

Chilling unit accumulation and degree-day requirements of four sweet cherry (*Prunus avium* L.) cultivars

V. Hochmaier

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Abstract

Sweet cherry requires a period of low temperatures (chilling hours accumulation) to break dormancy and warm temperatures (degree-days accumulation) for bud break, tree development and fruit production. Research was carried out to establish local chilling hour and degree-day requirements for various stages of reproductive development for the main cultivars planted in the Los Antiguos valley, located in the province of Santa Cruz in Southern Patagonia, Argentina (71°38' W, 46°32' S). Three methods were used for chilling calculations over six years to obtain the number of hours at or below 7°C, and to estimate weighted chilling units (CU), determined for the period from bud differentiation stage (February 15th) until July 15th, when CU accumulation was completed to release trees from endodormancy. The average values were: 1,615 hours at or below 7°C and 1,550 CU, respectively. Simple phenological models were developed for 'Bing', 'Van', 'Lapins' and 'Sweetheart' for eight phenological stages: swollen bud, visible flower bud, white tip, first bloom, full bloom, petal fall, fruit set and harvest. Data were transformed to cumulative degree-days (CDD), calculated as mean daily air temperature (T) minus a base temperature (T₀) of 4.5°C ($CDD = \sum (T - T_0)$) after swollen bud (SB) stage. The methods compared for degree-day calculation were 1) High/low method, 2) Integration method (both calculated with a Vantage Pro2 weather station), and 3) manual calculation of temperatures obtained every half hour from data loggers located at the experimental sites. No differences were found between methods ($P > 0.05$) and CDD average at harvest varied from 765 for 'Van' to 916 for 'Sweetheart'.