



Chestnut Gall Wasp – Monitoring a New Threat

Few trees rival the sense of reverence that the American chestnut commands.

For well over a century, the American chestnut has maintained its historic importance to the eastern forest ecosystem and the fascination of those who call it home. Despite the devastating effects of the chestnut blight unintentionally introduced around 1904, the species has refused to disappear, persisting as sprouts in fencerows and the forest understory as if waiting for help to one day arrive. Today, as scientists optimistically pursue multiple strategies for developing blight resistant trees, the American chestnut is once again under assault by another exotic introduction . . .



Figure 1, Oriental Gall Wasp, Photo credit: Gyorgy Csoka, Hungary Forest Research Institute, Bugwood.org

The Asian or Oriental Gall Wasp (*Dryocosmus kuriphilus*) was first observed in the United States in 1974 infesting Chinese chestnut near Bryon, GA. It has since spread as far north as Pennsylvania and Maryland, and westward to central Kentucky. We have been aware of the gall wasp in Mercer and Erie counties for over three years. By spring 2008, alarmed owners were reporting strange masses on Mercer County Chinese chestnut trees. Strange indeed, the life cycle of Asian Gall Wasp contends with the best invaders of science fiction. Here are some interesting and important facts:

- Asian Gall Wasp has one generation per year and reproduces asexually
- Adult females lay eggs inside chestnut buds in early summer.
- Eggs hatch soon after, but larvae remain inactive.
- Larval growth begins at budbreak the following spring, when one or more larvae induce rapid formation of conspicuous stem, petiole, or leaf galls (Fig. 2). These galls provide the developing wasp protection throughout the larval and pupal stages.



Figure 2, Oriental Gall Wasp Galls
Photo credit: Jerry A. Payne, USDA Agricultural Research Service, Bugwood.org

- Adults (Fig.1) emerge from galls in the early summer, fly to new shoots and lay eggs for the next generation.

During the spring of 2009, significant numbers of galls appeared on many of the American trees in Mercer County. The effect on severely infested trees is quite obvious in terms of tree vigor and suppressed nut production – something of great concern to those of us involved with breeding and reintroduction efforts. In February 2010, and again in 2011, our western Pennsylvania chestnut volunteers assisted Dr. Lynne Rieske-Kinney, an entomologist from the University of Kentucky and member of the NE1033 multistate research project “Biological Improvement of Chestnut through Technologies that Address Management of the Species, its Pathogens and Pests” by collecting over 400 2009 galls for analysis in her laboratory. According to Dr. Rieske-Kinney:

I'm trying to track the range expansion of the gall wasp and its parasitoid recruitment, so your data points would be extremely valuable. I'm most interested in sites at the leading edge of the infestation . . .

I'm most interested in learning what is regulating gall wasp populations. In addition, I'm interested to learn if the parasite that was introduced in the late 1970's following the initial gall wasp introduction is able to move with expanding gall wasp populations, or if what is parasitizing the galls in newly invaded territories are our native parasites that are "learning" to use this new resource.

What you and your crew have collected for me is last year's galls (eggs were laid in summer 2009, galls formed in spring/summer 2010), which will contain the remnants of the gall wasps themselves, as well as evidence of parasites, predators or pathogens that might be affecting gall wasp populations. The galls will be measured and a subsample will be dissected to learn:

- the number of chambers per gall (each chamber can contain a gall wasp larva)
- the incidence of parasitization, predation (rare) and pathogens
- the identity of the parasites (determined through molecular analysis since they're impossible to distinguish morphologically)
- if any pathogens can be isolated and (hopefully) identified with the help of Dr.Sandy Anagnostakis.

(Dr. Anagnostakis is another chestnut researcher with the NE1033 project)

As in most things "chestnut", the importance of volunteers' willing to assist in "Citizen Science" is critical. The need for trained volunteers to serve as eyes in the field and boots on the ground will only grow as we face many obstacles standing in the way of bringing back American chestnut to our forests. Asian gall wasp is another challenge we need to monitor in order to better understand its impact on our efforts. You can assist our knowledge of how far and fast this pest is expanding its range with your powers of observation. Dr. Rieske-Kinney tells us one of the issues is an inability to

establish a consistent protocol for sampling given that each infestation tends to be so different. By the time you read this article, the galls will be well formed and quite noticeable. If you would like to help monitor this pest, here are a few recommended guidelines:

1. Study the photographs of the galls in this article and read the Nutshell article available at this extension website : Mercer.extension.psu.edu
2. Examine as many chestnut trees as possible in your area.
3. If you observe galls, record the tree species (Chinese, American, unknown, etc.), approximate age or size (height and/ or dbh), and the setting (e.g., orchard, landscape planting, fencerow, etc.)
4. Provide an estimate of the "**infestation level**" by estimating the number of infested trees as well as the number of total trees.
5. Provide an estimate of the "**infestation severity**" by estimating the number of total galls on 3 branches of each tree you observe.
6. Email above information and location of infested trees (GPS would be ideal) to gwm6@psu.edu or phone 724-662-3141 extension 106. Another option is mailing your observations to:
Gary Micsky
Penn State Cooperative Extension in Mercer County, P.O. Box 530, Mercer, PA 16137

Acknowledgments and many thanks to the following for their contributions to this article:

Dr. Lynne Rieske-Kinney, Department of Entomology, University of Kentucky lrieske@email.uky.edu

THE NUTSHELL, June 2009, a publication of The Northern Nut Growers Association, Greg Miller, President, William Sachs, Editor, wsachs@alumni.princeton.edu

Sustainable Management of the Invasive Asian Gall Wasp? Interactions between native and introduced natural enemies?

W. Rodney Cooper¹ and Lynne Rieske-Kinney*²University of Kentucky Department of Entomology, Lexington, KY 40546-0091
¹Current address: USDA ARS Shafter Research Extension Center, Shafter, CA

Insect Images The Bugwood Network: <http://www.bugwood.org/>
Jerry A. Payne, USDA Agricultural Research Service, Bugwood.org; Gyorgy Csoka, Hungary Forest Research Institute, Bugwood.org