OSU Wine and Grape Research and Extension Newsletter

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Welcome to the August 2008 Newsletter!

Welcome to the summer 2008 Newsletter! In this issue, our group of winegrape researchers throughout the state has comprised a summary of the statewide incidence and damage caused by Short Shoot Syndrome and mites over the past few years. Be sure to check this out as it provides some interesting information! Also, a vineyard update has been included in this issue regarding the cool spring and mention of some vineyard observations due to the cool weather. We are full swing into the season and have been on the go conducting research trials and organizing educational events through Extension. There are a number of field tours that will be organized for later this summer, so please check out the Upcoming Events section. Finally, as we wrapped up another academic year, we wanted to recognize OSU students that are currently working in the winegrape industry.

Cheers,

~The OSU Winegrape Team

New Source of Enology Information

James Osborne, Ph.D., Enology Extension Specialit

Announcing the development of a new source for Enology information, the 'EnologyAccess.org' website. This organization is comprised of enological research institutions from around the globe including Oregon State University, UC Davis, Cornell, Washington State University, University of Bordeaux, University of Adelaide, and Stellenbosch University. It is intended to serve as a repository of enological research knowledge generated from all aspects of winemaking. The Launch date is scheduled for August 23, 2008 with the first 'Webinar', "A Technical Guide to the Adams/Harberston Tannin Assay" featuring Dr Jim Harberston, being offered August 27th. However you can go to the website now and register for FREE membership at the Registration Page. This will ensure that you will be notified of upcoming events and receive an invitation to participate in the first webinar. This is the beginning of what I believe will be a very valuable tool involving national and international collaboration.

Notes from the Vineyard

Patty Skinkis, Ph.D., Viticulture Extension Specialist

This spring was looking pretty bleak with the cold temperatures and a slow start to the growing season. I was really hoping for a stellar year in 2008 after beginning here at OSU in 2007 with one of the industry's most challenging years in the past decade. The cold weather lead to a delay in bud break at nearly 3 weeks later than in previous years in many areas of the state.

The cool spring that held out through the first half of June also lead to some minor but notable developmental problems, the vines simply couldn't grow very rapidly in these conditions. As a result, there were some relatively widespread occurrences of boron toxicity throughout the Willamette Valley. Lower leaves of the vine exhibited the toxicity levels while new growth at shoot tips was healthy. This toxicity levels appear localized and should not be detrimental to the overall growth of the vine this season. Also, vines experienced shorter shoot lengths than in previous years by the time the vines reached bloom. Further evidence that the vines wanted to grow more surface area under this cool weather was the occurrence of laterals beginning to push on vines that were not yet hedged or to the top of the trellis wire. The final observation for spring 2008 was the widespread cane borer problem in the Willamette Valley where many

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The deformed leaves above are evidence of boron toxicity on basal leaves. Note the distal leaves and others appear normal, indicating a localized toxicity.

vineyards became host to many more of these pesky invaders.

As the weather began to turn warmer later in June, bloom commenced although a bit later than in pervious years. The good news in most areas is that bloom proceeded smoothly. While many vineyards in 2007 exhibited a relatively long bloom period on the order of weeks, vineyards in 2008 experienced bloom from 10-80% cap fall within several days! This turn of events may lead to a good year for fruit set!

Here's to hoping for a long, warm Indian Summer!

OSU's Viticulture and Enology Degree Program Update

Patty Skinkis, Ph.D., Viticulture Extension Specialist

This spring 2008 marked the 6th year of the OSU undergraduate program in Viticulture and Enology. Students that have gone through the program have been successful in developing their education and starting into new career in the winegrape industry. In June, several students graduated from the OSU Viticulture and Enology Program and will soon begin their new careers. Our continuing students are involved in internships throughout Oregon and California:

June 2008 Graduates

- Jared Etzel — Assistant Winemaker, Fisher Family Vineyard, Santa Rosa, CA
- Mike Etzel — Assistant Vineyard Manager, Willakenzie Estate, Yamhill, OR
- Mitch Ridge — Crush Intern, King Estate, Eugene, OR
- Jeff Rowe, MS — 12th & Maple Wine Company, Dundee, OR
- Bryan Weil — Enologist, Hogue Cellars, Prosser, WA

Continuing E&V students

- Alex Nichols — Student Research Tech, USDA-ARS, Corvallis Vine Nutrition
- Tara Ambrose — Intern, King Estate, Eugene, OR
- Nick Caputo — Intern, Coehlo Winery, Amity, OR

OSU Fermentation Science Students at Gallo

- Corey Zschoche — Full time position, fermentations
- Chad Clausen — Intern, research winery
- Zach Wiegand — Intern
- James Winther — Intern, experimental pilot plant

Grape must nitrogen content and fermentation

James Osborne, Ph.D., Enology Extension Specialit

Grape must nutrient content can have a profound effect on the composition of a wine and ultimately overall wine quality. One of the most important nutrients in this regard is nitrogen. Yeast growth, fermentation kinetics, and flavor production can all be influenced by the nitrogen status of the must with insufficient nitrogen being a leading cause of stuck fermentations and elevated H_2S production (see Fall 2007 newsletter http://wine.oregonstate.edu/files/files/VitNewsletterOct07WebVersion.pdf). In addition, low nitrogen levels in a grape must can often indicate low levels of other essential nutrients such as the vitamins pantothenic acid and thiamin. These vitamins are also essential for a healthy fermentation with low pantothenic acid being linked to H_2S production while thiamin is a vitamin essential for yeast growth. For this reason the nitrogen content of a grape must is an important variable to consider as you seek to minimize potential fermentation problems.

The primary organic nitrogen source in grapes is the amino acids while the major inorganic source is ammonium (NH_4^+). While these forms make up the bulk of nitrogen in the grape (excluding grape proteins and peptides) not all of the amino acids are able to be utilized by the yeast come fermentation time. In particular, the amino acid proline (one of the most abundant amino acids in grapes) is not utilized by the wine yeast Saccharomyces cerevisiae to any great extent under fermentation conditions. In addition, grape proteins are not usually utilized by the wine yeast either. Therefore, the usable nitrogen fraction is often referred to as yeast available nitrogen (YAN) and is of more significance than total nitrogen content when considering the nutrient status of your juice/must. YAN is composed of the yeast available amino acids plus NH_4^+. The recommended levels of YAN in a grape must to have a successful fermentation (all things considered) are between 140-200 mg/L for a 21°Brix must and between 250-300 mg/L for a 25°Brix must. These are not hard and fast rules as many people may have no problems fermenting juice with much lower YAN levels then these. But these YAN levels have been found by researchers to result in fermentations with good kinetics and minimal H_2S production. Also remember that not all yeast strains are created equal so be careful when using a yeast strain that has a high nutrient requirement.

The two most common methods used to measure YAN are the NOPA assay (in combination with ammonium analysis), and formol titration. For the NOPA test, a chemical reaction between free amino acids (this excludes proline in particular) and a reagent (the NOPA reagent) results in a color change that can be measured in a spectrophotometer. This color change is used to calculate the free amino acid content (FAN) that is then combined with the ammonium concentration (quantified using an enzymatic assay) to give the YAN content of the juice. Formol titration involves titrating the sample with formaldehyde. Formaldehyde is a carcinogenic substance and

therefore this method is more suited to well equipped labs with experienced analysts. Both of these methods will give you relatively accurate information regarding the YAN level of your juice/must and allow better informed nutrient management decisions to be made.

Nitrogen amendments at the winery usually involve the use of diammonium phosphate (DAP) or more recently, commercial preparations of organic nitrogen that contain inactivated yeast or yeast products. These commercial products usually also contain vitamins and lipids for yeast growth that DAP alone will not supply. One thing worth mentioning regarding nutrient additions is the impact of adding too much nitrogen or other nutrients. Much is known about the consequences of low YAN (stuck ferments, H_2S, UTA issues) but some recent research has shown how high nitrogen content of a grape must can impact the production of flavor and aroma compounds by the yeast. High YAN musts tended to have increased amounts of ethyl acetate (nail polish remover), acetic acid, and decreased higher alcohols. There is also some evidence that the type of nitrogen present in the must can impact yeast flavor production. For example, nitrogen from amino acids versus nitrogen from DAP may impact production of certain flavor and aroma compounds differently. So the nitrogen content of your must can influence the flavor and aroma profile of your wine. This is another reason why measuring YAN content of your must and only making appropriate amendments is important.

The fruit YAN level can also be influenced by numerous factors in the vineyard including varieties and/or rootstock, climate, soil, season, and nitrogen supplementation. Some grape varieties, such as Merlot or Syrah, naturally have lower berry nitrogen content than other varieties such as Sauvignon blanc or Pinot noir. Of course, given the right set of circumstances all grape varieties have the potential to produce grapes with low nitrogen content. In particular, seasonal variations and vineyard management can have a major impact on the nitrogen content of the grape. When we consider the changes of nitrogen compounds in a grape berry over time we see that from véraison onward ammonium decreases, while amino acid concentrations increase. However, as extended ripening occurs there is a reduction in YAN that may lead to insufficient YAN concentrations in fruit that has seen extended 'hang-time'. What also occurs is that close to harvest the concentration of arginine (an important source of YAN) decreases or plateaus while the concentration of proline (an amino acid the yeast cannot utilize) increases. Therefore, the total nitrogen content of the berry may remain unchanged but the nitrogen composition of berry has changed resulting in a decrease in YAN. In particular, high proline grape musts are often associated with increased maturity and increased vine stress, particularly moisture stress.

The nitrogen content of the grape has been shown to be influenced by nitrogen supplementation in the vineyard. However, the numerous studies investigating the specifics of this process have resulted in conflicting conclusions. This is partly because of the complexity of nitrogen utilization in the grape vine. The grapevine utilizes nitrogen in numerous different ways including vegetative growth. Numerous other factors such as vine vigor canopy density, petiole nitrogen, and soil moisture, also need to be kept in mind when assessing nitrogen amendments in the vineyard. For example nitrogen addition to a vine with high nitrogen status could result in increased vegetative growth instead of increased grape YAN levels. YAN levels also tend to be lower during dry years where water stress may result in less nitrogen uptake by the vine while over cropping can also result in low juice/must YAN levels.

Wet years when there is a high incidence of rot will also lead to decreased YAN in you juice/must as *Botrytis* will consume large amounts of nitrogen as well as essential vitamins such as thiamin. Therefore, consider nutrient additions (not just DAP as this will not replace the vitamins) in years where there are rot issues. Microbial spoilage by microbes such as *Kloeckera* and *Lactobacillus* can also lead to nutrient deficiencies and in particular thiamin deficiency. In addition, other processing practices can also impact YAN. The process of saignee can result in low YAN in the bleed-off juice. This is because there is a higher concentration of arginine in the grape skin then the pulp while proline is more abundant in the pulp. Therefore, juice bleed-off during this process and used to make a Rose wine can cause fermentation problems due to low YAN levels.

So in summary, the nitrogen content of a grape juice/must can influence the performance of the alcoholic fermentation as well as the production of certain aroma and flavor compounds. Low YAN can result in stuck fermentations, H_2S production, and UTA characteristics. High YAN can result in rapid high temperature ferments, and increased production of ethyl acetate and acetic acid. The key to good management of YAN levels is to monitor it both in the vineyard, especially in low fertility sites, but also in the winery as the fruit is arriving so that appropriate amendments can be made. If the busyness of crush makes this impractical, freezing samples and measuring the YAN at a later date when time allows can still yield valuable information. This data may give you some historical perspective on the nutrient status of certain blocks in a given season. However, given the seasonal and regional differences that exist in Oregon, relying on previous year's data to make management decisions regarding nitrogen can be risky versus real-time monitoring of the current year.

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Survey of The Incidence of Rust mites and 'Short Shoot Syndrome' in Oregon

Vaughn Walton, Patty Skinkis, Amy Dreves, Steve Renquist, Rick Hilton, Steve Castagnoli, Clive Kaiser, Marcus Buchanan

Introduction

This research is being conducted to determine the incidence of a vineyard problem known as "Short Shoot Syndrome" (SSS) in Oregon. Numerous vineyards have this problem in the Willamette Valley. However, until recently, little knowledge was available on the incidence of mite-associated SSS.

Growers throughout the state were asked to participate in the study include collecting data through a questionnaire on the perception of the incidence of the problem, vineyard management practices (organic/biodynamic/sustainable, cover crops, spray program, etc.), mite/pest "hot spots" in the vineyard, and acreage effected. In addition, approximately ten percent of the state's vineyards were randomly selected and plant material collected for laboratory inspection of eriophyid mite incidence and mite-associated SSS symptoms.

Vineyards in the Willamette Valley have been identified to have symptoms described as 'Short Shoot Syndrome' where early season growth is stunted leading to leaf, shoot and cluster deformation. In severe cases, shoot abscission and cluster abortion occurs causing considerable crop loss. This damage is thought to be caused by bud and rust mite feeding on leaf and flower primoridia in the buds or on young tissues (Bernard et. al. 2005). This problem began to emerge as early as 2001 in Oregon but has been reported to have existed for more than 10 years and more recently in Washington (Walton et. al. 2006). Reports of similar symptoms were made from Sonoma and Monterey in California during March 2008. Results of a 2006-2007 study indicate a strong correlation of rust mite infestation with characteristic symptoms (Walton et. al. 2007). Crop losses of 10-80 percent have occurred in Washington's Walla Walla Valley vineyards due to rust mite infestations (Prischmann and James 2005). An awareness of the severity of the problem in Oregon is necessary to justify research and identify possible trends in location, infestation and severity.

Methods

SSS Industry Survey: During the summer and fall of 2007, a questionnaire was developed and distributed to the industry to determine the impacts of SSS throughout the state. Industry members were contacted through the help of OSU Viticulture Extension and Oregon Wine Board email lists of industry members. Questions were asked regarding incidence location, severity of symptoms, affected cultivars and perceived crop losses. Growers were also asked about the control methods, timing and compounds used for the mitigation of SSS.

Vineyard Plant Material and Crop Loss Survey: A statewide grower database (obtained from the Oregon Wine Board and the OSU Viticulture Extension Program) was used in order to select representative geographical grape-growing areas. All areas were systematically sampled with OSU county extension agents and grower collaboration. A proportional quantity of plant materials were collected from farms in each of the major grape growing areas of Oregon. Plant materials were collected from late-dormant cane prunings between January and April during 2007 and 2008. A minimum of forty canes per 1-3 acre vineyard block were collected from each participating vineyard throughout the different grape growing regions of the state. Dormant vine cuttings were collected with a systematic sampling system, forcing the sampler to collect canes throughout the entire sample block. Collected canes were between three and twelve inches in length, each containing a minimum of three internodes. Plant material from each block was placed into sealed plastic bags and cooled containers, marked and shipped to the laboratory for further investigation under dissecting microscopes. On each collected cane, one viable basal bud was dissected and the incidence of eriophyid mites, and mite-related SSS recorded.

Approximately ten percent of the total wine-grape acreage in Oregon were selected for investigation of 'Short Shoot Syndrome' (ca.1800 acres) symptoms. Within this acreage, we attempted to survey approximately ten percent of a given vineyard site. During the two seasons canes was collected from 100 farms (4,000 canes total) with a total of 180-200 acres being assessed.

Crop loss assessments were conducted in vineyards that exhibited eriophyid mite incidence and mite-related SSS during ripening (September 2006, 2007 and planned during August through September 2008). A ranking system was used to determine percentage crop loss using a central-systematic sampling system in order to survey entire blocks. Damage was assessed on whole vines on each of five vines in a section (bay) using the method described in Walton et. al. 2007.

Results and Discussion

SSS Industry Survey. A total of 70 respondents reported on this survey. Of this group, 45 percent observed symptoms of SSS or mite damage in 2007 while 55 percent had reported that they never had these symptoms in their vineyards. The vast majority of those that have experienced SSS, were located in the north Willamette Valley. Respondents noted that the disorder has been seen since 2000 but has become progressively more pronounced up to 2007. Twenty three percent of the respondents have experienced this problem for more than 5 years. In many cases, vineyard record keeping for this specific problem did not occur in vineyards prior to 2005, after which there was increased awareness 2007 with the onslaught of OSU research and Extension education of this problem.

Symptoms and Severity. According to the results of the online survey, the vineyard acreage affected was less than 5 percent (< 10 acres). The symptoms are not linked to any specific cultivar or clone, and varieties being grown throughout the state have been identified to have symptoms, including Pinot noir, Pinot gris, Chardonnay, Merlot, Tempranillo and Cabernet sauvignon. Symptoms were observed more often in irregular patterns and not in specific blocks for 70% of those who have reported observing the symptoms of SSS

but there was a general agreement that certain blocks seemed more vulnerable than others, having observed the symptoms more than once in these areas. Crop losses due to this disorder were variable and are shown in Figure 2. One third of the respondents had no crop loss, and 20 percent had reported significant crop losses of 25 percent or more. This suggests that crop losses are likely related to severity of infestation and symptoms. The maximum level of crop loss reported was 50%.

Mite Control Methods. Growers that experienced SSS were asked about their management methods of eriophyid mite populations early in the season. Control methods are shown for 2007 (Figure 3) and in years past (Figure 4). In 2007, many growers found early season sulfur sprays, applied at woolly bud to be beneficial in controlling mite populations. There was an increase in the use of early season sulfur sprays in 2007 than in the previous years with better timing and the combination of 2 sprays rather than a single application in previous years. The rate of application reported ranged from 3 – 8 lb/acre. Also, many indicated pre-bud break sulfur or lime sulfur use to control mites.

Vineyard Plant Material and Crop Loss Survey: Newest records indicate that the total known area under wine grape production in Oregon is approx. 17,400 acres (Table 1, Figure 1). The majority of grape production is in Yamhill, Polk, Washington, Marion, Jackson, Lane and Douglas counties, each containing between 5 and 32 % (total 85%) of the total acreage (Table 1). Materials were collected from approximately 10% of all farms involved in the study. Eriophyids and mite-related SSS were found in eight of the fourteen counties that were surveyed. Mite-related SSS were found in all vineyards where eriophyids were present. The three biggest wine producing counties,Yamhill, Polk and Washington Counties, showed SSS and eriophyid mite incidence on 40-50% of the sampled materials. Counties where no mite presence and symptoms were yet found include Jackson, Lane, Clackamas and Wasco.

Symptoms and crop losses were found in all vineyards where mites were present (Table 2). Typically no symptoms or crop losses were found in vineyards where mites were absent. Records of crop losses were found in all counties where mites and SSS were present in the sampling years of 2006 and 2007. Crop loss assessments will be made in Hood River, Josephine and Jackson counties during August - September 2008.

Results of the physical survey suggest that SSS is found through the wine industry in Oregon as a whole with impact on vine architecture and crop loss. However, the majority of incidences are in the Willamette Valley. Reports of damage were also made from vineyards in Napa, Sonoma and Monterey counties in California. Data from our research during 2006-2008 show that mites and related symptoms appear for no apparent reason in a vineyard block, which was confirmed by 70% growers in the Industry Survey. Over years, mite numbers and symptoms gradually become less and eventually totally disappear after the third to fourth season. Research on the control of mite numbers during the woolly bud stage showed a marked impact on mite numbers resulting in lower numbers, symptoms, and thus crop losses. The current recommendation is 1-2 wooly bud sprays of registered pesticides in order to mitigate mite numbers and crop damage levels. While we have identified the correlation of rust mites to the symptoms of "short shoot," we are still uncertain of the causes of these outbreaks. This is a topic of further investigation. In order to do so, we have focused our current research on the seasonal biology of mite populations in vineyards, optimizing chemical control and optimizing biological control agent conservation through the use of alternative fungicide spray programs. Additional work should be conducted to determine vine physiology implications that may be playing into infestation as well as persistence of this problem.

click here for tables & graphs

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Upcoming Educational Opportunities and Events

Southern Oregon Annual Vineyard Tour and Annual BBQ
July 31, 2008
8:00 AM – 5:00 PM

An annual tour of regional vineyards will be held to observe and discuss practices, problems, solutions, and innovations! Area vineyard managers and a group of Oregon State University faculty will be joining the tour to discuss management in the vineyard. Registration if FREE! Following the tour, the Rogue Valley Winegrower's Association Annual Industry BBQ will be held at Del Rio Vineyards. For more information, please see: http://hort.oregonstate.edu/ViticultureWorkshops.

Columbia Gorge Vineyard Field Day 2008
August 5, 2008
12:30 – 5:00 PM

Join us for a field day in the Columbia Gorge, visiting vineyards in Oregon and Washington near Hood River and White Salmon. Vineyard visits will feature observations and discussion on general vineyard management, pest and disease management and other hot topics in viticulture. Area vineyard managers and a group of Oregon State University faculty will be joining the tour to discuss problems and management in the vineyard and the winery. Registration if FREE! For more information and to register for this event online, go to: http://hort.oregonstate.edu/ViticultureWorkshops.

Vineyard Practicum
August 23-24 2008

A tour of vineyards in Southern Willamette Valley and Southern Oregon will give participants a closer look at the practical vineyard management. This is a session for students of the undergraduate and graduate degree programs in Viticulture and Enology at OSU but is open to those who are beginners in the industry. For more information and registration, stay tuned by visiting: http://hort.oregonstate.edu/ViticultureWorkshops. Space is limited.

Grape Maturity Workshop
September 19, 2008
9:00 AM – 4:00 PM

A hands-on workshop will cover sampling and testing protocols for evaluating winegrape maturity as a tool for making harvest decisions. This will include vineyard observations, cluster and berry sampling, sample preparation, analysis procedures for soluble solids (sugars), titratable acidity, pH, and sensory evaluation and how to make adjustments to the vintage. Instructors: Barney Watson and Al Mac Donald, Chemeketa's Vineyard Management/Winemaking Program and Patty Skinkis and James Osborne, OSU Viticulture and Enology Extension. Register early – space is limited! For more information, see http://www.chemek.cc.or.us/aboutus/locations/eola/news.html.

Vine Ventures Workshop – Central Oregon
September 6, 2008

Is grape growing possible in Central Oregon? This will be the focus of an informative workshop on the basics of site evaluation and general viticulture for the difficult growing areas of central Oregon. Mark your calendar for this event; time and location information will be forthcoming. Stay tuned by visiting http://wine.oregonstate.edu/event.