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## Sugar Accumulation Disorder Affecting Several Vineyards

There's nothing like tending a nice crop of grapes all season, only to watch a portion of them shrivel and having to drop them before harvest. Berry shrivel has been a malady of some vineyards throughout the West Coast for many years. Several shrivel disorders may occur, and berries of each have a distinct appearance when examined closely (see the Hansen, 2013 reference).

Sunburn occurs with insufficient leaf cover on the west or south side only.

Late season shrivel occurs just before commercial harvest, likely as water moves back into the vine from the berries, especially with delayed harvest. The rachis (the stem structure of a cluster) is healthy with this disorder. Late season shrivel may be especially pronounced in Syrah grapes.

Bunch stem necrosis, also known as waterberry, initially causes black spots on pedicels (branches of the rachis that attach to berries) but often is not noticed until the entire rachis dies. It is especially prevalent in

Cabernet Sauvignon in the North Coast. It usually causes increased sugar concentration in the berries.

Sugar accumulation disorder (SAD; formerly called berry shrivel) is the most common form of shrivel. SAD causes poor berry coloration and low sugar accumulation, and is triggered after veraison. It was named sour shrivel (Suppression Of Uniform Ripening) by Dr. Bhaskar Bondada of Washington State University, which also describes the taste of SAD-affected berries. SAD fruit typically have lower pH, berry weight, and Brix compared to normally developing fruit. Berries may contain up to 70-80% less sugar than healthy berries and are often shriveled. Unlike bunch stem necrosis, the rachis remains healthy. With both diseases, berries near the cluster tips are often more affected than berries at the stem end.

SAD occurs in many wine grape varieties, both red and white. No consistent patterns are discernible in a vineyard or a vine. In

some vineyards, the whole vine may be affected, with some clusters shriveled and others not shriveled but having lower sugar and pH. In other cases, normal clusters on SAD vines may be healthy with normal sugar and pH levels. Vines affected in one year may or may not be affected the next year. Damage can range from 5% of vines to 25% or more in a given year. No pathogen has been identified, although it is possible that a pathogen may be involved. University of California experiments found that healthy buds grafted onto SAD vines developed SAD fruit; also, SAD was able to spread from grafted buds to affect an entire vine.

The causes of SAD and bunch stem necrosis are not fully understood. Studies have shown that both disorders are likely associated with death of phloem tissues in the rachis that prevents water and sugar transport into the berries, and there may be a gradual transition between the two disorders. With bunch stem necrosis, necrotic lesions result in reduced water and sugar transport into the berries. With SAD, transport is also reduced, but without the rachis dying.

No methods for control of SAD or bunch stem necrosis have been developed. A UC

study showed that neither crop thinning at fruit set nor thinning the greenest clusters at veraison reduced SAD. The only strategy recommended at this time is to monitor vineyards with a history of SAD before harvest and drop affected clusters. Field studies involving Gallo and UC researchers are currently underway near Clarksburg.

## References

- Bondada, B. 2015. Sour shrivel management: Are we there yet? [Part 1](#) and [Part 2](#). PowerPoint presentation at Napa Grape Growers Sustainable Viticulture Seminar, May 6, 2015.
- Hall, G.E., B.R. Bondada, and M. Keller. 2010. [Loss of rachis cell viability is associated with ripening disorders in grapes](#). Journal of Experimental Botany 62(3): 1145-53.
- Hansen, M. 2013. [An expensive disorder](#). Good Fruit Grower. Feb. 15, 2013, p. 24-25.
- Krasnow, M., M.A. Matthews, R.J. Smith, J. Benz, E. Weber, and K.A. Shackel. 2010. [Distinctive symptoms differentiate four common types of berry shrivel disorder in grape](#). Calif. Agric. 64(3): 155-159.

## Stunting Disorder of Young Vineyards

This spring, a new disorder of second-year vineyards occurred in some Sacramento and San Joaquin County vineyards that were planted in mid-season 2014. The newly planted vines appeared healthy in 2014, but a large proportion of them failed to push or grow well in spring 2015. There was no commonality in the variety, rootstock, soil, or herbicide spray program. Vines from two Sacramento County vineyards were taken to Doug Gubler (UCD Plant Pathology). *Cylindrocarpon* spp., some of which cause

[black foot disease](#), were found but in low amounts – not high enough to cause disease.

Some have theorized that a cold weather event in winter or early spring may have led to this problem, with the plants inside the vine protectors somehow experiencing unusually low temperatures at a time when they were highly susceptible. Or perhaps the vines hadn't gone fully dormant by late fall and suffered cold injury. In any case, generally the vines have begun growing normally in May. If you have a hypothesis about the cause of this disorder, please let me know.

## Sunrise Pear Looks Promising

The 2015 fire blight epidemic year has provided a unique opportunity to evaluate pear varieties for blight susceptibility. The variety trial in Walnut Grove was established in 2010 in a commercial orchard planted at the same time. General characteristics of the varieties evaluated are described below, followed by observations from the trial.

Sunrise, released by USDA in 2006 as a blight-resistant cultivar, ripens early, before Bartlett and close to Starkrimson. It has light green skin (yellow when ripe) with a pink or red blush and little russetting. Evaluations by UCCE pomology advisor Rachel Elkins and USDA-ARS researchers have shown excellent overall consumer acceptance in comparison with existing commercial varieties. For more information on Sunrise, see the reference below.

Blake's Pride, also developed by USDA for blight resistance, has aromatic, juicy fruit and consistent yield. The original tree was hybridized in 1965 and it was released in 1998. The fruit is shaped like Bartlett and the skin is yellow with tan russet that to some people looks unattractive.

Cinnamon is a fully russeted, late maturing pear that was discovered as a limb mutation in a Bartlett tree near Hood River in 1979. It ranked high in Rachel Elkins' taste tests, scoring as well as Bartlett for overall liking and purchase intent.

Carmen, Norma, Santa Maria, and Turandot are Italian varieties.

Carmen is a consistent bearer and although it flowers with Bartlett, it ripens about 2 weeks earlier. The fruit has a good appearance, long shelf life, and is very tolerant of handling and transportation.

Norma is used for high-density orchards because of its medium-low vigor. Fruits are large and attractive, and have a slight rust on a portion of the surface.

Santa Maria has very large fruit that mature early and are light green to slightly yellow skin,

with good quality. The skin is yellow green and sun-exposed areas are pink to red. But the trees are highly sensitive to fire blight.

Turandot fruit are slightly red-colored, although red color increases during cold storage. Fruit are medium sized with yellow-green skin.

**Walnut Grove Trial Observations.** Santa Maria produced very large green fruit, but trees were removed in 2014 because blight decimated them. Carmen trees set very large numbers of secondary blooms, and two years of severe blight has also severely damaged the trees. Carmen and Norma trees are being removed this year, and most Bartlett and Cinnamon trees have also been cut way back. This year, no blight was found on Blake's Pride or Turandot, only one of the Sunrise trees had a blight strike, and very few strikes were found on Tosca and Andy trees.

From 2011 to 2014, Andy, Norma, and Turandot produced the greatest growth, and Blake's Pride and Cinnamon the least; Sunrise produced moderate growth. Tosca consistently produced small fruit and Cinnamon produced large fruit. Total yield per tree was greatest for Sunrise and Tosca. Overall, Sunrise has performed well in this planting, and this variety deserves further testing. Unfortunately, only Bartlett still has use for both fresh and canning markets.

At least one commercial nursery has Sunrise pear budwood currently available.

*Funding for this trial was provided by the Calif. Pear Advisory Board.*

### References

- R.L. Bell and T. van der Zwet. 2011. '[Sunrise' pear](#). HortScience 46(1): 118-120.  
Bell, R.L., T. van der Zwet, and R.C. Blake. 1999. '[Blake's Pride' fire blight-resistant pear cultivar](#)'. HortScience 34(3): 451.

## Brown Marmorated Stink Bug Regulations for Shipping Produce

As part of a USDA Specialty Crops Research Initiative planning grant, regional meetings were held in four western states to solicit input from industry about brown marmorated stink bugs (BMSB), including four meetings in California. At both the Sacramento and Fresno County meetings, one of the biggest concerns expressed was regulations regarding the transport of commodities across county and state lines, as well as exporting produce. A significant proportion of crops potentially affected by BMSB in California have large interstate and international export markets.

The Calif. Dept. of Food and Agriculture (CDFA) established a pest rating system to guide actions for dealing with pests:

- “A” rated pests are organisms of known economic importance subject to state (or agricultural commissioner) enforcement action that may include quarantine, eradication, and other steps.
- “B” rated pests also have a known economic importance but they are regulated solely at the discretion of the individual county agricultural commissioner.
- “C” rated pests are generally not subject to state enforced action except for nurseries.
- “Q” rated pests require a temporary “A” rating pending determination of a permanent rating.

Years ago, BMSB was a Q rated pest in California. A few introductions were eradicated when BMSB had the Q rating, including findings in a storage facility in Vallejo (Solano County) in 2005 and in a camper in Sheldon (Sacramento County) in 2006. In part because BMSB was already established in Los Angeles County, it has had a B rating for several years.

BMSB is currently established in at least one urban area in each of seven counties: Butte, Los Angeles, Sacramento, San Joaquin, Santa Clara, Sutter, Yolo, and Yuba, and has

been detected in at least 16 additional California counties. As of May 2015, no living BMSB have been found in the San Joaquin Valley south of Stockton, and no reproducing population is known of in the North Coast. Also as of May 2015, no BMSB damage has been reported on any farm in California, but a single adult was found in a trap near a Butte County orchard in the fall of 2014.

**International Export.** According to Ramona Saunders, Sacramento County Deputy Agricultural Commissioner, most foreign exports of fruits and vegetables require phytosanitary inspection and certification. If BMSB was found, the shipper would need to recondition the shipment. A certificate would probably not be issued if it couldn't be shown with a reasonable certainty that the shipment was BMSB-free. However, each country has a list of “insects and diseases of concern” and sometimes they will allow presence of an insect that is not on that list. But the majority of countries require that no insects be present, including Canada and Mexico.

According to Duane Schnabel, CDFA Pest Exclusion Branch Chief, international export shipments generally have a standard of zero tolerance for pests. Countries may list an organism as harmful and not permitted, or hold a high standard of cleanliness. A single organism may trigger a shipment rejection or reconditioning. A federal phytosanitary inspection is required in order to clear the shipment for export.

It should be noted that shipments of non-agricultural products could also be rejected, as in Australia where some loads of cars from the US have been denied entry unless they are fumigated for BMSB control.

**Interstate Shipping.** A federal or state quarantine may be in place to restrict the movement of a harmful pest. However, BMSB is currently not a quarantine pest in any state although some states may be looking at

imposing regulatory status. If a state or territory enacts a quarantine, an inspection (zero tolerance) and certification would be required for interstate shipping to that state or territory.

According to Nick Condos, Director of the CDFA Plant Health and Pest Prevention Division, BMSB is not known to have caused any trade issues within the U.S. No other state has implemented an exterior quarantine against a BMSB-infested area and no foreign trading partners have specific import restrictions for BMSB host crops. Nonetheless, another state or country may reject infested shipments if they consider BMSB a harmful pest. Normally a state or country would have to be free from BMSB in order to justify such an action. With at least 41 states now having BMSB, it is increasingly unlikely that there will be interstate shipping issues.

**Shipping Across County Lines.** Agricultural commissioner biologists from nine Northern California counties were contacted about how they will likely handle commodity shipments into their counties. BMSB populations are currently present in at least one urban area in six of the counties (San Joaquin, Sacramento, Yolo, Sutter, Yuba, and Butte) and as of May 2014 not yet in the other three (Napa, Sonoma, and Solano). Responses were highly variable, ranging from no regulation

because BMSB is already present to potentially rejecting and returning loads if BMSB is found. Two of them said they may attempt eradication if an infestation is found, if deemed possible, but all of them realize it's a matter of time before BMSB spread throughout the state.

If a farm becomes infested and the grower wants to ship a commodity to another county, he or she would need to work with the receiving county's agricultural commissioner to understand their requirements to prevent rejection of the shipment. If BMSB is found in a load, the load could potentially be held for further evaluation, reconditioned and released, or rejected. However, most commissioners are not actively monitoring and would only know about an infestation if someone informs them.

In part, regulatory actions will depend on the situation: What is the risk? How many shipments are involved? How large is the infestation? How widespread is BMSB in the counties of origin and destination? Eventually, all BMSB regulations will certainly decline as the pest becomes more widespread. For now, it will be important to communicate with agricultural commissioners in destination counties to determine their requirements.

## Meetings and Publications

### Vineyard Herbicide Trial Field Meeting

Tues., June 30, 2015, 9:30 – 11:00 AM

Location: 15327 CA-160, Isleton, CA

*DPR Continuing Education Units: 0.5 hr. Laws & Regs., 1 hr. Other*

Come view and hear about the 23 pre-emergent herbicide treatments used in this spray trial, which was established by John

Roncoroni, UCCE weed science advisor. Treatments were applied in late January. Please see the attached flyer.

### New UC IPM Database of Herbicide Symptoms

This database provides an online photo repository to identify plant damage from herbicides. The database was developed by Dr. Kassim Al-Khatib, weed science professor at UC Davis and Director of the UC Statewide Integrated Pest Management Program (UC IPM). It has nearly 1,000 photos of damaged plants, which are cataloged to show damage that can occur from 81 herbicides in more than 14 specific herbicide modes of action, applied in the field to demonstrate the symp-

toms or when known herbicide spray has drifted onto the plant. Damage to over 120 different crops and ornamental plants by known herbicides is covered. The database contains additional information on modes of action of various herbicides, herbicide damage, plants included, and an index of example herbicide trade names and active ingredients. The repository can be found at <http://herbicidesymptoms.ipm.ucanr.edu/>.

### Weed Pest Identification and Monitoring Cards

(Electronic cards for printing)

These cards (48) are based on the UC publication *Weeds of California and Other Western States*. They cover the most common weeds, grouped into 8 categories:

- Broadleaf annuals
  - » Erect, low growing, and scrambling
- Broadleaf perennials
  - » Viney and not viney
- Grasses
  - » Annuals and perennials
- Sedges

Each weed is identified by a description and excellent close-up color photographs of various growth stages—187 photos in all. On the reverse of each card is a description of the various growth stages, habitat, distribution and management tips.

Cost: \$18.00. Publication No. 9013

Visit <http://anrcatalog.ucdavis.edu>, Search 9013



## Vineyard Herbicide Trial Field Meeting

**Date: June 30, 2015**

**Time: 9:30 am – 11:00 am**

**Location: 15259 Hwy 160, Isleton, CA 95641**

UC Cooperative Extension Weed Science Advisor, John Roncoroni will show and discuss the in-field results of an herbicide trial and the options available to grape growers for weed control.

There will be a discussion of proper usage, rates and precautions of newly registered herbicides for vineyard use.

**From North the site is 1.3 miles south of Isleton on CA-160, just past Delta Diamond Farm. From South the site is 3.3 miles north of Highway 12 on CA-160**



**CE units applied for:**

1 hour, Other

1/2 hour, Laws & Regulations

There is no charge for this field meeting. RSVP's are not required.