different species of wasp. Kinsey named them *Andricus operator* form *operator* and *Andricus operator* form *operatola*.

Summer generation: Wasps of this generation that have emerged from woolly catkin galls, are smaller than those of the spring generation. Female wasps are 2.2 – 2.5 mm, while males are 1.7 – 2.2 mm in length. After mating, females, lay fertilized eggs in second year acorns in July, causing a small seed-like, or pip gall to form between the cap and the outside of the acorn. (See Figure 1.) Inside this gall the wasp larva develops, protected from predators. (See Figure 2.) Acorns that are attacked stop development and do not produce viable seed. Only

females emerge two years later. With time the galls separate and drop out, leaving the acorns with a divot. (See Figure 3.)

Spring generation: Parthenogenetic females, that have emerged from pip galls, lay eggs in developing female oak flowers in late April to early May. These females are from 3.2 – 3.5 mm long. A white woolly gall develops. On close inspection the ‘wool’ looks to be modified leaf hairs. (See Figure 4.) Hard cells develop within the gall that protect the developing larva and then pupa. Male and female wasps emerge from the brownish mature woolly galls in June to July.

HOSTS: Felt lists black, red, scarlet, scrub and Spanish oaks as hosts. In 2019, we did not see these galls on the acorns of a black oak in Windsor. Acorn production in oaks can take one or two years. White oaks produce mature acorns in one season. Red oaks take two years to produce mature acorns. Oak trees do not have perfect flowers: male and female flowers are separate. In red oaks pollination occurs in the spring but fertilization of the egg or ovule is delayed until the next season. A small swelling is all that is obvious on the trees during the first winter. The ovule matures the second spring which is when fertilization takes place.

MANAGEMENT OPTIONS: For affected oaks in the landscape where shade or green is the intended use, loss of the acorn crop may be desired as it lessens clean up in the fall. However, if trees were planted for the purpose of mast to feed wildlife, the loss of acorns is undesirable. Yet, chemical management in forest settings is often uneconomical and undesirable because of all the nontarget species affected. Given that the summer generation takes two years to develop, mast would be produced every other year. Also, planting oaks in the white oak group, which are not hosts, could provide a yearly source of mast.



Figure 4. Spring generation of acorn pip/woolly catkin gall on scrub oak flower. © Charley Eiseman. Used with permission. (www.charleyeiseman.com)

REFERENCES:

Cecich, Robert. 1994. *Biology and Silviculture of Northern Red Oak in the North Central Region: A Synopsis*. North Central Forest Experiment Station, St. Paul, MN.

Eiseman, Charlie. 2011. Bug Tracks Blog.

Felt, E. P. 1940. *Plant Galls and Gall Makers*.

Kinsey, Alfred. 1920. *Life Histories of American Cynipidae*. American Museum of Natural History.