

Grape Entomology Research and Demonstration in Arkansas and Missouri

SERA-14 Progress Report on Research/Extension Projects, 2007

Dr. Donn Johnson, Barb Lewis, and Sandra Sleezer,
University of Arkansas, Entomology, Fayetteville, AR 72701

Project 1 and 2 Funding Sources: Missouri Wine & Grape Board (through 30 June 2008) and Viticulture Consortium-East (through June 30 2007)

Project 1 titled, “Demonstration & verification of best management practices for wine grape production in Ozark Mountain region”

In 2007, we had Spectrum WatchDog weather stations in 3 vineyards in AR (1 grower in Altus purchased a station) and 5 vineyards in MO recording at half hour intervals: temperature, hours of leaf wetness and percent relative humidity. Every week or so, these data were used to run the Spec7 Pro™ grape black rot, botrytis, downy mildew and powdery mildew disease predictive models to produce graphs of disease risk events. The US degree-day (DD) mapping calculator (<http://pnwpest.org/cgi-bin/usmapmaker.pl>) was used to generate cumulative DD color thermocline maps of grape berry moth development (base 47° F and upper threshold 93° F). These models produced graphs available at:
Arkansas: <http://comp.uark.edu/~dtjohnso/AR%20DD%20Map%20Disease%2007.pdf>
Missouri: <http://comp.uark.edu/~dtjohnso/MO%20DD%20Map%20Disease%2007.pdf>

We plan to compare these vineyard specific graphs to corresponding insecticide and fungicide spray records. Growers in two vineyards in AR and four in MO recorded insect trap catch weekly from early April to partial harvest. Management recommendations and trap data and graphs of predicted daily disease risk were placed on the Fruit IPM website as needed or when available: <http://comp.uark.edu/~dtjohnso/>

At grape tailgate meetings in April and May in Arkansas and Missouri, we discussed pest and disease management following the April 8 frost that caused total vine defoliation from then until early May. We stressed a greater need for weekly checking for presence of small grape berry moth larvae in the few clusters that did develop to better time insecticide sprays. Sprays against grape phylloxera were considered unnecessary in 2007 due to the lack of a first and only a partial second generation of foliar phylloxera.

Grape Berry Moth (GBM). The 2007 mean season total catch of GBM in pheromone traps in vineyards were at least half that caught in 2006, except in Rocheport (**Table 1**).

Grape Root Borer. The grape root borer (GRB) trap counts varied between years for the four sites monitored from 2005 to 2007 (**Table 2**). Just before GRB flight began in June 2007, we set out a GRB mass trapping experiment in four vineyards (Ste. Genevieve, MO; Hermann, MO; Hindsville, AR; and Lowell, AR). We tied 1 GRB sex pheromone green

bucket trap to the top trellis wire per acre in each of four 15 to 16 acre blocks. We placed inside each trap a Vaportape dichlorvos insecticidal strip (Hercon Environmental) to cause rapid knockdown, prevent escape and make GRB identification and counting easier. The Trece GRB sex pheromone lures were replaced in late July. Trap counts and GRB pupal skin counts (600 vines per treated block or 100 vines per check block in St. James) were recorded in July and August or early September. Some of the season total trap counts in 2007 were fairly high but < 6% of grapevines were infested GRB as noted by the low number of GRB pupal skins counted.

Project 2 titled, “Survey and control of aerial and root grape phylloxera.”

Grape Phylloxera (GP). On 20 to 25 April 2007, we set out sticky traps to begin our description of the seasonal biology of grape phylloxera. Ten Vignoles vines were selected in Purdy, MO and Altus, AR. Six inches from each vine, we pushed into the soil a four sided aluminum box measuring 8” x 4” (open top and bottom) and covered top opening with a white sticky card. We also wrapped double sticky tape around the base and top of each grape trunk and on a shoot on each lateral cane. These sticky tapes capture the first crawlers in Altus, AR on 13 June and in Purdy, MO on 25 June. We did not locate GP galled shoots until July. The season total crawler catches per tape were < 30 and < 7 in Altus, AR and Purdy, MO, respectively (**Figure 1**). We started capturing winged adults emerging from soil in late August and September. Susceptible vines like Vignoles and Norton experienced only moderate leaf galling by late August.

Project 3: Titled, “Identify Semiochemicals Produced by Green June Beetles.”

Funding Source: Arkansas Agricultural Experiment Station Research Incentive Program (through 30 June 2008)

We continued field testing various odor blends for relative attractiveness to green June beetle (GJB) adults. On several dates, we collaborated with Dr. Maciej Pszczolkowski (Missouri State University, State Fruit Experiment Station, Mountain Grove, MO). In Purdy, MO we set out modified Japanese beetle traps that funneled GJB adults into a clear 3-gal. plastic box. Traps were hung at 3’ height in transect parallel to but 100 ft out from a Seyval grape block infested with GJB. The mean numbers of GJB caught per trap were: 91% isopropyl alcohol captured 1,069; blend Mix-M captured 1,090 GJB; and 50% isopropyl alcohol captured only 691.

Fruit Sprayed. Four replicates each had a glass jar containing ten green June beetle adults feeding for 72 hrs on ten insecticide dipped grapes. The synthetic insecticides (respective % mortality) were: Fenprothrin (Danitol 2.4 EC) (100%); Thiamethoxam (Actara 25WG) (85%); Acetamiprid (Assail 30SG) (85%); Carbaryl (Garden Tech Sevin Concentrate Bug Killer) (45.7%). The OMRI approved organic insecticides (respective % mortality) were: Bt subsp. tenebrionis (Colorado Potato Beetle Beater) (45%); Rotenone plus Pyrethrin (Bonide Products) (40%); Azadirachtin (Aza-Direct) (35%); and Pyrethrin plus Piperonyl butoxide (Houseplant & Garden Insect Spray) (22.5%).

Beetles sprayed: Four replicates each had ten green June adults dipped in one of six insecticide dilutions, 2X, 1X (field rate), 0.5X, 0.25X, 0.125X and 0.06X. Dipped beetles were placed in glass jar to feed on untreated grapes for 48 hrs. The 1X labeled field rate doses were: 471 ppm Danitol 2.4EC; 5867 ppm Garden Tech Sevin Concentrate Bug Killer 22.5%; and 103 ppm Actara 25WG. The LC95 values in ppm for each insecticide were: Danitol = 123.8 (0.26X field rate); Carbaryl = 2717.0 (0.46X field rate); and Actara = 385.1 (3.7X field rate). Carbaryl worked better when beetles were dipped in insecticide (95% kill with half the field rate) compared to killing 45.7% when feeding on dipped fruit.

Publications/Presentations:

Kamas, J. K. Striegler, A. Allen, D. Johnson and S. Sleezer. 2007. Pierce’s disease in Ozark Mountain region vineyards: a one year snapshot of disease incidence and vector distribution, pp. 131-132. Program & Proceedings of the 22nd Annual Midwest Grape & Wine Conference.

Johnson, D. 2007. Overview of grape insect pests and pest management, pp. 68-79. Program & Proceedings of the 22nd Annual Midwest Grape & Wine Conference.

Johnson, D.T., B. Lewis and S. Sleezer. 2007. Grape insect management. Oklahoma & Arkansas Hort. Industry Show in Ft. Smith, AR on 5 January.

Johnson, D.T., S. Sleezer, and B. Lewis. 2006. Control and survey of grape phylloxera in the Ozarks. Poster, Entomological Society of America, Indianapolis, IN on 11 December.

Johnson, D.T. and B. Lewis. 2006. Grape phylloxera efficacy study in Missouri. Report to IR4 Program and Bayer CropSciences.

Table 1. Season total grape berry moth trap catches in five vineyards.

| Vineyard | Risk of GBM | GBM 2006 | GBM 2007 |
|--------------------|------------------|----------|----------|
| Ste. Genevieve, MO | low | 25.5 | 0 |
| St. James, MO | Moderate to high | 180.0 | 121.0 |
| Hermann, MO | High | 112.5 | 27.0 |
| Rocheport, MO | Low to moderate | 23 | 55.0 |
| Hindsville, AR | Moderate to high | 75.7 | 27.0 |

Table 2. Season total numbers of grape root borers per trap and pupal skin counts

| Vineyard | Season No. GRB moths per trap | | | % Vines with GRB Skins |
|--------------------|-------------------------------|------|-------------------|------------------------|
| | 2005 | 2006 | 2007 ^a | 2007 ^b |
| Ste. Genevieve, MO | 31 | 65 | 52.0 (833) | 5.3 |
| St. James, MO | 11 | 130 | 150.0 | 0.5 |
| Hermann, MO | 8 | 34 | 13.6 (218) | 4 |
| Hindsville, AR | 5 | 33 | 0 (0) | - |
| Lowell, AR | - | - | 10.9 (174) | - |

- a Mean trap catch (total season catch in 16 traps) from 16 grape root borer sex pheromone baited green bucket traps set out at 1 trap per acre to mass trap the males in each 15 acre block
- b Percentage of vines infested with pupal skins after inspecting ground under 600 vines per block or 200 vines at St. James

Figure 1. Number of grape phylloxera crawlers captured on double sticky tape traps wrapped around canes or trunks of vines in Altus, AR and Purdy, MO (2007)

