SERA014 Progress Report 2005

Oklahoma State University

1. Oklahoma Grape Management Course and other Horticultural programs.
Becky Carroll, Extension Assistant and Dean McCraw, Professor Emeritus

Over 400 growers, potential growers and county extension educators have participated in the Oklahoma Grape Management Course offered over the past five years. The course is designed to meet once a month for 4 hours from March through October. A team of specialists present teaching points that are relevant to the stages of wine grape development coinciding with each meeting. Topics discussed in class are reinforced in the demonstration vineyard each month. The wine grape demonstration vineyard at the Oklahoma Pecan and Fruit Research Station is host to field days and other educational programs not associated with the course. Cultivar and rootstock evaluations at three Oklahoma locations are ongoing with data collection beginning in 2003. This research is supported by the Kerr Foundation.

2. Surveys for Pierces Disease of Grapevines in Oklahoma.
Sharon L. von Broembsen, Professor/ Extension Plant Pathologist and Brian Olson, Diagnostician

Seventeen vineyards located primarily in southern Oklahoma along the borders with Texas and Arkansas were surveyed in 2003. During 2004, the eighteen vineyards surveyed were more generally distributed throughout Oklahoma production areas. During both surveys, all grapevines in the second leaf or greater in these vineyards were inspected and petiole samples from visually unhealthy vines for which no apparent cause was evident were taken for laboratory analysis. Products resulting from DNA amplification using polymerase chain reaction technology (PCR) were elucidated on gels in 2003, but real time PCR was used for the 2004 analyses. *Xylella fastidiosa* was not detected in any samples in either 2003 or 2004. In October 2004 we detected *X. fastidiosa* for the first time in Oklahoma in an elm located in the OSU Botanical Garden at Stillwater. The finding shows that *X. fastidiosa* can survive in plants in northern Oklahoma.

3. Surveys for grape pests in Oklahoma, 2002-2004.

Phil Mulder, Professor/ Extension Entomologist

Pierce's Disease and Leafhopper vectors - One reoccurring concern from growers across the state has been the question of whether Pierce's Disease will eventually have an impact on their industry. To understand their concerns, you must recognize the potential as it relates to our closest neighbors that produce wine grapes. Currently, Pierce's Disease, caused by *Xylella fastidiosa* appears to be restricted to portions of North America with mild winters. It has been found in all southern states that raise grapes commercially; from Florida to California, and in Mexico and Central America. In the southeastern states, from Florida through Texas, Pierce's Disease is the single most formidable obstacle to the growing of European-type (*Vinifera*) grapes. Outbreaks of the disease have been reported in states adjoining Oklahoma, namely Texas and Arkansas. These two neighbors report presence of the disease as well as the primary vector (the glassy-winged sharpshooter, *Homolodisca coagulata*). Reports from California suggest that their state is the most heavily infected with Pierce's Disease, with nearly the entire lower third of the state reporting infestations of the primary vector *(H. coagulata*). With limited amounts of rootstock available from neighboring states, California is a common site visited for obtaining new plant materials. This further compounds the risk for Oklahoma growers who may contract Pierce's Disease, simply by unknowingly shipping it into the state.

Presently, all known vectors of the disease belong to the insect order Homoptera. The main vector groups are leafhoppers (sharpshooters), planthoppers, froghoppers and spittlebugs. To date, while several different representatives of these groups of insects occur in Oklahoma, the glassy-winged sharpshooter and related organisms have not been found, but targeted surveys are ongoing. With the advent of the new wine grape industry in Oklahoma, it is imperative that we first determine the potential for this insect and related species to thrive and survive the winter in our state. Without this base information we will not be able to evaluate the potential for Pierce's Disease in Oklahoma. If the potential for the vectors and related disease is somewhat limiting in Oklahoma, then the state may also serve as a disease-free zone of

production that could guarantee a continuous supply of plant material to our adjoining neighbors.

Grape Vine Moth and European Grape Berry Moth – Currently, the Grape vine moth, *Lobesia botrana* and the European grape berry moth, *Eupoecilia ampiguelia* appear to be restricted to portions of central Europe and Southwest Asia (Middle East). Based on longitudinal comparisons; however, Oklahoma falls within the parameters needed for development of these species and could support several generations per year on grapes. *L. botrana* has a baseline developmental temperature of 10°C, which allows us to readily follow the progress of this insect, if it is recovered within the state. The Oklahoma Mesonet system continually monitors environmental conditions in 115 sites across the state and also provides model information that tracks development of the alfalfa weevil, *Hypera postica*. This insect also has a developmental threshold of 10°C.

Materials and Methods

The greatest potential for encroachment of the glassy-winged sharpshooter and other potential vectors is likely near the Arkansas or Texas borders. With this in mind, in 2003 and 2004 we monitored six and seven well-established vineyards, respectively. These vineyards are located throughout the state near these high-risk (for Pierce's Disease) areas. We attempted to locate cooperators close to the Texas and Arkansas state lines; however, all counties adjoining these states did not have well established vineyards.

Due to a lack of funding from the agency, sampling did not begin until June in the targeted region of the state. Therefore, information on degree days associated with the Grape vine moth was not obtained; however, sampling for the two moth species was conducted in six locations. These locations were scattered throughout the state and represented the range of conditions in which grapes are grown in Oklahoma as well as those counties where grape production is more concentrated. Surveys for the two moth species were conducted using six Pherocon 1CP wing traps placed in two (three traps each) diagonals across the vineyard. Three traps each on one diagonal were baited with pheromone of one species, while the remaining three traps received the pheromone of the other species. Trap bottoms were replaced when needed and

pheromone lures were replaced every three weeks. Suspect insects, those resembling either one of the two moth species, were returned to the Department of Entomology and Plant Pathology for positive identification.

One method of surveying leafhoppers and related species at each site was conducted using six yellow sticky traps placed in two diagonals (x-pattern) across each vineyard. One diagonal had traps located near each corner and in the center of the perspective vineyard, with traps placed at chest height or higher. Traps located on the other diagonal were placed at ground level or within 30 cm of the soils surface. Traps were monitored once per week and replaced by a new trap during each inspection. Traps were transported back to the laboratory for careful observation of leafhoppers and similar organisms. Suspect insects, those resembling potential vectors (glassy-winged, blue-green, *Graphocephala atropunctata*, green, *Draeculacephala minerva* and red-headed, *Carneocephala fulgida* sharpshooters) were placed in vials of methanol and set aside for subsequent positive identification. A second method of survey involved weekly sweep samples, using a standard 15 inch sweep net. In areas where adjacent vegetation was available, 25 sweeps were taken at these locations. Confirmation of species identification was conducted by Dr. Isabella Lauziere, Research Entomologist with the Texas Agricultural Experiment Station, Texas A&M University System and USDA-APHIS. Late in the season, all sites were surveyed for plants with symptomatic signs of Pierce's Disease. Sampling was suspended September 27, 2004. Results were tabulated during the last three months of 2004 and information has not yet been entered into the NAPIS data base.

Results and Discussion

Throughout the sampling period, no Grape vine moth nor European grape berry moth specimens were recovered at any of the test sites. This was not surprising, since neither species has been documented in the United States.

Tables 1-4 show captures of suspect leafhoppers (*Cuerna lateralis, Draeculacephala robinsoni, Cuerna costalis, Empoasca fabae, and Xyphon flaviceps*) across the areas monitored. Four of the suspect leafhoppers species were well distributed across the sample area, while *H. coagulata* and *D. minerva* were not recovered. *E. fabae* and *C. lateralis* were the most common species recovered. During the trial period over 20,000 leafhoppers were captured on sticky cards and in sweep

nets (Table 1). *C. lateralis,* the grape leafhopper, was by far the dominant species with nearly 19,000 specimens collected. *E. fabae*, the potato leafhopper was also quite common with over 4,600 specimens captured. Table 1 also shows that captures were greater in lower sticky traps than in sweep samples or in sticky traps placed at chest height or higher. Miscellaneous leafhoppers constituted those Cicadellidae that were not suspect vectors for Pierce's disease. The greatest numbers of leafhoppers were captured in Kiowa County, Oklahoma, with over 11,000 specimens recovered at one site (Table 2). *C. lateralis* was the most common species captured in this location, outnumbering the closest other species by nearly tenfold (Table 2). This scenario was similar in the Harmon County #1 location, with nearly twice the number of *C. lateralis* collected versus captures of *E. fabae* (Table 3). At the Harmon County #2 location, *C. lateralis* and *E. fabae* dominated the species captured (Table 4).

At each location, *X. flaviceps* was the least common species encountered and likely poses the smallest threat in vectoring Pierce's Disease, since it is not a xylem feeder. Besides recovering the xylem feeding *D. robinsoni; C. costalis*, *D. navicula*, *Oncometopia orbona*, *Graphocephala versuta* and *G. hieroglyphica* were also recovered in extremely low numbers. Each of these species also feed on the xylem of plants, and could therefore possibly serve as vectors of Pierce's Disease. To date, no Pierce's Disease has been recorded in Oklahoma. In 2003 and 2004 petiole analyses conducted at many of these sample sites revealed no confirmed (DNA-PCR) cases of the disease.

Table 1. Total captures of suspect leafhoppers in sticky traps placed at two heights and from sweep samples taken at the same sites, Oklahoma (2004).

	Total captures (high sticky trap)	Total captures (low sticky traps)	Total captures (sweeps)	Totals
D. robinsoni	1,049	1,203	88	2,340
C. costalis	11	278	7	296
E. fabae	733	3,946	356	5,035
X. faviceps	15	46	1	62
C. lateralis	3,086	6,139	0	9,225
Miscellaneous Leafhoppers	555	3,273	140	3,968
Totals	5,449	14,885	592	20,926

Table 2. Total captures (3 traps/height) of suspect leafhoppers in sticky traps placed at two heights in Kiowa County #1, Oklahoma (2004).

	Total captures (high sticky trap)	Total captures (low sticky traps)	Totals
D. robinsoni	95	104	199
C. costalis	10	83	93
E. fabae	249	1,363	1,612
X. faviceps	1	12	13
C. lateralis	3,086	6,139	9,225
Miscellaneous Leafhoppers	83	421	504
Totals	3,524	8,122	11,646

Table 3. Total captures (3 traps/height) of suspect leafhoppers in sticky traps placed at two heights in Harmon County # 1, Oklahoma (2004).

	Total captures (high sticky trap)	Total captures (low sticky traps)	Totals
D. robinsoni	53	108	161
C. costalis	0	51	51
E. fabae	177	1,244	1,421
X. faviceps	15	46	61
C. lateralis	373	2,445	2,818
Miscellaneous Leafhoppers	136	842	978
Totals	754	4,736	5,490

Table 4. Total captures (3 traps/height) of suspect leafhoppers in sticky traps placed at two heights in Harmon County # 2, Oklahoma (2004).

	Total captures (high sticky trap)	Total captures (low sticky traps)	Totals
D. robinsoni	101	195	296
C. costalis	0	33	33
E. fabae	246	1,076	1,322
X. faviceps	3	1	4
C. lateralis	552	6,054	6,606
Miscellaneous Leafhoppers	187	823	1,010
Totals	1,089	8,182	9,271