University of Nebraska Viticulture Program

August/September 2005 Volume VIII, Issue 4

Nebraska Vine Lines

Editors: Dr. Paul Read, Professor of Horticulture & Viticulture
Donna Michel, University of Nebraska Viticulture Program

Imad Dami to speak at November 5th Workshop

Dr. Dami has a strong research background in stress physiology, particularly the effects of cold temperatures on grapes.

Imed Dami is Assistant Professor, Department of Horticulture and Crop Science at Ohio State University, with research responsibilities in viticulture. Dr. Dami received his advanced education at Colorado State University and worked as a Viticulture Extension Associate at Virginia Polytechnic Institute and State University. He then became the state viticulture specialist at Southern Illinois University where he provided leadership associated with a very rapidly growing grape and wine industry.

Dr. Dami has a strong research background in stress physiology, particularly the negative impact of cold temperatures on grapes. The focus of his current research program is to improve vineyard management with the goal of improving wine quality.

Dr. Dami has conducted research on chemical and physical treatments for delaying bud break in the spring, thus reducing the likelihood of damage caused by late Spring cold temperatures. He will explain the physiology and anatomy of dormant grape buds and discuss strategies for avoidance of damage caused by frost and freeze events. There will also be a panel of growers sharing their experiences, successes and failures in trying to combat late spring frosts and freezes.

Cutting Edge Cultivars: A Report on the Eastern Region ASEV Meeting

By Paul E. Read, Professor

The 30th Annual Technical Meeting and Symposium of the Eastern Region of the American Society of Enology and Viticulture featured in-depth discussions, analyses and opinion about new cultivars, Pinot Gris and Missouri's number one cultivar, Norton (Cynthiana). Traminette was the first cultivar discussed, with detailed reports by Tony Wolf's research group (Virginia Tech) on the influence of training systems and rootstocks on yield parameters and wine sensory attributes. Traminette grown on Geneva Double Curtain and high cordon trellising systems exhibited overall better performance than other systems such as VSP. John Brahm of Arbor Hill Winery, Naples, NY, the first commercial winery to produce Traminette wines, presented his perspective on the potential of this important new cultivar. He has made it in semi-dry, dry and sweet styles, all of which have achieved significant acclaim. During tastings, several wineries' versions of Traminette were tasted, with **Cuthills Vineyards** Traminette (made with grapes grown by **Geo. Spencer Vineyards**) receiving accolades from attendees that tasted it. Although Pinot gris appears to not be sufficiently hardy for much of the Midwest and Nebraska, interestingly contrasting styles were presented by several speakers from Ohio and Michigan.

Norton/Cynthiana is the leading red winegrape grown in Missouri and was the subject of both the pre-symposium field trip to Stone Hill Vineyards and Adam Puchta Vineyards near Hermann, and of an entire morning of presentations and discussions relating to both viticulture and enology.

Keith Striegler, Mid-America Viticulture and Enology Center, presented "Positive and Challenging Attributes of Norton/Cynthiana in the Vineyard", and several speakers (Steve Menke, Pennsylvania State University, Gary Main, University of Arkansas; Dave Johnson, Stone Hill; Phillipe Daguisy, Crown Valley Winery, St. Genevieve, MO; and Jennifer McCloud, Chrysalis Vineyards, Middleburg, VA) discussed winemaking practices for this cultivar.

The last day featured presentations relating to Cold Hardy Cultivars. Peter Hemstad, Anna Katharine Mansfield and Bradley Beam discussed Minnesota cold-hardy cultivars and potential introductions. Of particular note were high-quality blush and port-style Frontenac wines, LaCrescent and Frontenac Gris

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Grape Crown Gall Biology and Strategies for Control

By Thomas J. Burr, Professor of Plant Pathology
New York State Agricultural Experiment Station, Cornell University

Crown gall is a disease of world wide importance on grape that is caused by a bacaterium *Agrobacterium vitis*. Crown gall occurs on many different fruit and ornamental crops, but in those cases it is caused by A. *tumefaciens*, a related bacterium. A. *vitis*, which is only found on grape, most commonly causes the development of galls at graft unions or on lower trunks and to a lesser extent on the cane.

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Cutting Edge Cultivars: A Report on the Eastern Region ASEV Meeting

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semi-sweet to sweet wines and a complex red wine made from MN1211. (Editor's note: Anna Katharine Mansfield will be a featured speaker at the 9th Annual Nebraska Winery and Grape Growers Forum and Trade Show March 3 and 4, 2006. Editor's second note: La Crescent and MN1211 have both performed well in University of Nebraska Viticulture Program trials.)

Winemaking challenges and techniques were also focused upon, including excellent discussions regarding yeast and malolactic fermentation, yeast supplements and aids, defects in wines, atypical aging and flavor chemistry. Terry Bates (NY) gave an excellent presentation on vine growth, root biomass and nutrient patterns (Terry will also be a featured speaker at the 9th Forum. For Nebraska grape growers that are looking for advice on fertilizers and grapevine nutrition, Dr. Bates' presentation should be of great value). "Eight years of Grapevine Cultivar Evaluation in Nebraska" was the title of a talk presented by Paul Read, University of Nebraska Viticulture Program, and Keith Striegler discussed rootstock effects on Vignoles in Ozark Mountain vineyards. (Dr. Read's presentation is now on the University of Nebraska Viticulture Program web-site).

During informal tastings, **Whiskey Run Creek Vineyards & Winery's** Edelweiss and Chambourcin received high acclaim. Semi-sweet Petite Amie and Brianna from **Cuthills Vineyards** were also given high marks.

Grape Crown Gall Biology

(continued from Page 1)

When young vines develop crown gall at their graft unions they often die, whereas older vines may show stress depending on the severity of the gall and will usually survive the infections. A. *vitis* lives internally in grapevines and can be isolated from bleeding sap; therefore it is frequently disseminated in apparently-healthy propagation material.

Galls are generally not observed on grape roots; however, the bacterium causes necrotic lesions on roots. Recently we also found that *A. vitis* can cause necrosis of the cambium in wounded woody canes, thereby preventing wound-healing and adversely affecting graft take. Further research to elucidate the potential negative effects of *A. vitis* at graft unions is underway.

Infections. The infection process of *Agrobacterium* represents the only known case of natural inter-kingdom transfer of DNA (bacterial DNA is transferred to and expressed in the plant). Thus crown gall infections can be considered a form of natural genetic engineering of plants. The infections are initiated at injury sites; on grapes, these are most commonly caused by freezing temperatures. Another common infection site is the graft union where that bacterium may cause galls, or completely prevent graft take, as mentioned above. Other types of wounds—such as those made from cultivation and during pruning—generally do not stimulate the development of crown gall. Wounds release chemicals (sugars and phenolics) that stimulate the crown gall infection process once they are detected by the bacterium. They cause the bacterium to migrate toward the wound where it attaches to the plant cells. The chemicals also trigger the expression of genes in *A. vitis* that are necessary for infection. Once *A. vitis* transfers a portion of its DNA (genes) to the plant, the genes encode enzymes that stimulate production of abnormal levels of plant hormones (auxin and cytokinin) that cause the plant cells to proliferate and form galls.

Wounding of plants probably plays another role by stimulating the development of plant cells, during wound healing, that are highly susceptible to infection by the pathogen. We are continuing research to identify specifically which cells in grape wounds become infected and the role of auxin in stimulating the development of the cells, during wound healing, that are highly susceptible to infection by the pathogen. We are continuing research to identify specifically which cells in grape wounds become infected and the role of auxin in stimulating the development of the cells.

Pathogen variability. Strains of *A. vitis* are variable with regard to their genome, including the number and types of pathogenicity genes they carry. Strains collected from commercial vineyards and from wild *V. riparia* vines collected in New York State were grouped based on genetic profiles. It was discovered that all of the strains isolated from wild *V. riparia* were non-gall forming types and appear to represent a separate group of the bacterium.

Sources of inoculum. Thus far, *A. vitis* has not been detected on plants other than grape, or in soils collected from sources other than vineyards. Once introduced to soil, however, the bacterium was found to survive for at least a two-year period on infested grape root debris. Grape roots are known to persist in soils for long periods after vines have been removed,

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Region IV Grape Growers - South Fork Vineyard

Western Nebraska Grape Harvest Workshop

Saturday, August 27, 2005

Registration: 7:30 am—MDT
8:00 am—2:00 PM MDT

Registration fee—$25 (includes lunch)

Members of NWGGA—$5.00

Pre-registration is required. Public is invited to attend—Guided tours will be available.

845 Road East D
Ogallala, NE—69153-4759

South off I-80 to Prospector Drive (First Service Road East) to Road D

Phone: 308-284-6394

E-mail: southfrk@megavision.com

(**Grape Crown Gall Biology and Strategies for Control—Continued from Page 2).**

and it is likely that *A. vitis* will persist with them. Although survival on root debris comprises a source of inoculum for infection of new vines, we believe that the most common and important means of introducing the pathogen to a vineyard is by carrying it along with new vines.

Control practices. Strategies for management of crown gall include water management, maintaining multiple trunks in crown gall-conducive vineyards, considering scion and rootstock susceptibility, obtaining "clean" plants when possible, and selection of sites that are not prone to winter injury. As mentioned above, injuries from cold temperatures stimulate the development of crown gall. The practice of multiple-trunking will not eliminate the bacterium from vines; however, it often allows a grower to establish trunks that do not develop crown gall and from which a crop can be produced. Obviously, if injury occurs yearly on trunks, they will get repeated crown gall infections and will not produce a suitable yield. Where possible, managing vine vigor through water management also affects crown gall. Vines in wet sites that grow vigorously late in the season will typically be more prone to injury and subsequently crown gall.

Because the bacterium can survive internally in cuttings, methods have been developed to index them for *A. vitis*. A standard method that we use involves callusing cuttings and then assaying the callus tissue for the pathogen. If A. *vitis* is present, it will multiply to levels in the callus that allow its detection on a selective culture medium. Isolated colonies are then characterized with antibodies (ELISA) and with other methods such as PCR. Although the methods to identify the bacterium are very accurate, it is difficult to know the sensitivity of indexing methods; i.e., how many bacteria in a cutting can be detected? If *A. vitis* is not detected in a cutting, we cannot be entirely certain that it is free of the pathogen. Research is continuing to improve the sensitivity of indexing methods. (continued on page 4).

Grape Crown Gall Biology (continued from Page 3)

Attempts have been made to produce *A. viti*s-free grapevines. One approach was to submerge grape cuttings in water at 50° - 52° C for 30 to 60 minutes. This treatment resulted in little or no bud injury if treatments were done in January and February, when they were fully dormant. Later treatments sometimes resulted in bud death or delayed bud growth. The treatments were shown to significantly reduce the levels of *A. vitis* in the cuttings, but even the higher temperature for 60 minutes did not eradicate all of the bacterium from the cuttings. Therefore, the procedures evaluated thus far are not recdommended as means of eliminating *A. vitis* from cuttings.

It is possible to produce *A. vitis*-free vines by initiating the plants from shoot-tips in tissue culture. It was determined that A. vitis is not present in tips of grape shoots and therefore vines propagated from them are free of the bacterium. Subsequently, such vines have been established in mother blocks in sites that were not previously planted to grapes. Vines in the mother blocks are being indexed yearly to determine if they remain free of *A. vitis*. Thus far this approach has been successful in three different test cases for providing sources of propagation material that are free of the pathogen. In another mother block that was planted immediately adjacent to a crown gall-infected vineyards, the bacterium could be detected in the mother block vines within four years. Therefore the bacterium can move from vine to vine possibly in water or by roots from different plants that come in contract with each other. Scion and rootstock cultivars should also be considered in the management of crown gall, as they differ in their susceptibility. In general, all *Vitis vinifera* cultivars are highly susceptible as compared to *V. labrusca* and hybrids. However, especially within the hybrids, the range of susceptibility can be quite great. Rootstocks also differ greatly in their susceptibility to crown gall. Highly resistant are Couderc 3309 and Mdgt 101-14, whereas more susceptible are Richter 110 and Teleki 5C. A general correlation can be made between the efficiency of rootstock callusing and their susceptibility to crown gall. As mentioned above, callus cells are highly conductive to infection and therefore these rootstocks are more susceptible to infection. Although scion and rootstock genotypes differ in susceptibility to crown gall, this does not necessarily mean that "resistant" cultivars are free of the bacterium. Previous studies indicated that resistant cultivars such as C3309 still harbor systemic populations of *A vitis*. Complicating the determination of cultivar susceptibility to *A. vitis* is the fact that different cultivars respond variably to different diverse strains of the pathogen. Such considerations must be taken into account when evaluating germplasm for susceptibility to crown gall.

There are no effective chemical controls for crown gall. Although antibiotics and copper bactericides are able to kill the bacteria on contact, they do not penetrate the vine and come in contact with bacteria residing systemically. Painting of galls with anti-bacterial mixtures may kill bacteria in the gall (and in some cases gall tissues) but will not eliminate the bacterium from the vine.

Biological control of crown gall on fruit and ornamental plants has been very effective, and commercial preparations of a non-pathogenic *Agrobacterim* (K84) are sold in many regions of the world. Unfortunately, K84 is not effective against *A. vitis* on grape. However, it has been shown that when a non-pathogenic strain of A. *vitis,* F2/5, is applied to wounded grape tissue in advance of gall-forming pathogen, crown gall is prevented. The mechanism by which F2/5 prevents crown gall is unknown. Two interesting points are: that it only inhibits crown gall on grape, and that it must arrive at the wounded grape tissue before the pathogen.

Although F2/5 has been shown to be highly effective for controlling crown gall in greenhouse experiments, its effectiveness has not yet been proven in the field. Several experiments are underway and in these cases vines are soaked in suspensions of F2/5 prior to planting. The objective is to allow F2/5 to colonize wound on the roots and crown and to ideally establish itself in the grapevine. Thus far, variable success in control of crown gall with F2/5 in the field has been noted.

The incidence of crown gall and its importance in vineyards throughout the U.S. appear to be on the increase. This trend seems to be occurring regardless of winter temperatures. Possible reasons may be related to new vineyards being established in many regions of the U.S. and the possibility that some sites are not environmentally suitable for growing certain cultivars or rootstocks. Other reasons for increased crown gall may have to do with vineyard (crop) management. Over-cropping can lead to vine stress and subsequent sensitivity to cold injury and thus crown gall. In California, the changing of rootstocks in recent years has influenced the number of samples expressing crown gall that have been sent to my laboratory. In almost every case, vines showing crown gall were grafted on highly-susceptible rootstocks.

Our work has been able to progress because of the continued support form the NY Wine and Grape Foundation, the Lake Erie Regional Grape Program, the NY Grape Production Research Fund, the USDA Viticultural Consortium East Program and various private sources.

Timely Tip: Crop Yield and Ripening

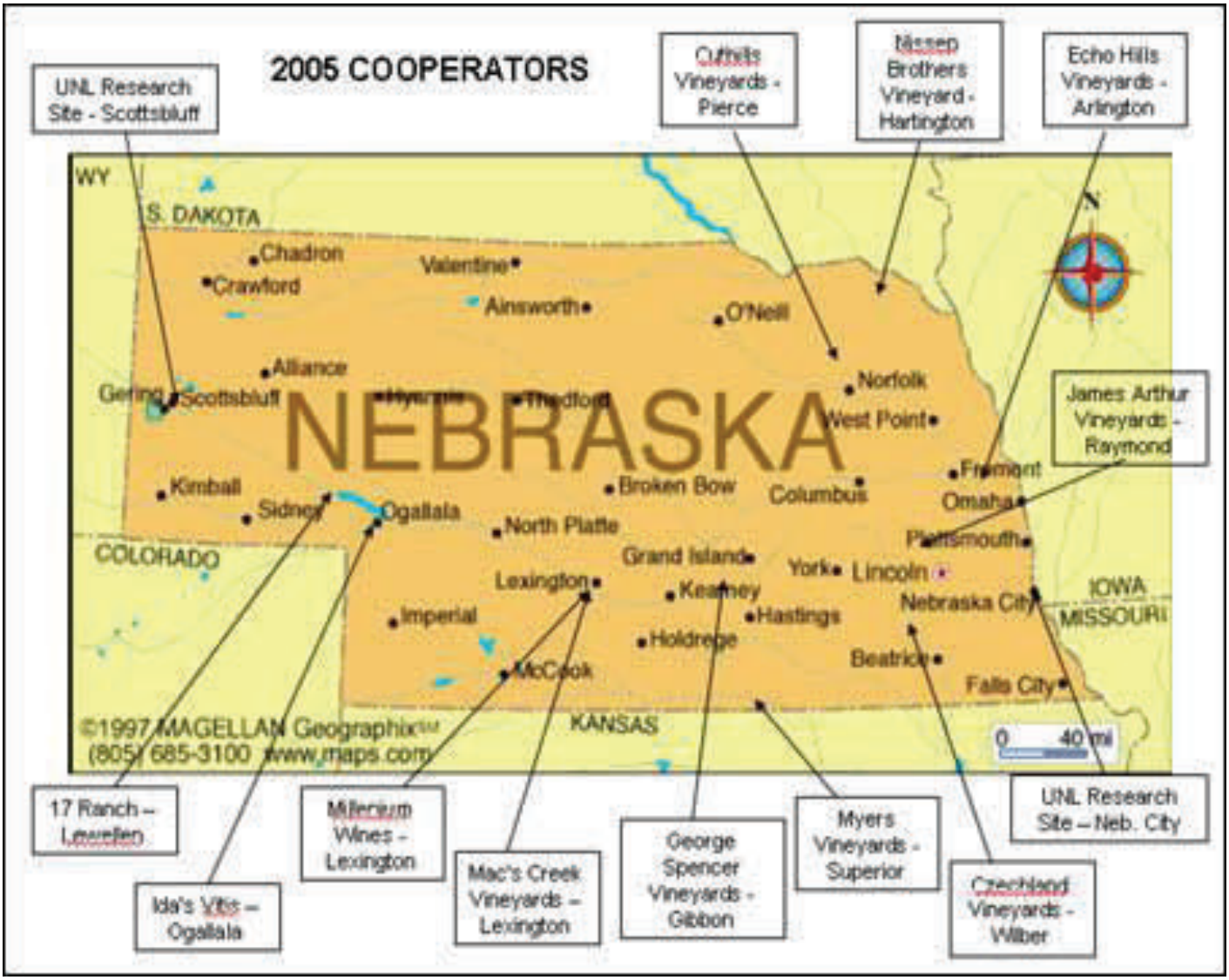
Grape berries reach their maximum weight at 18 to 20 Brix (depending on the variety). The weight than gradually declines as soluble solids increase. Decreases in berry weight are a function of variety, cultural practices (irrigation, nutrition, trellis system, etc.), and vineyard location. Generally, berry weight decreases 1% to 3% per point increase in Brix.

Interdisciplinary Research Program

Chelsey Wasem, Graduate Research Assistant, Entomology

As vineyard numbers increase in the state of Nebraska, the need for basic and applied research has also increased. An interdisciplinary research program was initiated last year to increase our understanding of the phenology (recurring life cycle stages) of grape cultivars and their associated insects and diseases. Thirteen cooperating vineyards across Nebraska were selected by researchers at University of Nebraska-Lincoln's Department of Entomology to assess insect presence and seasonal activity. Cooperators collected insect specimens, taking note of cultivar and percent feeding damage. For a complete list of insects, visit the Grape Entomology website at : http://entomology.unl.edu/public/viticulture/

Pheromone traps for grape berry moths, red-banded leafrollers, and Japanese beetles were set up to monitor the activity of these pests. Collected insects were returned to the Entomology Department at monthly intervals to identify and count insects present in cooperating vineyards. While no grape berry moths or Japanese beetles have been collected so far in the pheromone traps, red-banded leafroller catches have ranged from none to 150 per trap per month depending on location. We would like to thank these cooperators for the collections, observations, and being our eyes in the vineyards.



Register for the November 5, 2005 Workshop

Pre-registration for the November 5th Workshop on Cold Temperature Avoidance and Management will help us plan for lunch and assure you a place at this important workshop. Please send in the form found later in this issue.

You got mail!

Nebraska Vine Lines by E-mail

We now have the capability to send your copy of the Nebraska Vine Lines by e-mail. If you would like to receive the Nebraska Vine Lines by e-mail, please send your e-mail address to dmichel@unl.edu and say "electronic NVL please." We would like to encourage e-mail subscriptions in order to keep our costs down for the Nebraska Vine Lines. **IMPORTANT:** even though you may think that we have your e-mail address already, because e-mail addresses change frequently, you **MUST** send us your e-mail address again. Thanks for helping us reduce costs so that we may continue to

2005 Nebraska Grape Growers Survey

available on web site:

The 2005 Growers Survey compiled by the Nebraska Grape and Wine Board and funded by the Nebraska Department of Agriculture is now available on the NWGGA web site, www.nebraskawines.com.

Please take a few minutes to review the information as we had a great response rate from all of the Nebraska growers. This is the first time we have received enough data to give us a much better understanding of the cultivars that are planted and specific harvest data from previous years.

I want to thank all of you who took the time to complete this survey this last winter/spring. The information will help us better tell our story to the Nebraska legislature and the people in our fine state of Nebraska.

Eric Nelson

Nebraska Grape and Wine Board Chairperson

Be sure to put the 9th Annual Forum on your calendar:

March 3 and 4, 2006. Outstanding speakers, growers round-tables, local speakers and an outstanding trade show await you at the 9th Annual Nebraska Winery and GrapeGrowers Forum and Trade Show to be held at the Kearney Holiday Inn March 3 and 4, 2006.

Anna Katharine Mansfield, University of Minnesota Enology Project Leader will highlight the winery and winemaking sessions, providing insights into the characteristics of new grape cultivars and techniques that enable top-quality wines to be produced from them. Are you a grower that has questions about grape nutrition, fertilizer practices and the relationships of root growth to canopy growth and management? If so, the 9th Forum's Advanced Viticulture sessions featuring Dr. Terry Bates, Cornell University, will help you get to the "root" of the problem. Local growers will weigh in by sharing their techniques and experiences and a special session will help beginning growers to focus on problems associated with vineyard establishment and management of young vineyards. Again, experiences of the Nebraska growers and the University of Nebraska Viticulture Program will be shared with participants.

"The Constitution only gives people the right to pursue happiness.. You have to catch it yourself." —Ben Franklin

It is, of course, entirely possible to cook without using wine. It is also possible to wear suits and dresses made out of gunnysacks, but who wants to?"

—Morrison Wood,
With a jug of wine

Multi-colored Asian Lady Beetles: Good guys with some bad habits

Dr. Frederick Baxendale,
Extension Specialist, Entomology

Multi-colored Asian lady beetles are voracious predators on a wide array of insect and mite pests. The beetles are native to Asia and were introduced into the US between 1978-1982 for the purpose of biologically controlling pecan aphids. Unfortunately, they invade homes, bite, and can taint your wine. Crushed beetles release defensive secretions into juice and give wine a musty aroma and flavor. As few as 2-24 beetles per lug of grapes can be detected in wine (Aurora).

Observe beetle activity throughout the growing season. At harvest, vines can be vigorously shaken to dislodge the beetles. Infested clusters should be avoided when harvesting. If needed, apply products with some repellency such as Neem, Camphor and Menthol. Use insecticides with short post harvest intervals (PHI) (e.g., Provado, Neem or pyrethroid-based products). Remember, MALB are our 'friends' most of the time!

Apple Flea Beetles found in Ogallala

By: Chelsey Wasem, Graduate Research Assistant, Entomology
University of Nebraska-Lincoln

Several apple flea beetles (*Haltica foliaceae*) were found at Ida's Vitis, Gamet family vineyard in Ogallala, NE.

These flea beetles chew small "shot holes" in foliage of grapes, as well as evening primrose and crabapples. Flea beetles are small, 3/16", and often shiny metallic dark green in color. They have enlarged hind legs and can jump much like a flea. Flea beetles overwinter as adults in leaves and soil litter. They are active in mid-spring through early summer. Flea beetles can be controlled by cultural methods including cleaning up leaves and soil litter, and maintaining general sanitation practices in the vineyard.

Picture courtesy of Jim Kalisch, Department of Enomology

Insect Spotlight: Grape Phylloxera

Grape phylloxera are aphid-like insects that cause galls on the roots and foliage of grapes. Only roots of European varieties, *Vitis vinifera* L., are susceptible to root damage. To prevent vine loses from phylloxera damaged roots, grape cultivars are grafted onto resistant American rootstocks. Only the leaf form of phylloxera damage are found in vineyards with resistant rootstocks.

Pruning equipment, tires, and shoes can transport crawlers, so sanitation is the best method of reducing phylloxera from spreading through the vineyard. Infestations of foliar phylloxera must reach very high levels before grape yields are affected.

Grape phylloxera have a complex life cycle with both sexual and asexual forms. They overwinter as eggs under bark of trunks and older canes, or as nymphs on roots. In the spring, a stem mother emerges from the egg, begins feeding on shoot tips, and initiates gall formation on the underside of leaves. The female becomes enclosed in the gall where she asexually produces several hundred eggs. Crawlers emerge, leave the gall, and feed on nearby shoot tips initiating new gall formation. There can be three to five generations of the foliar feeding phylloxera each season. Some crawlers move to the soil to feed on roots, but do not produce galls and cause little or no injury. Male and female winged adults emerge from the soil. After mating, females produce eggs which overwinter.

The insert on the photo reveals the eggs of the female. If you look close you can see the phylloxera.

Photos courtesy of Jim Schild, Scottsbluff County Extension Educator.

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REMEMBER—Future Forums

2006—March 3 and 4—Holiday Inn, Kearney, NE
2007—March 2 and 3—Holiday Inn, Kearney, NE
2008—February 29 and March 1—Holiday Inn, Kearney, NE

November 5, 2005—Fall GrapeGrowers Workshop
University of Nebraska Viticulture Program

East Campus Student Union—Lincoln, NE

REGISTRATION FORM
FALL GRAPE GROWERS WORKSHOP
East Campus Student Union—University of Nebraska
Lincoln, NE

November 5, 2005

Name_____ $49.00

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(Additional attendee)

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