

# Control and Survey of Grape Phylloxera in the Ozarks

Donn T. Johnson, Sandra Sleezer and Barbara Lewis, University of Arkansas, Fayetteville, AR (ssleezer@uark.edu)

### Abstract

A study of the biology of foliar grape phylloxera (GP) found at least three generations per year. The stem mother galls formed in April. The next generations' galls started early to mid May, late June and probably late July. A Danitol spray was applied July 8 that eliminated these last generations.

A second study revealed that '3309C' is an extremely resistant rootstock, while some own-rooted cultivars such as 'Vignoles' are much more susceptible. It is recommended that future grapes in the Ozarks to be planted on resistant rootstocks.

A protocol to determine an economic threshold is being developed. In 2006 study we found fewer galled shoots per vine when 0, 1 or 2 galled disks were added per vine, compared to 4 to 16 galls. The extent of GP root damage among cultivars needs more sampling.



**Fig. 3.** Ventral view of grape phylloxera in leaf gall with eggs



**Fig. 4.** Dorsal view of grape phylloxera in leaf gall with eggs

**Table 1.** Seasonal change in foliar grape phylloxera stage distribution and number of galls per leaf on 'Norton' and 'Vignoles' grapevines in Purdy, MO (2006)

Date/Cultivar	No. eggs/gall	No. crawlers/leaf	No. adults/gall	No. galls/leaf
<b>'Norton'</b>				
5/1/06	147.2	4.7	0.9	1.2
5/11/06	117.7	7.8	0.5	1.1
5/25/06	26.8	6.3	0.1	1.2
6/9/06	54.4	0.07	0.5	9.97
6/23/06	35.3	0.64	0.74	46.4
6/30/06	103.0	4	0.76	82.8
7/13/06	51.5	0.38	1	253.4
7/25/06	39.0	0.78	0.62	219.8
7/31/06	9.5	0.7	0.24	203.9
8/10/06	0.2	0	0	234.1
8/31/06	6.8	0	0.14	149.2
<b>'Vignoles'</b>				
6/2/06	59.02	0	0.8	11.9
6/9/06	161.3	1.6	0.8	6.6
6/16/06	19.4	0.8	-	50.9
6/23/06	13.2	0.9	0.2	9.4
6/30/06	44.8	2.2	0.6	27.5
7/13/06	24.2	0.7	0.6	60.1
7/25/06	1.4	0.2	0.02	95.2
7/31/06	4.8	0.6	0.1	124.0
8/10/06	0	0	0	62.7
8/31/06	0	0	0	21.7

**Table 3.** Insecticide control of foliar grape phylloxera in 'Norton' grapes in Purdy, MO (2006)

Treatment	No. sprays	No. galled shoots/vine on 16 June
Check	-	10.8a <sup>b</sup>
Admire Pro <sup>a</sup>	1 <sup>a</sup>	10.03a
BAS 320	1	6.8b
BAS 320	2	4.8b
Assail	1	1.8c
Assail	2	0.3c
Danitol	1	0.2c
Danitol	2	0.08c

a 1 = sprayed on 11 May; 2 = sprayed on 11 and 25 May  
b LSD0.05 = 2.6 (Waller-Duncan K-ratio t Test)

### Introduction

Grape phylloxera are tiny soft bodied insects that feed on the foliage (Fig 1 - 4) and roots (Fig. 5) of grape plants. Feeding by foliar GP produce galls (gallicoles) on the foliage that can reduce fruit yield and quality. The root form causes nodosities on feeder roots (Fig. 6) and tuberosities on larger roots which cause a loss in photosynthates and essential nutrients. However, root and vine death is attributed more to pathogenic fungi that enter the GP feeding wounds than to GP feeding and gall formation. In the last decade, growers in the Ozarks have been transitioning to wine grape cultivars with susceptibility to GP attack.

### Objectives

- 1) Describe the life history of GP in the Ozarks
- 2) Determine the extent of damage that foliar and root GP cause in the Ozarks
- 3) Develop economic thresholds for foliar GP for the more susceptible cultivars
- 4) Determine the levels of resistance or tolerance to root GP of several different rootstocks and own rooted cultivars in the Ozarks.

### Results and Discussion

- The seasonal changes in numbers of each stage of foliar GP suggests at least 3 generations per year (Table 1).
- The rootstock study confirms the substantial resistance of 3309C rootstock to root GP and shows a significant difference in numbers of nodosities on own rooted cultivars grown in the Ozarks (Table 2).
- Vines with 2 or fewer GP infested leaf discs had significantly fewer galled shoots per vine (< 7) on May 11 compared to > 8.5 galled shoots on vines with 4 to 16 leaf discs.
- Results from the efficacy experiment show Danitol 2.4EC and Assail 30WG to be significantly more effective against foliar GP than other compounds (Table 3).

### Methods

Twenty leaves were collected at random every other week to determine the life cycle of foliar grape phylloxera. Ten leaves from each sample were counted for the number of galls per leaf, and numbers of eggs, crawlers, and adults per gall.

In the rootstock study all roots were dug from a 2ft x 1ft x 1ft area next to the vine (Fig. 7). They were taken to the lab and stored in a refrigerator. In the lab, all nodosities and radicles were counted on each root sample.

Individual leaf discs infested with 1 GP stem mother were attached to 'Norton' vines. The treatment vines were set up with 0, 1, 2, 4, 8, or 16 leaf discs per vine on May 11.

The efficacy study was done first by ensuring all vines had at least 2 stem mother galls on each treatment and control vine. The treatment vines were then sprayed with selected insecticides and the number of galled shoots per vine were counted on June 16 to determine rates of infestation.



**Fig. 5.** Grape phylloxera on 'Chardonnell' root



**Fig. 6.** Grape phylloxera nodosities on 'Vignole' roots

### Future Goals

These studies will be repeated and expanded in 2007. One of our goals is to establish an economic threshold for GP for cultivars grown in the Ozarks. Another possibility is to describe the microbes associated with root disease in GP infested grape roots and the effects of mulches and composts on root death, as well as how long it takes for grape roots to become infected with fungi after GP establishment. It could also be of benefit to study GP movement in different soil types.



**Fig. 1.** Grape phylloxera galls on a 'Norton' leaf



**Fig. 2.** Grape phylloxera crawler and eggs

**Table 2.** Number of grape phylloxera nodosities on roots of phylloxera-resistant rootstock '3309C' and on five other grape cultivars on own-roots at the University of Arkansas-Farm in Fayetteville, AR (2006)

Cultivar	No. vines	No. root nodosities ± SE
3309C	4	1.5 ± 1.5 b <sup>a</sup>
Geneva Red	6	31.0 ± 14.7 b
St. Vincent	6	75.7 ± 64.2 b
Chambourcin	6	80.2 ± 19.3 b
NY70.0834.05	7	696.3 ± 302.1 a
NY73.0136.17	7	586.9 ± 177.0 a



**Fig. 7.** Sandra Sleezer sampling grape roots at the University of Arkansas farm



**Fig. 8.** Healthy grape foliage at the University of Arkansas farm



**Acknowledgements**

A special thanks to Sammi Jones, Brittany Slamons, and Rob Sleezer. Partial funding was provided by the Missouri Wine & Grape Board, USDA Viticulture Consortium-East and the University of Arkansas Agricultural Experiment Station.

