SHuR FARMS®
Frost Protection
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Do I really need Over the Vine Water for Frost Protection?

If you are in an area that has limited (or maybe zero) water available for frost protection, is there anything that you can do to mitigate the frost risk to your vineyard? In some areas, such as Mendocino county or Pope Valley for example, the conventional wisdom is that water is the only effective method to protect against frost. But is that true?

Well, the answer is...maybe. To clarify, first we must understand the frost risks and how different methods protect and then choose the correct tools to deal with the problem.

The blunt fact is that areas such as Pope Valley or Mendocino County in California simply are not suited to growing wine grapes. It gets too cold, too early. Plants are genetically predetermined to come out of dormancy at a particular time and if that time is prior to when the region would normally experience its last winter storm of the season (called advection freeze), then that crop or variety is not suited to growing there. The judicious advice is to plant crops and varieties that come out of dormancy after the time the region normally experiences its last winter storm event. When economics make it viable to overcome the occasional deep freeze such as it is in these areas then extraordinary measures might be appropriate and financially beneficial, and after all isn't that what it's all about?

Since advection freeze conditions are caused by a cold mass of air moving (usually from the north arctic regions) over the ground and there is no temperature inversion, only two of the four frost protection categories can help to stave off frost damage. Those 4 categories are; 1. Warming the air, 2. Preventing heat loss from the ground, 3. Covering the crop with a warm 'blanket' to shield from the cold, and 4. Modifying the natural growth patterns of the crop. Only 3 and 4 can offer potential help under advection conditions.

Pruning later is effective because it delays bud break and modifies the natural growth patterns. Over vine water is effective because it puts a coat on the vines to shield from the cold. All other methods of frost protection require an inversion to be effective.

During advection conditions the cold air that causes damage is not due to ground cooling (which in turn cools the air from the ground up causing an inversion layer), but rather the cold air mass that causes frost damage comes in above the ground at varying heights and from varying directions. True advection freezes are cold winter storms complete with wind, clouds, snow, hail, sleet, and Santa Claus. Under these conditions, even water might not be effective and can actually make the situation worse under extreme conditions. Luckily, true advection freezes rarely happen during the growing season. If they did, no one would grow that crop there.

So then, what are we really dealing with???

What we are dealing with is called a 'regional temperature deficit'. These events are radiation frost but the warmest air in the region is below the safe temperature for growing the crops. There are clear

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skies, no wind and an inversion layer. This means that the accumulation areas (frost pockets) will be colder than the areas that have good cold air drainage, but even the warmer areas are too cold and must be protected.

These regional temperature deficits occur more frequently than full on advection freezes in these areas, but do not happen every year. A good estimate is that Pope Valley and Mendocino County will experience this about once every three or four years. Under these conditions, over vine sprinkling is a necessity, but be aware that the temperature differences between the non-accumulation areas such as hillsides and the frost pockets remains the same as in any radiation frost event. This means that if a cold pocket is 6 deg. F colder than the regional temperature and the regional temperature is 29F, then the cold pocket will be 23F. This is beyond the range of micro sprinklers. To protect, even the higher areas that normally do not get damaged will need to be sprinkled. To protect the frost pockets under these conditions a secondary frost protection method that is compatible with water must be employed simultaneously.

The goal then should not be to eliminate water for frost protection, but to minimize water usage and to protect the entire vineyard under the most severe conditions. Under normal conditions, only the cold air accumulation areas get cold enough to get frost damage and these areas can be controlled with other non-water methods. Because of the risk of a regional deficit, these other methods must be compatible with the over vine sprinklers. If your water grid is controlled by a sensor located in the coldest spot, then you will be using water over the entire vineyard when only a small portion may need frost protection. Under the most severe frost conditions then only the warmest areas will be protected and the colder areas may suffer even greater damage with water than if nothing was done at all. This is the downside of over vine sprinklers, they go from complete protection to catastrophic failure with not much middle ground. On their own, they are not at all a perfect solution under these conditions.

Conventional wind machines are not compatible with over vine sprinklers. Wind machines blowing over water will cause evaporation and evaporation results in cooling, (think ‘evaporative coolers’). The air temperature will drop causing more damage than what would have occurred without any frost protection at all. Since sprinklers must be turned on when the air temperature is several degrees above the critical point to compensate for evaporative cooling that will occur, these types of wind machines could only be employed under very mild conditions. If water is turned on first wind machines cannot be employed at all until the vines are completely dry. Wind machines are simply not suitable for areas that could experience regional deficits.

Cold Air Drains® are compatible with over vine sprinkling and work synergistically with them, enhancing the value of both. CAD machines remove the cold air in the coldest areas eliminating the need for sprinklers until such time as a regional deficit occurs. The effect of cold air drainage is to reduce or eliminate the temperature differentials between the colder ‘frost pockets’ and the areas that are sufficiently drained and normally would not experience frost damage.
Since both methods may be used simultaneously, even under the most severe conditions all areas of the vineyard would be protected.

By Steve Hammersmith

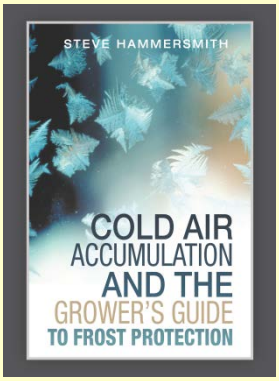
Shur Farms Accepting Scholarship Applications!

Shur Farms 2016 scholarship applications are now being accepted. Deadline is August 1, 2016, requirements are; 3.0 or higher GPA, Agriculture related major preferred, and a deposition of why we should select you.

Contact Amber Andrade for an application at: amber@shurfarms.com or call us at (909) 825-2035.

Upcoming Events

Jul. 25-27, 2016: Australian Wine Industry Conference, Adelaide, Australia
Nov. 8, 2016: Rootstock, Napa, California
Dec. 1, 2016: North Coast Wine Industry Expo, Santa Rosa, California
Jan. 24-26, 2017: Unified, Sacramento, California
Feb. 2017: World Ag Expo, Tulare, California
Feb. 16-18th, 2017: Texas Wine Grape Growers Association Expo, San Marcos, Texas



"Cold Air Accumulation and the Grower's Guide to Frost Protection" By Steve Hammersmith

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