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BOOK OF ABSTRACTS

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Experimental Determination of Chilling and Heat Requirements in Almond Cultivars and Their Projection Under Climate Change Scenarios

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Flowering in almond (*Prunus dulcis*) is a critical phenological stage that strongly influences fruit yield and quality. It is regulated by winter chill and subsequent heat accumulation, making the precise quantification of these requirements fundamental for cultivar adaptation in warming climates. In this context, global warming specially compromises the fulfillment of chilling requirements, potentially disrupting flowering synchrony, increasing the risk of frost damage, and limiting cultivar suitability in traditional growing regions. Therefore, determining the agroclimatic requirements of each cultivar is essential for selecting the most suitable cultivars for the specific climatic conditions of each growing region. This study experimentally determined the date of chilling fulfillment of four representative cultivars with contrasting flowering times: 'Desmayo Largueta' (very early), 'Marcona' (early), 'Texas' (mid-season), and 'Tuono' (late). Over two seasons, floral buds were sampled weekly and exposed to controlled forcing conditions for eight days, considering chilling fulfillment when a 30% increase in bud fresh weight was reached. Then, chilling requirements were quantified using three models (Chilling Hours, Utah-Chilling Units, and Dynamic model-Chilling Portions), and heat requirements using the Growing Degree Hours model. Chilling fulfilment occurred between late October and early December, depending on the cultivar and the season. In order to assess the cultivar response to global warming, the dates of chilling fulfillment were predicted under different climate-change projections using Representative Concentration Pathway (RCP) scenarios, RCP4.5 (effective reduction of greenhouse gas emissions) and RCP8.5 (continuous increase in greenhouse gas emissions). Model projections indicate delays in dormancy release ranging from 10 to 25 days, depending on the scenario and cultivar. These significant delays would affect the current phenological synchronization of almond cultivars in Zaragoza. Integrating experimental phenological data with long-term climate projections provides valuable insight into cultivar adaptability and supports strategic decision-making for almond orchard planning and resilience in the face of global warming.