Climatic influences on flowering dynamics, reproductive development and fruit set in litchi cv. Dehradun

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The present study investigates the effects of climatic variability on the reproductive development, flower sex ratios, and fruit set of *Litchi chinensis* cv. Dehradun in Himachal Pradesh from 2021 to 2023. Results reveal that cooler temperatures during floral bud induction (November–December) favoured balanced flower sex ratios and floral differentiation, promoting a successful fruit set. Higher temperatures in December 2022, however, led to increased vegetative growth and reduced reproductive output. Early flowering in January was advanced by cooler conditions in 2021–22, while improved rainfall and humidity further supported panicle health and fruit retention. Warmer April–May conditions contributed to elevated fruit drop and cracking, impacting yield. Additionally, cooler temperatures encouraged longer, more robust panicles, positively influencing flower production. These findings highlight the significance of cooler temperatures during key stages of litchi development and suggest the potential of adaptive practices, such as supplemental irrigation during dry spells, to counter climate impacts on yield and quality.

Keywords: Climate change, flowering, fruit set, litchi, temperature.

the formation of a highly suitable climate for litchi production. Following such conditions, the panicle emergence under Himachal conditions occurs during January. It has been reported that climate is a major player in panicle emergence. The existing climate of the region at the time of flower bud differentiation is the key driver for determining the panicle type, i.e. the litchi bears two types of panicle, namely pure and mixed panicles. The main environmental factor affecting litchi flowering is the existing temperature during November–December and at the time of panicle emergence. According to published literature[1] a minimum of 15°C temperature results in floral bud differentiation. However, if the temperature rises above 20°C, the buds start vegetative morphogenesis. The low temperature is a prerequisite for successful flowering. Kumar[2] reported that minimum temperature impacts pollen formation, fruit set and retention. Temperature is also known to impact the development of male and female flowers. The development of leafy panicles was found to be higher at the temperature of 20/15°C as compared to 15/10°C (ref. 3). The process of flowering in litchi is highly complicated, and there is no established pathway determining the floral development. The literature available pertaining to the relationship between existing weather and flowering is **minimal**. Temperature [illegible]