Freeze injury is one of the greatest threats for winegrowing production in Canada and many regions across North America. Cold hardiness is a dynamic condition that varies throughout the dormant period and is determined by the grapevine’s genetic potential and environmental conditions. Ontario has experienced dramatically different climate conditions over the last 3 years. Bud cold hardiness assessments using differential thermal analyses (DTA) has been a vital tool in order to determine the impact of seasonal differences and viticulture practices on grapevine cold hardiness. Examples of studies currently being performed include examining the impacts of crop level, harvest date and water status on grapevine cold hardiness to recommend best practices to our industry to achieve optimal cold hardiness. Monitoring cold hardiness throughout the dormant period has become an invaluable tool to assist grape growers in managing and preventing winter injury. Assessing vine hardiness levels of multiple cultivars across many regions in Ontario has increased our understanding of how cultivars differ in terms of cold tolerance based on location and season. An advanced cold hardiness database, VineAlert (www.ccovi.ca/vine-alert) was developed to store, monitor and display vine hardiness levels throughout dormancy. Through VineAlerts’ alert system, grape growers can be notified of potential risks from forecasted cold events and informed management decisions can be made to protect vines from winter injury using winter protection equipment such as wind machines.