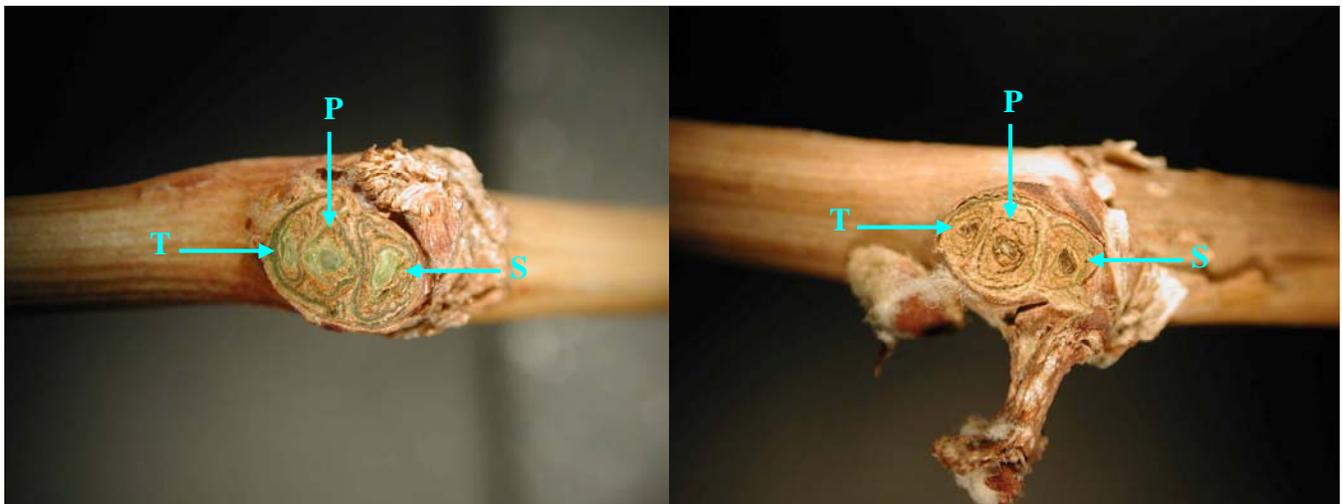


Cold hardiness of grapevine buds at the Western Colorado Research Center - Rogers Mesa near Hotchkiss, Colorado, 2012/13.

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Dormant buds were collected from 8-year old, own-rooted vines growing at the Western Colorado Research Center - Rogers Mesa. Vines are planted at a vine x row spacing of 4-6' x 8', spur pruned on bilateral cordon, and trained to a VSP. Buds were taken from shoots of moderate vigor that had no obvious sign of damage. Shoots were cut so as to leave a 4-bud spur, and six buds were used from each shoot (i.e. bud position 5 to 10). Shoots were cut in the field into single-node cuttings. For each temperature treatment, twenty buds were selected at random, placed in plastic bags, and then placed into a programmable freezer. The starting temperature for the freezing program was altered depending on the outside temperature at the time of bud collection. For example, on 7 November 2012 the outside temperature at the time of bud collection was ~44 °F, so the freezing program was initiated at a freezer temperature of 44 °F. In contrast, outside temperature on 20 December 2012 was ~7 °F and the program was initiated at a freezer temperature of 7 °F. Irrespective of the starting temperature, the freezer was programmed to reduce the temperature by 5 °F over a 30-minute interval, and then hold at that temperature for 30 minutes. This cycle was repeated until the threshold temperature for a sample was reached. At the end of the holding period for that threshold temperature one bag containing twenty buds was removed, temperature decreased by 5 °F over 30 minutes and held for 30 minutes, etc. After removal from the freezer, buds were left at room temperature for a minimum of 24 hours and then cut open to evaluate the tissue. Buds showing vibrant green tissue were judged to be viable (left photo below) whereas buds showing brown tissue were judged to be dead (right photo).



Photos: Sectioned grape buds showing the compound nature of the ‘latent bud’. All buds are alive in the left photo while they are dead in the right photo (P – Primary bud; S – Secondary bud; T – Tertiary bud).

Cold hardiness is influenced by many different factors, including variety, crop load, harvest time, post-harvest conditions, vineyard weather conditions, and the duration of a cold event. With our freezing protocol buds are exposed to a certain minimum temperature for a period of 30 minutes. Shorter or longer periods at this minimum temperature may result in lower or higher bud damage. For example,

Variety	Date	Control ²	15°F	10°F	5°F	0°F	-5°F	-10°F	-15°F	-20°F
Rkatsiteli	7 Nov 2012	0			0	0	35			
Rkatsiteli	4 Dec 2012	0				0	5	40	100	
Rkatsiteli	19 Dec 2012	4				0	0	5	70	
Rkatsiteli	8 Jan 2013	7					10	0	10	
Rkatsiteli	22 Jan 2013	15					10	15	45	
Rkatsiteli	6 Feb 2013	0					20	20	55	
Rkatsiteli	26 Feb 2013	7.5					10	20	95	
Rkatsiteli	12 Mar 2013	0				15	30	55	100	
Rkatsiteli	26 Mar 2013	15			15	10	25	90		
Rkatsiteli	9 Apr 2013	5		16	30	95	100			

¹ Note that the percentage damage is for the primary bud only. The damage is somewhat less when secondary and tertiary buds are included as they are more cold-hardy than the primary bud.

² “Control” values are from samples not placed inside the freezer.

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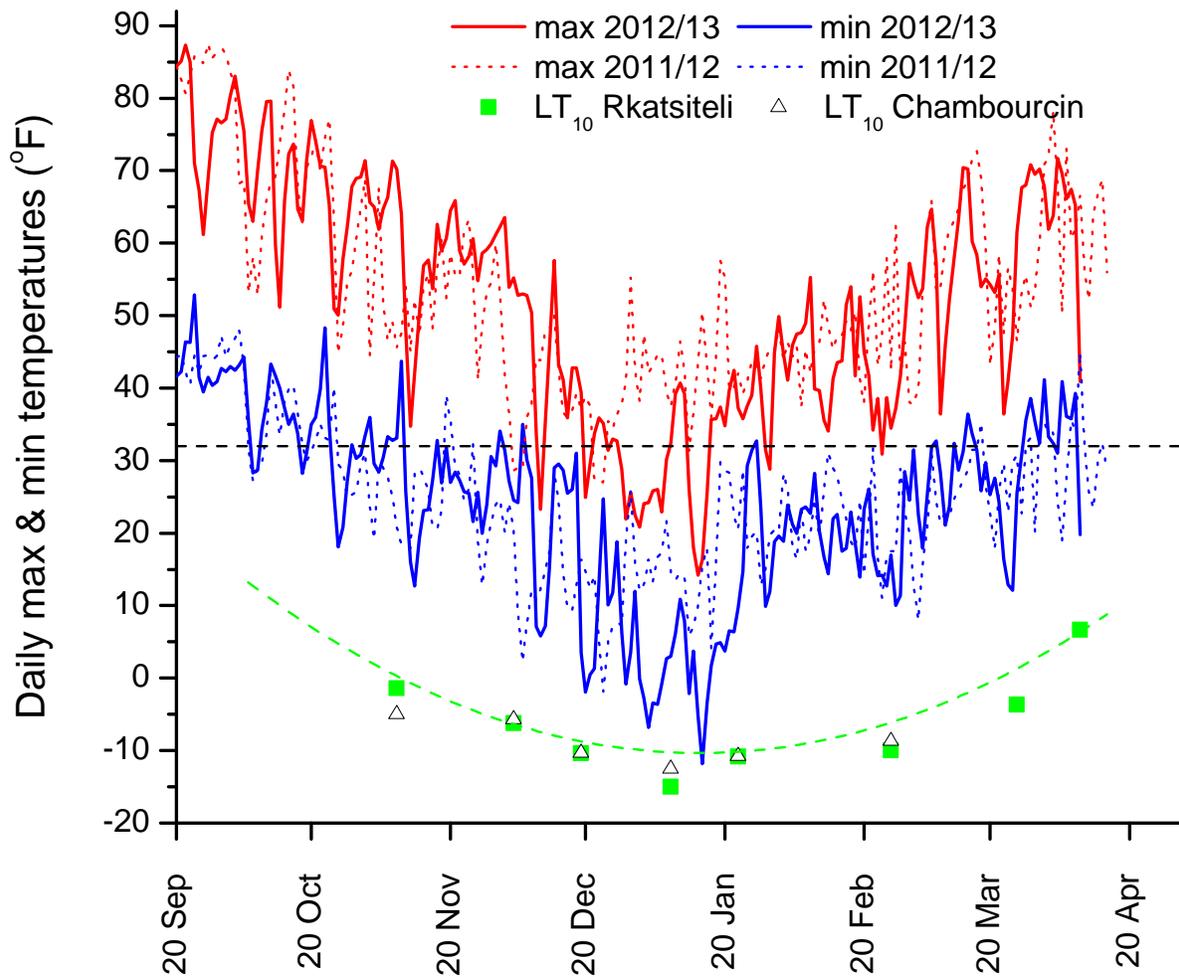


Fig. 1: Daily maximum and minimum temperatures recorded at the Western Colorado Research Center – Rogers Mesa near Hotchkiss, Colorado for 2011/12 & 2012/13, and critical temperatures for a 10 % bud kill (LT₁₀) estimated from Table 2. The dashed line represents a predicted value for LT₁₀ for Rkatsiteli based on a curve fitted to previous years' data. Temperature data for various locations within the Grand Valley can be found at <http://www.winecolorado.org/colorado-grape-growing/weather-station-network/>. Meteorological data from other locations throughout Colorado may also be available from the COlorado AGricultural Meteorological nETwork - COAGMET.