Brrrr...

or How Our Vines Make it Through the Winter

This article was written by Domaine du Nival, published December 14th, 2013 on the Facebook profile of the author at www.nival.ca

It's really freezing cold this morning... so much so that birds long ago flew to the warmer south. Our vines are not so lucky, rooted in the soil and not escaping Quebec's winter.

As you know, to help them out, we have made cute little tents that protect them from the cold by creating thermal insulation against ambient air. This way, when temperatures drop outside, the fabric confines a cushion of air heated up by the ground kept bare. The goal is thus for this cushion of air to keep a temperature that is high enough to prevent losing primary buds (the fruit-producing buds) and, of course, to prevent the pure and simple death of the stock. For this cushion of air to work, it is therefore crucial to maximize the area allowing heat transfer with the ground (i.e. maximize the bare ground surface under the tent to heat the air), while ensuring the fabric's maximum imperviousness. This is similar to a home during the winter; each little hole lets outside air in, thus cooling the air under the fabric. And since there is no thermostat to turn up (!), it is crucial to minimize air intake under the fabric.

To do so, we have developed an ingenious fabric tie system with specially-designed tie rails mounted on each spike and with a stretched wire running at the base of the tents, on each side of the row. Once stretched, these wires and the entire system create a large heat transfer surface while maximizing the tents' imperviousness on the ground. And since each piece of fabric is pierced and inserted on each spike, a tape seals the hole on each spike to ensure maximum imperviousness.

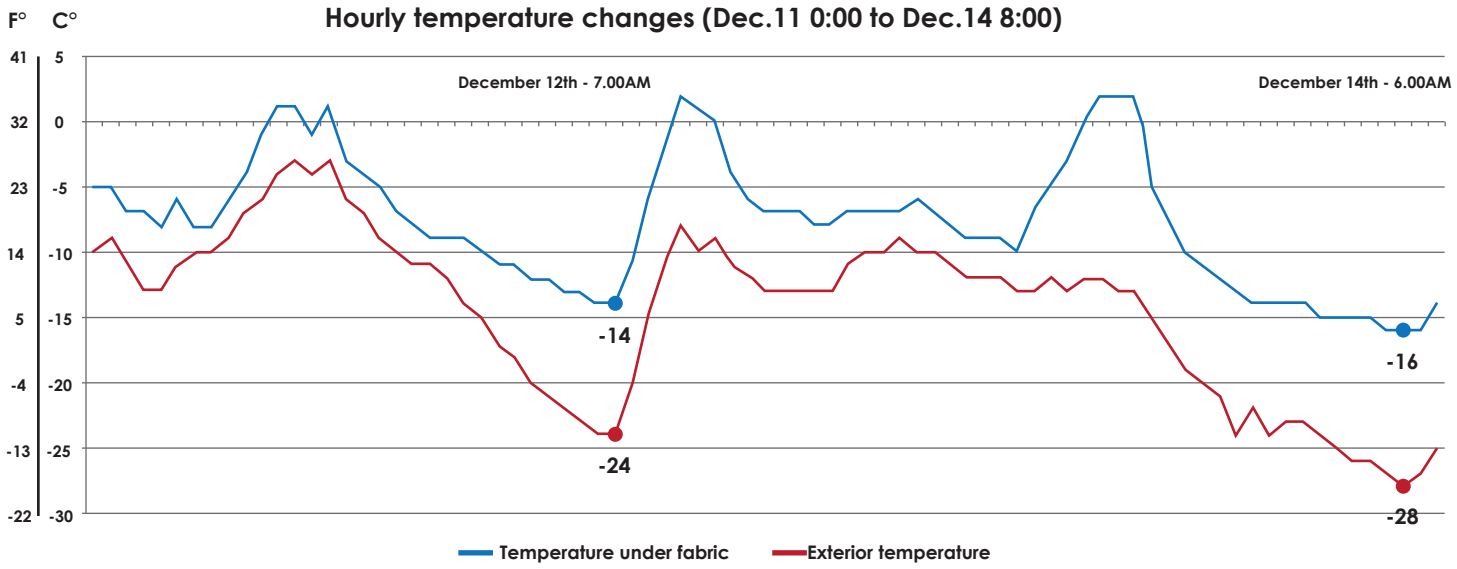
But is it truly efficient?

We have been working for several years now on creating a winter protection system for vines that is relatively affordable, lasting, easy to install and, most of all, efficient. Over the past five winters, we have tested multiple systems, including:

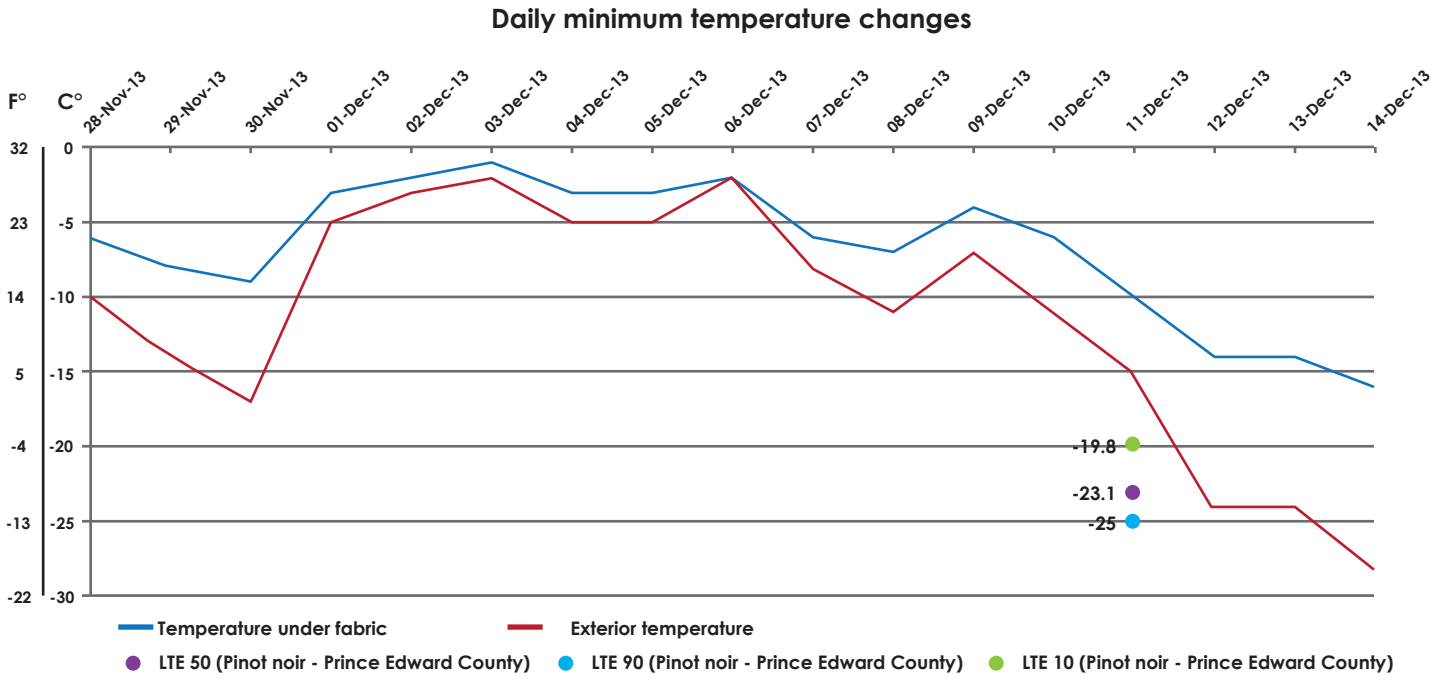
- Vines covered with Thermo-foil-type insulation
- Supplementary heat with heating wires
- Vines individually wrapped up in Hibertex Pro fabric

Several vines were devastated during these tests and sometimes, collateral damage was significant. Yet today we are reaping the benefits of these different tests. They have directed the development of the current protection system and now allow us to be distinctly more confident about the efficiency of our winter protection.

All the same, the severe cold periods such as that of this past December 11-14 always bring lots of stress. And so what a relief it was to see that the protection system worked just as expected. The chart below highlights the efficiency of the system in reducing temperature variability and, mostly, countering extremes.



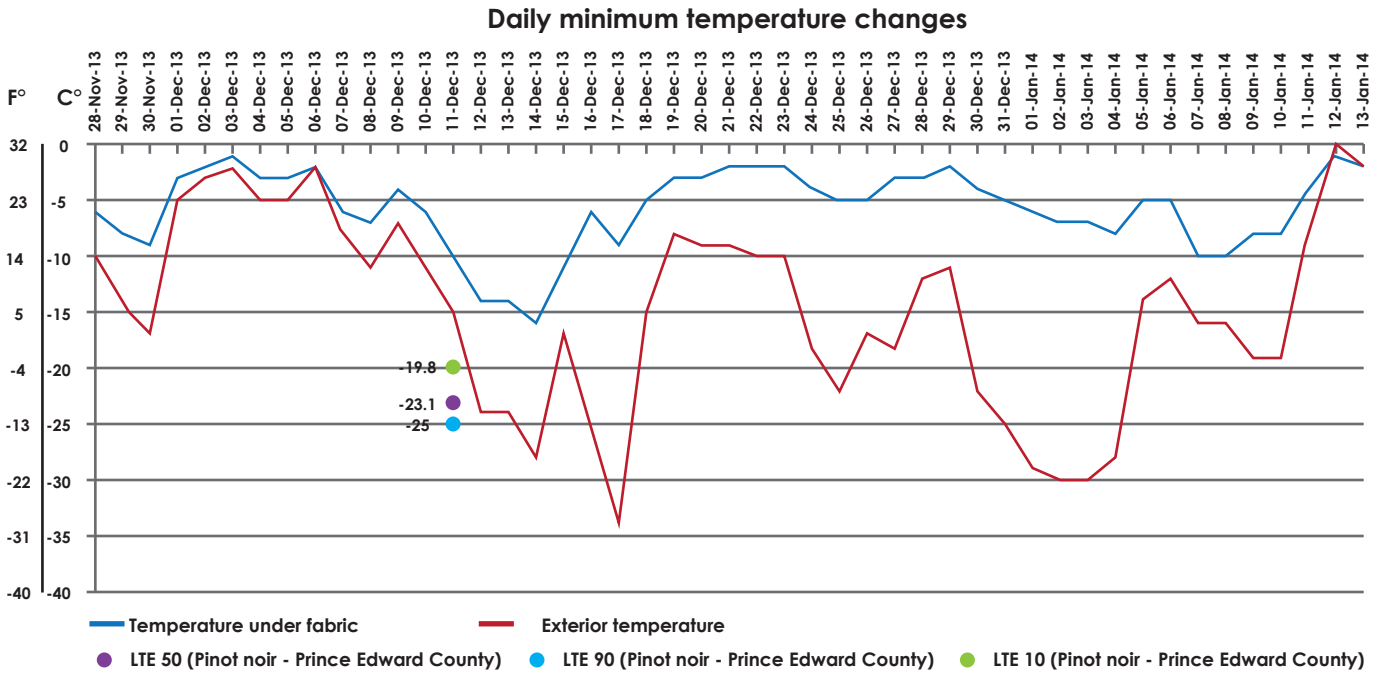
Therefore, since the beginning of winter, the protection fabric saved our vines from critical temperatures that could have endangered them. In the chart below, we see that during the coldest days, the daily minimum temperature recorded under the fabric is always much higher that the outside temperature. Furthermore, the chart indicates the data collected by the Cold Climate Oenology and Viticulture Institute (CCOVI) of Ontario's Brock University on lethal temperatures for pinot noir buds in Prince Edward County (PEC). These temperatures, shown as LTE 10, LTE 50, and LTE 90, respectively represent the temperature at which 10%, 50%, and 90% of primary buds are killed by frost. For example, as of December 11, 2013, the pinot noir's LTE 10 in PEC was -19.8°C (-3.64°F). We may thus expect that thresholds be similar to what is happening in southern Quebec and, therefore, at -19.8°C (-3.64°F), 10% of pinot noir primary buds will freeze and die. As you can see below, even during this past December 13-14 night, the minimum temperature under the fabric remained almost 4°C (7.2°F) higher than the pinot noir LTE 10, which leads us to believe that there was no significant damage to our vines. This is even more encouraging because the snow cover (!) was extremely limited with only 5-7 cm (2-2.75 in)on the ground and almost nothing on the fabric.



Of course, since winter has only just begun, we will be updating this note regularly to monitor the evolution of our precious little vines until next spring. Until then, let us hope for large amounts of snow to insulate the vines properly against the upcoming cold waves!

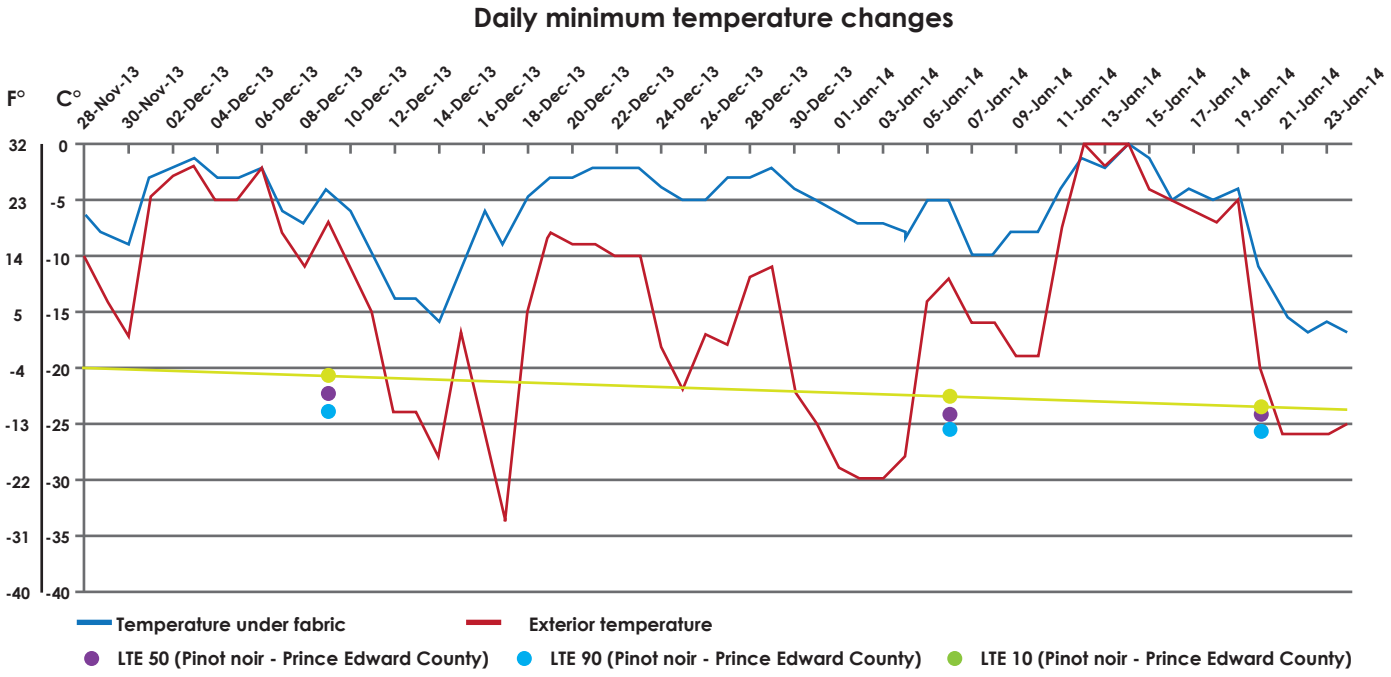
UPDATE – JANUARY 15, 2014

As promised, here is a short update on daily minimum temperature changes under the fabric and outside. Of course, given the heavy snowfall received before Christmas, vines are adequately protected and the temperature under the fabric varies very little. With the recent rise in temperature, the snow cover decreased, but we can still count on a good 20 cm or so on the ground. The snow forecasted in the coming days should help bring the protection system back to its maximum efficiency.



UPDATE – JANUARY 24, 2014

After a big week of intense cold, we had to visit the vineyard to assess the efficiency of our winter protection system. Since the last update, we have only received 2-3 cm (0.8 - 1.2 in) of snow and given the significant melting of the snow cover in early January, it really was not enough to add an additional layer of insulation on our fabric. Therefore, our sleep was not peaceful since we know very well that the system can reach its limits during extended periods of arctic cold without snow. Fortunately, the collected data confirm the efficiency of the system, even beyond our expectations, as shown in the chart below.



Note: We have replaced the data on Prince Edward County's critical temperature thresholds (LTE 10, LTE50 & LTE90) with other data from the Niagara Lakeshore appellation. Unfortunately, the CCOVI that provided this data did a single assessment, on December 11, 2013, in Prince Edward County. We were thus lacking data to monitor these critical thresholds' changes and we therefore prefer to use the Niagara data with which, even if this region is farther from here, we have a better idea of the critical temperature changes.