

Grapes 101

Managing Winter-Injured Vines

Grapes 101 is a series of brief articles highlighting the fundamentals of cool climate grape and wine production.

by Tim Martinson



Shoots from secondary and tertiary buds. Primary bud (circled) did not push. Note there are no visible clusters.

The polar vortex brought record low winter temperatures to the Midwest and northeast early in 2014, along with multiple low temperature episodes over several weeks. Many vineyards suffered a wide range of bud injury, and an unknown amount of trunk injury – even with cold-hardy ‘Minnesota’ varieties. Now that budburst has occurred, growers have a better idea of what they are dealing with and how severe the damage is. It’s time to deal with the injury. So what are the consequences, and what should growers do to manage injured vines?

Bud injury. A week or two after budburst, it’s easy to assess how many shoots have ‘pushed,’ but those that have will be a mixture of primary (normally highly fruitful), secondary (much less fruitful, with fewer, smaller clusters) and tertiary (fruitless) buds. Often, latent buds from the trunks, cordons, and particularly the base of the vine (suckers) will push instead of ‘count buds’ – those intentionally left after pruning on one year canes.

Trunk injury. The phloem, vascular cambium, and xylem (tissues that conduct water and nutrients) are right below the bark, and also subject to winter injury. Damage is often hidden and sometimes delayed. Buds may push and vines with trunk injury may suddenly collapse in mid-season or later – or next year. Trunk injury is hard to evaluate.

Intact roots, few shoots, low crop. Winter injury leaves the vines with a largely intact root system, but fewer growing tips to channel spring and summer growth into. Even vines with close to an optimal number of shoots (5-7 shoots per linear foot of canopy, or about 30-40 shoots for a vine with 6 ft. spacing), will have much less fruit than normal. The bottom line: Vines will have the same growth potential, but less crop and fewer shoots to ‘hold them back.’ Expect more vegetative growth, which can lead to more shading and less fruitful buds the following year.

Management issue 1: Leaving enough shoots. Growth potential can be channeled into a few, long, rapidly growing canes, or several moderately growing shoots. The challenge with winter-injured vines is to leave enough shoots to distribute the growth potential among many, rather than a few.

Management issue 2: Trunk renewal. Regardless of the severity of winter injury, growers need to be prepared to replace trunks following significant winter injury. Existing trunks that have only a few buds pushing on the top will fail to produce even growth of new vascular tissue around the trunk. Cambium activation and cell division to produce new xylem and phloem tissue is triggered by hormones that come from the shoot tips. No green shoots, no reactivation.

Here are a few scenarios with a range of injury severity:

1. Normal shoot number on top, moderate sucker growth: These TWC-trained Marquette vines have 30-50 shoots, and shoot growth is very even. There are a few suckers growing out of the base of the vine. Cluster number is reduced (many of the shoots that pushed were secondaries), but the trunks and cordons should be in good shape, and produce a normal complement of shoots next year. Prime management goal: Spurs for next year that are evenly spaced. Retain 2 suckers for potential trunk renewal.



2. Many shoots on top, but more sucker growth. On this TWC-trained Frontenac, more and longer suckers are present at the base of the vine. Even though there is ample shoot number on top, some of the shoots are weaker, and the potential for trunk injury is higher. Management goal: maintain top growth, retain 2-4 suckers for potential trunk replacement, observe vines for signs of trunk injury and crown gall in mid-season.



3. Few shoots on top, many suckers: This VSP-trained Frontenac vine has less than 50% of target shoot number, and a high number of shootless or 'blank' nodes, so trunk renewal is a must. Management goal: Retain top shoots and suckers to have enough growing tips to produce 'right-sized' trunk renewals. Retain all suckers through mid-season; tie loosely together with twine to keep shoots from spreading over ground.



4. No top growth, vigorous suckers. Marquette at a different site: Trunks are dead, but vine can be renewed. Retain suckers. Trunks can be removed during season, or during dormant pruning. Draw suckers together loosely with twine to promote upward growth and keep them off the ground. Keep as many suckers as you can. Choose the best-positioned ones for trunk renewal the following season.



5. No top growth, no suckers or weak sucker growth. These La Crescent vines will probably need replacement. There is no visible growth on top, and no vigorous suckers at the base of the vine. Order replacement vines, or plan on 'layering in' long shoots from adjacent vines the following year.



Final thoughts:

- **Site and training:** Winter injury episodes can provide a good opportunity to take a hard look at your site and training systems. Patterns of shoot and bud survival can reveal issues with air drainage (frost pockets) or internal soil drainage. It is also a good time to re-evaluate your training system and make decisions about what should be done differently.
- **Nitrogen:** Without a full crop N requirements will lessen, and supplemental N fertilizer should be minimal or skipped.
- **Disease Management:** Even without a crop, it's important to keep the foliage healthy. Powdery mildew, downy mildew, phomopsis, and black rot can all be present on the foliage. Maintain appropriate shoot density (4-7 shoots per foot of canopy) and use shoot positioning ('combing' on high wire training systems; VSP will still need to be positioned) to maintain airflow through the canopy, minimize disease pressure, and produce quality, fruitful buds for next year.

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