Vineyard Pest Management News

An OSU Newsletter about Vineyard Arthropods

Oregon State University Extension Service

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Summer 2008

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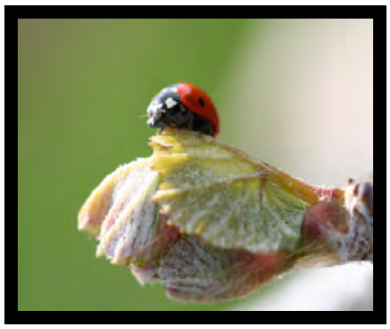

Mite associated Short Shoot Syndrome (SSS), take a closer look!

During the past few months we have had several requests from growers to inspect their vineyards that have 'SSS'. We did find many vineyards that exhibited mite associated SSS including shortened internodes, tissue scarring and cupped leaves (See extension publication EM 8944-E, OSU extension website) and laboratory inspection of plant materials did have infestations with rust and bud mites. However, in many vineyards, the symptoms were not typical of mite-associated SSS. Upon further inspection, we found several other factors that may lead growers to think that they have mites and mite-associated SSS. These factors may include: Zinc (Zn) or Boron (B) deficiency, over-cropping of a vineyard block for several consecutive seasons, frost damage, herbicide damage and damage caused by cane borers.

We would like to share descriptions of symptoms in order for growers to better understand why their vineyards show these symptoms and what they need to do in order to prevent future similar episodes.

Zinc or Boron Nutrient Deficiency (Fig. 1)

Inadequate Zn results in a reduction in leaf size, new shoot growth and inter-vein chlorosis. Shoot tips may die back in severe cases. Shoot tips do not elongate fully, resulting in compressed internode lengths (Fig. 1). Fruit set may be reduced on deficient vines and the tissue between the main veins turns yellow and chlorates. Here whole vines are affected compared to mite-associated SSS where the shoots closest to the trunk are more often affected.

Boron (B) deficiency often results in symptoms of short shoots and poor fruit set as B is needed for cell division and enlargement of cells in the apical meristem of the shoot (i.e. the growing point and origin of new growth). Boron is also needed for germination of the pollen and growth of the pollen tube to allow fertilization and "fruit set," and for this reason, when deficient in B, the clusters are very sparse with "shot" berries in addition to having short shoots. Furthermore, B deficiency results in yellowing between the veins of terminal leaves.

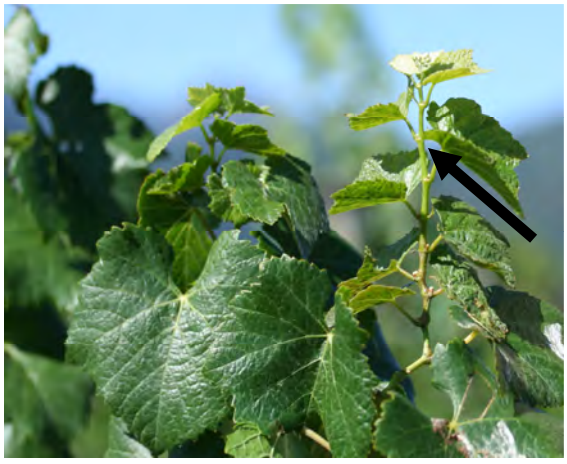

Fig. 1. Shortened internodes, and smaller elongated leaves due to B or Zn deficiency.

Zinc (Zn) deficiency can also result in short shoots and spindly, poor set clusters, similar to B. This is due to the fact that zinc is also required in the production of auxin, the vine's plant growth hormone, that is used in cell division and elongation of the shoot tips. Boron too has an impact on auxin production. With Zn deficiency, leaves in the terminal end of shoots (both primary and secondary) have leaves that are smaller in size than normal and may also turn yellow, similarly to B

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deficiency.

What about toxicity? Many vineyards throughout Oregon spray B yearly during their seasonal spray programs with the fear of having deficiency. With all micronutrients, there is a fine line between deficiency, sufficiency and toxicity! Therefore, over doing applications of foliar micros can potentially lead to excessive concentrations. Boron toxicity symptoms can look like those of mite-related Short Shoot Syndrome. For example, edges of leaves fail to grow and expand under B toxicity while the internal cells of the leaf blade continue to expand, causing puckering and cupping of leaves (Fig. 2). Necrotic spots can form along the leaf margin and within the leaf blade as well.

Fig. 2. Boron toxicity, note the cupped leaves and wide sinuses in the leaf.

The tricky part about separating symptoms of micronutrient deficiencies or toxicities from mite-related SSS is that not all of the above mentioned symptoms are always found when B, Zn or mites are the culprit! This makes diagnosis difficult at best but can be ruled out depending on your vineyard practices:

- Do you do tissue analysis yearly to determine any nutrient deficiencies?
- Do you spray foliar boron and/or zinc during the growing season? Are these sprays based on need?
- Did you observe uniformity in the pattern of short shoots: within vine or within the vineyard block?
- Did you observe late season leaf bronzing or other symptoms of mite infestation?
- Did you sample for the presence of mites?

Over-cropping of a vineyards (Fig. 3)

The key to vine size, vegetative growth and fruit production lies within the vine's ability to produce and store carbohydrates. When vines are stressed by having a large crop level, the majority of the carbohydrates fixed by the canopy through photosynthesis are shunted to the fruit and there is less carbohydrates put into storage for growth the following season. After bud break in spring the vine relies on the stored carbohydrates for this early season growth, .until there is a sufficient canopy. Without adequate carbohydrates, the shoots do not grow adequately, resulting in shortened shoots. Young vines that are cropped in their early years, during establishment, may exhibit this problem. Also, mature vines that do not have adequate water, nutrients or sufficient leaf area and a heavy crop level during consecutive growing seasons can have short shoots due to a lack of carbohydrates (Fig. 3). The symptoms of short shoot in this case is uniform across the affected areas. Most growers cropping at levels of less than 3 tons per acre on mature vines, are not likely experiencing this over-cropping effect. If you have experienced problems with low carbohydrate related short shoots, you'll also note poor fruit set and poor bud maturity, resulting in blind buds in following seasons.

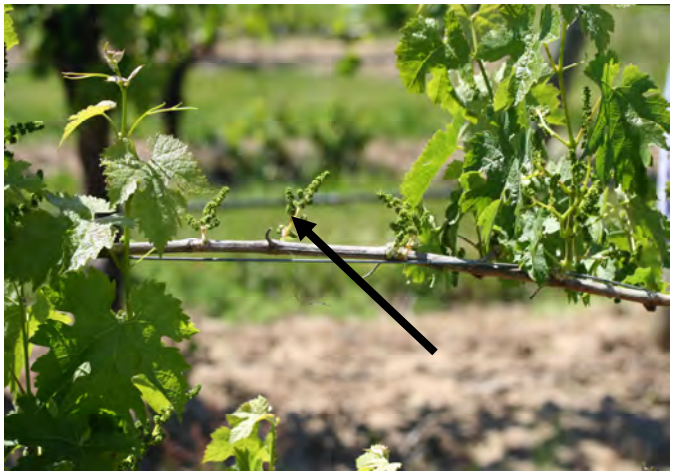

Fig. 3. Over-cropping may lead to bud failure as seen on this Merlot vine. Note flowers with little to no shoot. These will not continue to form or ripen to harvestable fruit.

To amend this problem, it is best to monitor pruning weights after dormant pruning to get an estimate of vine size. Balanced pruning can be used to identify bud number appropriate for the vine size. In essence, you will want to reduce bud number on weak vines. Once the vines are back into balance, more buds can be left on the vine after dormant pruning.

Frost Damage

It is estimated that more than $1 million damage was caused by frost in the Napa Valley during spring 2008. Frost damage was also common in Oregon during spring 2008. This type of damage usually occur during the early spring period due to sustained below-freezing temperatures. Buds that have not yet swollen and active are less prone to damage than buds that are actively growing. Usually secondary shoots will develop, but crop loss is significant. Frost is usually found in lower lying areas of vineyards and damage may be very uniform in these areas.

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Herbicide damage

Symptoms are similar to SSS (Fig. 4) except for the lack of scar tissue caused by mite feeding (Fig. 5). Damage is more dramatic in young leaves and growth tips of young shoots. Leaves are misshapen sometimes cupped and have closely packed, thick veins that lack chlorophyll. Farther down the shoot, damage symptoms are progressively less severe; leaves have a distinctive fan-shape appearance with parallel, strap-like, clear veins . The leaf margins often terminate in sharp points. Small, puckered, interveinal spots retain some green chlorophyll. Damaged flower clusters set very few or no berries. For more information on the symptoms and prevention of herbicide damage, refer to EM 8737, on the OSU extension website (http://extension.oregonstate.edu/catalog/html/em/em8737-e/) .

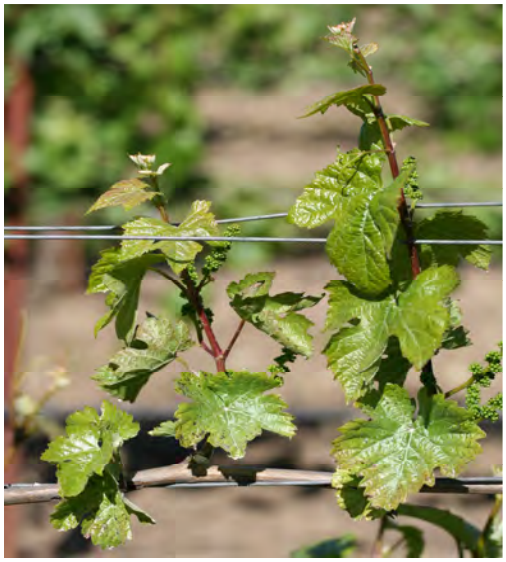

Fig. 4. Herbicide damage may look similar to SSS but visible scar tissue Fig. 4) due to arthropod feeding is lacking.

Damage caused by Cane Borers.

Damage due to cane borers may be caused by a complex of up to 6 different beetles. In California , Orange tortrix larvae were found feeding on buds during spring. Beetle species may include *Xyleborus dispar*, the European shot-hole borer; *Monarthrum scutellare*, *Xyleborinus saxeseni, Melalgus confertus*, the branch and twig borer; and *Scobicia declivis*, the lead cable borer. These species were all found emerging from riparian and untended wooded areas close to Oregon nurseries by Oregon State University researchers working on nursery crops. Symptoms were found in several vineyards in Oregon during spring 2007 and 2008 (Figs. 6 & 7). These are all wood-feeding insects. Damage to canes do not cause death, but on the East coast in the finger lakes region a reduction of up to 20% of bud development was found due to similar beetles feeding on vine tissue. Feeding of of Lepidopterans such as Orange tortix will cause death of the bud. Often, adults feed in tissue and burrowing takes place which completely conceals the insect. These symptoms show a random pattern within vineyards and on vines.

Fig. 5. Scar tissue due to arthropod feeding in the early season.

Establishment of borers in a vineyard may be due to two factors: (1) the Vineyard may be close to a habitat suitable to the insect, such as riparian or woodland areas, old orchards, dead wood piles or un-maintained vineyards, and (2) failure to destroy or adequately remove dead or damaged parts or prunings of vines that may have resulted from disease (*Eutypa*) or cultural practices such as T-budding, lowering the vine head, or mechanical pruning.

Evidence shows that good cultural controls such as removal of suitable habitats may help to manage the insect problem. This removal (burning or chopping) need to take place during the early part of the season before adults become active and disperse to vineyards from these alterative habitats. The residue from wood chopping should be incorporated into the soil or used as compost before adults emerge. It is important to maintain healthy vines by removal of dead material through pruning, adequate nutrition, using proper propagation methods, and ensuring good drainage through adequate soil preparation.

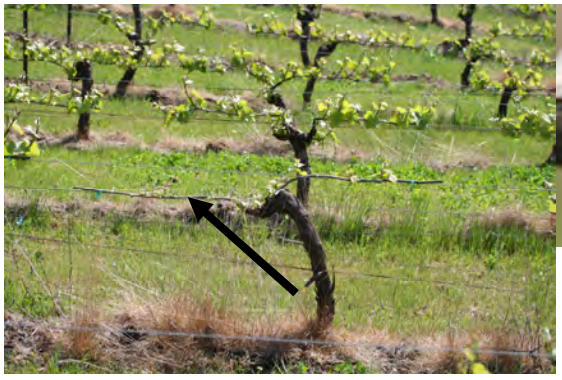

Fig. 7. Close-up of bud damaged by cane borer (arrow)

Fig. 6. Random bud failure due to cane borer damage in the Sherwood area during 2007.

Summary

The failure of buds and lack of normal development can be attributed to many different factors as described above. Therefore, it is important to carefully look at symptoms before reaching final conclusions. If no clear conclusions can be reached, it may be of benefit to have plant materials analyzed for nutrient deficiencies or mite incidence.

Plant materials can be submitted to the OSU Plant Clinic for such analysis. Information about the submission of plant materials can be found at:

http://www.science.oregonstate.edu/bpp/Plant_Clinic/index.htm