Cold hardiness is a covariant in dormancy assays

Kovaleski AP[A]; Campos-Arguedas F[A]; Kirchhof EM[A]; North MG[A]

[A] Department of Plant and Agroecosystem Sciences, University of Wisconsin–Madison, USA

Program theme: Environment, Ecology and Evolution;

Oral

Abstract

Bud dormancy is a necessary phase in the yearly cycle of perennial plants where seasonal unsuitable growth conditions occur. Where low temperatures define the unsuitable conditions, attainment of cold hardiness is also required to survive. In the spring, new growth is susceptible to frost damage at relatively warm temperatures compared to those in mid-winter (especially in temperate and boreal climates). Therefore, loss of cold hardiness occurs prior to budbreak. There is known overlap in the temperatures that contribute to either process, particularly at low, above freezing temperatures. Moreover, negative temperatures are important drivers of acclimation (increasing cold hardiness), and have recently been shown to contribute to dormancy fulfillment. When evaluating cold hardiness in different environments, warmer places generally result in less cold hardy buds for many species. As chilling affects rate of cold hardiness loss, less cold hardy buds require less time under forcing to break bud with same level of chilling as more cold hardy buds. By measuring cold hardiness when starting forcing assays, variation in time to budbreak can be separated between effects of chilling over dormancy, and changes in cold hardiness elicited by treatments. Ultimately, acknowledging cold hardiness dynamics reduces discrepancies in dormancy data from different climates.