Integrated Production Systems for Grapes and Japanese Beetles in Arkansas
SERA IEG-14 Progress Report on Research/Extension Projects, 2004

Donn Johnson[1], Barb Lewis[1], Joe Williamson[1], Jackie McKern[1], and Sherri Wesson[2]
[1] University of Arkansas, Entomology, Fayetteville, AR 72701
[2] White County Extension Agent AGRI, Searcy, AR 72143

Grape Berry Moth. In 2004, studies were conducted that involved pest monitoring and comparison of management practices for both grape berry moth and Japanese beetle. We recorded grape berry moth emergence in pheromone traps in several blocks of grapes in Judsonia and Springdale Arkansas (traps set out late March). Weather conditions in Judsonia were recorded using a WatchDog™ weather station (rain, leaf wetness, RH and temperature). These data were used to run models for predicting risk of disease (black rot, botrytis and downy and powdery mildew) or hatch of grape berry moth. In Springdale, Arkansas, temperature data at 30-minute intervals were downloaded from a Hobo® Pro logger to Excel spreadsheets and daily degree-days accumulated for a variety of fruit pests for predicting hatch – see Fruit IPM website: http://comp.uark.edu/~dtjohnso/. In 2004, Exosex auto-confusion dispensers (Exosect Ltd., UK) with grape berry moth pheromone were evaluated for potential to disrupt mating of each generation of grape berry moth. In 2004, we attempted to improve effectiveness of Exosex dispensers by making two applications at a 60-day interval to control all generations during the season (3 to 4). An abandoned 10-acre 'Concord' vineyard in Springdale, Arkansas, was selected. We placed a rate of 10 dispensers per acre restricted to the perimeter vines to minimize perimeter mating of adults during first flight from early April to mid-May. Most adults lay eggs and presumable mate along the vineyard perimeter until mid May. The second application was also at 10 dispensers per acre but distributed evenly throughout the vineyard. On 27 July 2004, the percent fruit damage by grape berry moth in the conventionally sprayed vineyard was 4.6 (west edge), 2.0 (south edge), 2.3 (east edge), 13.7 (untreated north edge), 1.3 (200 ft interior) and 0% (360 ft interior). In comparison, the Exosex-GBM treated vineyard had percent damage of 6.3 (west edge), 13.2 (south edge), 5.7 (east edge), 11.7 (north) and

6.0 (200 ft interior), 0.6 (360 ft interior). More work is needed to determine why the Exosex system did not work against the grape berry moth.

Pest Management Effects on Arthropod Diversity. Joe Williamson completed his M.S. thesis titled, “Effects of grape berry moth management practices and landscape on arthropod diversity in grape vineyards in the southern United States” and the manuscript is accepted for publication (Williamson and Johnson 2004).

Green June Beetle (GJB) **and Japanese beetle** (JB) adults were found attracted to a new experimental lure called Mix-M (Trécé Incorporated, Adair, OK). In 2004 in NW Arkansas, adult JB flight occurred from 8 June to 20 August and adult GJB flew from 14 July to 20 August. The Mix-M lure was evaluated from 14 July to 20 August 2004 by placing a lure in each of five JB yellow vane traps spaced 100 m apart in a vineyard in Springdale AR. These five traps captured a season total of 391 JB adults per trap and 1002 GJB adults per trap. The number of JB captured with this lure was very low compared to the thousands being captured concurrently per day in the same vineyard in JB traps baited with the mixture of floral lure and sex pheromone. However, the Mix-M lure attracted both male and female GJB adults in numbers that may have potential to reduce the number of adults entering and attacking ripening fruit. Future research is planned to determine if this lure can reduce GJB levels entering fruit plantings below an economically damaging level.

Japanese beetle (JB) was first detected in Lowell and Fayetteville in 1997. By 2002, this beetle was defoliating grape vineyards in Lowell and the UA-Fayetteville farm. In Fayetteville, adults were captured in lure traps from17 June until mid August (2003) and 7 June to 20 August (2004). The week of 26 July, a second year of Japanese beetle damage assessments were made of all the plant cultivars on the University of Arkansas-Fayetteville farm (see Stewart et al. 2004). Two additional Japanese beetle studies were initiated in 2004. We compared feeding preference of grape leaves treated with serial dilutions of Surround (kaolin clay), a mixture called DE + cinnamon + white pepper (St. Gabriel Laboratories), Repel (garlic extract), Sucrose octanoate (sucrose + octanoic acid ester). The sucrose esters were isolated when researchers investigated the insecticidal properties of the leaf hairs on tobacco leaves. The active ingredient acts by dissolving the waxy protective coating (cuticle) of target pests, causing the insect or mite to dry out and die). In this test, only the 10X solution of the mixture of DE + cinnamon + white pepper appeared to significantly reduce the feeding by Japanese beetle adults compared to the other concentrations and compounds tested.

The Japanese beetle can be killed by several entomopathogenic organisms. For this study we concentrated on the bacteria, *Bacillus popilliae*, that is the causal agent of milky disease in Japanese beetle grubs. Presently, St. Gabriel Laboratories is commercially producing *B. popilliae* as a powder called Milky Spore. It is suggested that Milky Spore would work best for community-wide protection. However, most people think as individuals and find it is easier to apply pesticides to alleviate the Japanese beetle grub problem in their yard. Skadeland (1981) patented a system to disperse pathogens for pest control. His goal was to use a modified Japanese beetle trap to contaminate Japanese beetle adults with Milky Spore bacteria, but the utility of this system has yet to be demonstrated. Subsequently, Klein and Lacey (1999) conducted studies showing that JB attractant traps with an inoculation chamber did inoculate Japanese beetle adults with entomopathogenic fungi, *Metarhizium anisopliae* (Metschnikoff), and was autodisseminated to larval habitats (Lacey et al. 1995). It was proposed that we demonstrate the effectiveness of this system (an improvement over that described by Skadeland 1981) for disseminating Milky Spore to larval habitats. This approach is expected to result in a broader distribution of the bacteria at lower cost per area and infect larger numbers of larval Japanese beetle with bacteria than achieved by turf applications that are more localized and time-consuming. At this time, we are waiting to evaluate the efficacy by noting survival and mortality of potentially infested larvae that emerged in the terrariums where bacteria-inoculated adults oviposited.

Grants Funded:

Milky Spore effectiveness and autodissemination against Japanese beetle (JB) in Arkansas. St. Gabriel Laboratories.

Publications or Newsletters or Presentations:

Williamson, J. R. and D.T. Johnson. 2004. Effects of grape berry moth management practices and landscape on arthropod diversity in grape vineyards in the southern United States. HortTechnology (Accepted July 2004).

Johnson, D.T. 2004. History and management of Japanese beetle in Arkansas and Oklahoma. Proc. OK and AR Hort. Industries Show 23: 62-66.

Johnson, D.T. and C.R. Rom. 2004. Development of alternative pest control programs in fruit. Invited, Southern Fruit Fellowship at the Fruit Research Substation in Clarksville, AR (18 June).

Stewart, C., J. McKern, P. Stewart, E. Stafne, J. McAfee, B. Lewis, C. Rom, D. Johnson and J. Clark. 2004. Differences in defoliation and damage by Japanese beetle among various fruit genotypes. Meeting of S. Reg. Amer. Soc. Hort. Sci. (8 February).

Johnson, D.T. 2004. Grape pest biology and management. Invited consultant to give Grape Workshop in Greensboro, NC (14 February).

Johnson, D.T. 2004. Grape integrated pest management (2001-2003). Invited, White County grower meeting in Searcy, AR (6 April).