

1 **Supplemental Table 1** *Formula and method for calculating daily chilling units (CU) used in this*
2 *study.* Daily CU values were computed using a concave–low parabolic model (Asakura et al. 2010)
3 modified from the Utah Model (Richardson et al. 1974). The model assigns maximum chilling
4 effectiveness (CU = 1.0 per hour) to temperatures at 4 °C, with zero chilling at temperatures below -
5 6 °C. To account for the negation of chilling by high temperatures, temperatures above 14.95 °C are
6 assigned a negative value (-0.2 CU). For hourly datasets, CU was calculated for each hour and summed
7 to obtain the daily CU. For daily datasets, hourly temperatures were estimated from daily mean (T_{ave}),
8 maximum (T_{max}), and minimum (T_{min}) values, and CU was calculated using the same parabolic
9 function. Cumulative chill units (cCU) were obtained by summing daily CU values from the onset of
10 chilling in autumn until first flowering date in spring.

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Calculation formula using hourly temperature values (K_KG and K_KM)

$$T < -6 \quad C(T) = 0$$

$$-6 \leq T < 14.95 \quad C(T) = (4 (14 - T) (T + 6)) / ((14 + 6)^2)$$

$$14.95 \leq T \quad C(T) = -0.2$$

$$C(D) = \Sigma C(T)$$

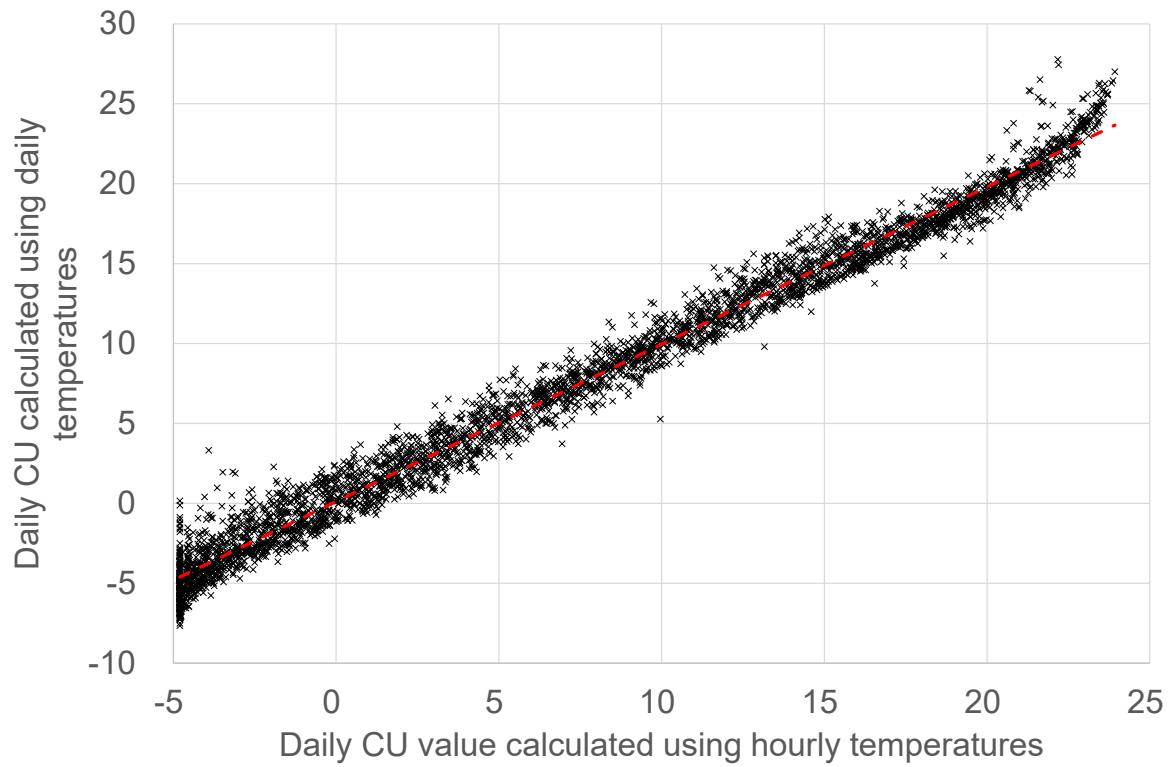
Calculation formula using daily temperature values (nine study sites)

$$C(D) = 28.0851 + 2.0457 T_{ave} - 0.4040 T_{ave}^2 + 0.0118 T_{ave}^3 - 1.4182 T_{max} +$$

$$0.0536 T_{max}^2 - 0.0003 T_{max}^3 + 1.0062 T_{min} - 0.0641 T_{min}^2 - 0.0005 T_{min}^3$$

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16 **Supplemental Fig. 1** The relationship between daily CU values calculated using hourly temperature

17 values and daily CU values calculated using daily temperature values (daily mean, maximum, and

18 minimum) at six meteorological stations in Kagoshima Prefecture in 2021-2024 (correlation

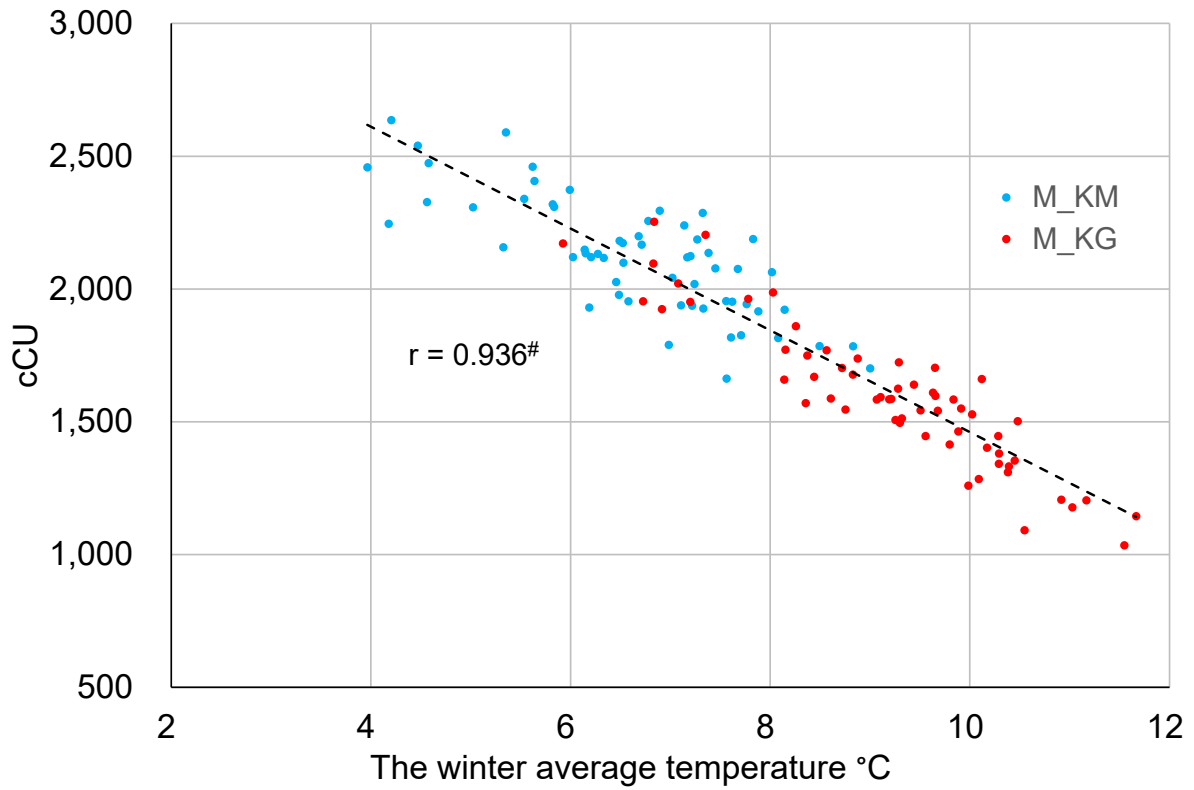
19 coefficient is 0.992).

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25 **Supplemental Fig. 2** The relationship between winter (Dec–Feb) average temperatures (1965–2024)

26 and cumulative chill units (cCU) at two meteorological observation points (M_KM, K_KG) in

27 Kagoshima and Kumamoto Prefecture. Dotted line is a regression line, r is the Pearson correlation

28 coefficient, and # indicates $P < 0.001$.

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