The grape and wine industry in Oklahoma has rapidly expanded since the late 1990s. Currently there are over 50 wineries in the state and over 600 acres of grapes. This new industry has largely chosen European cultivars as their primary grapes for winemaking. Many of the European cultivars are not well adapted to the continental conditions of Oklahoma and surrounding states. One of the primary concerns of grape growers is spring frost injury. A new frost index has been created to give a quantitative representation of frost risk for a cultivar at a particular site. This index utilizes average temperature, timing of budbreak, and frost and freeze data. A method for predicting timing of budbreak based on visible day light and accumulation of days with average temperatures over 51.5 °F is also presented. Actual budbreak dates from 2003-2007 ranged from 16 March to 14 April. Predicted budbreak dates from 1994-2002 ranged from 13 March to 22 April. ‘Chardonnay’ was at most risk of spring frost injury, whereas ‘Cynthiana’ and ‘Cabernet Sauvignon’ were at least risk over a 14-year period; however, all cultivars were subjected to a very high or moderate risk in at least three of the 14 years.