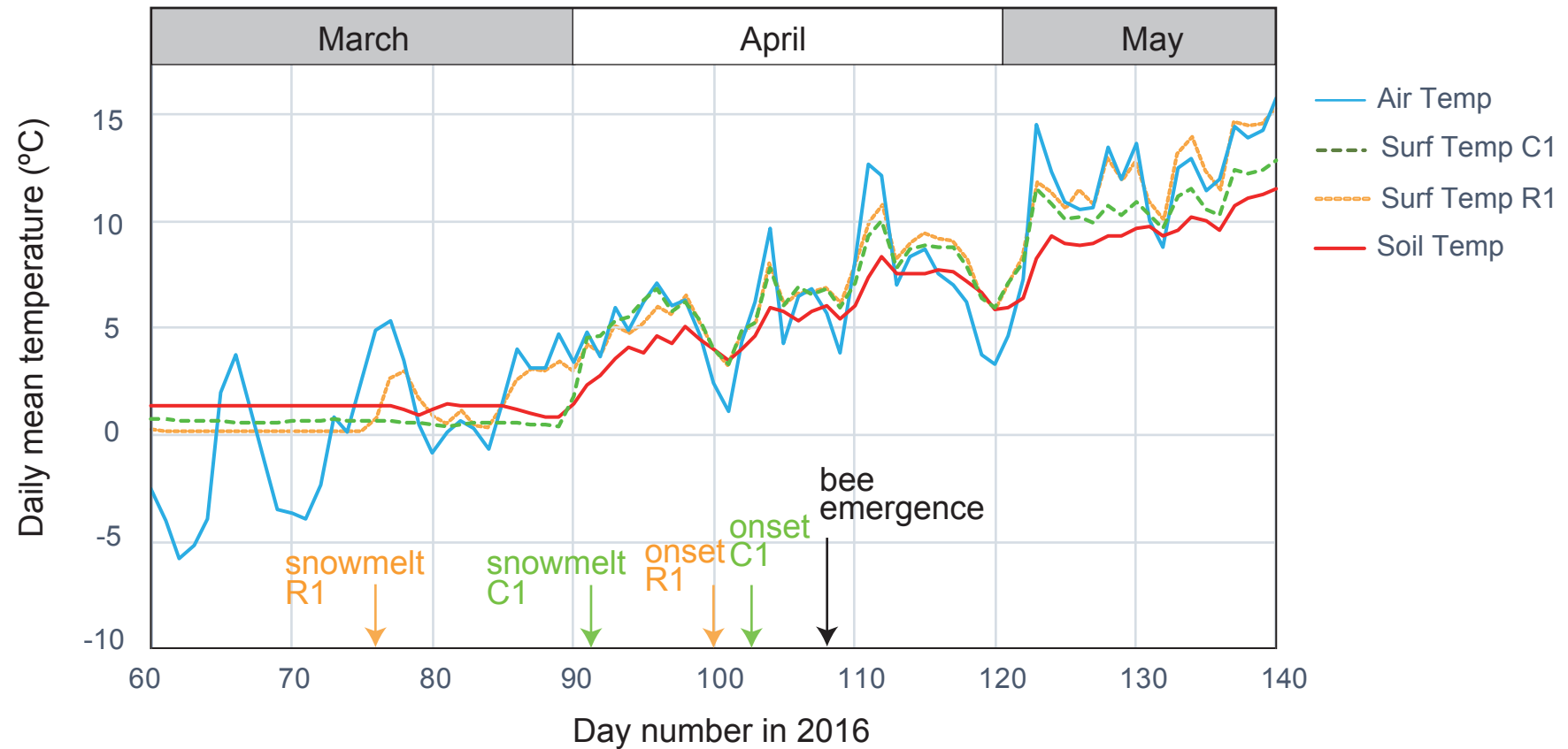


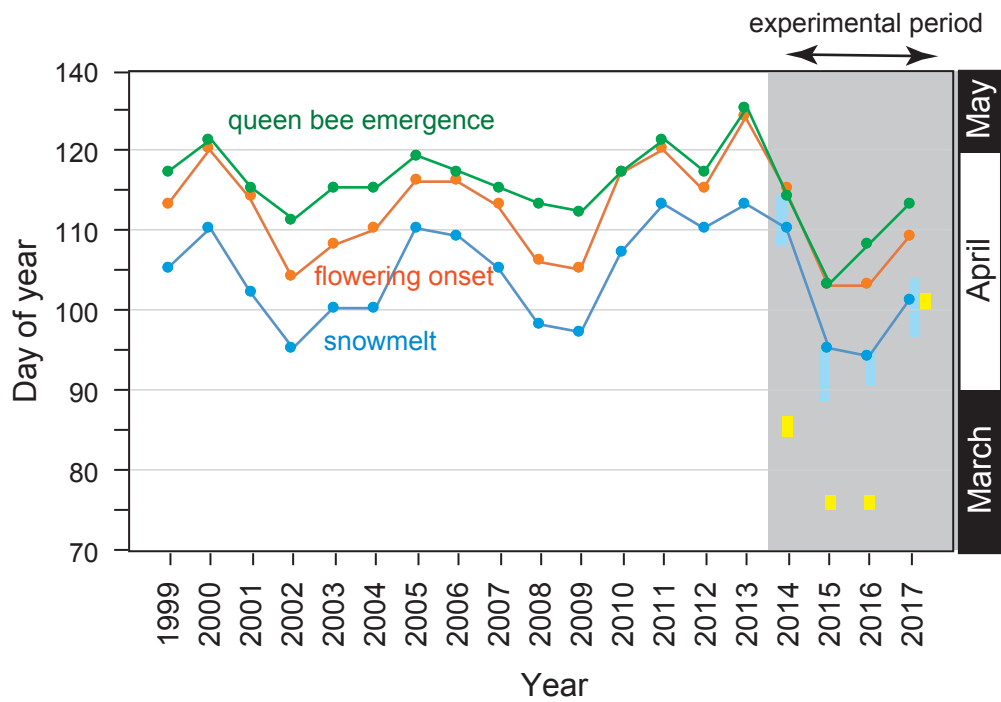
**Figure S1** Maps of (a) the research site (Nopporo forest) and the trail used to observe bumble bees, and (b) the location of the experimental plots. Long-term observations of flowering phenology and seed set in *Corydalis ambigua* have been conducted within an area enclosed by the broken line. HP: hand-pollination plot, C1–C3: control plots, R1–R3: snow removal plots. Air temperature (at 1.5 m) and soil temperature (at 5 cm depth) are recorded every hour at the weather station.



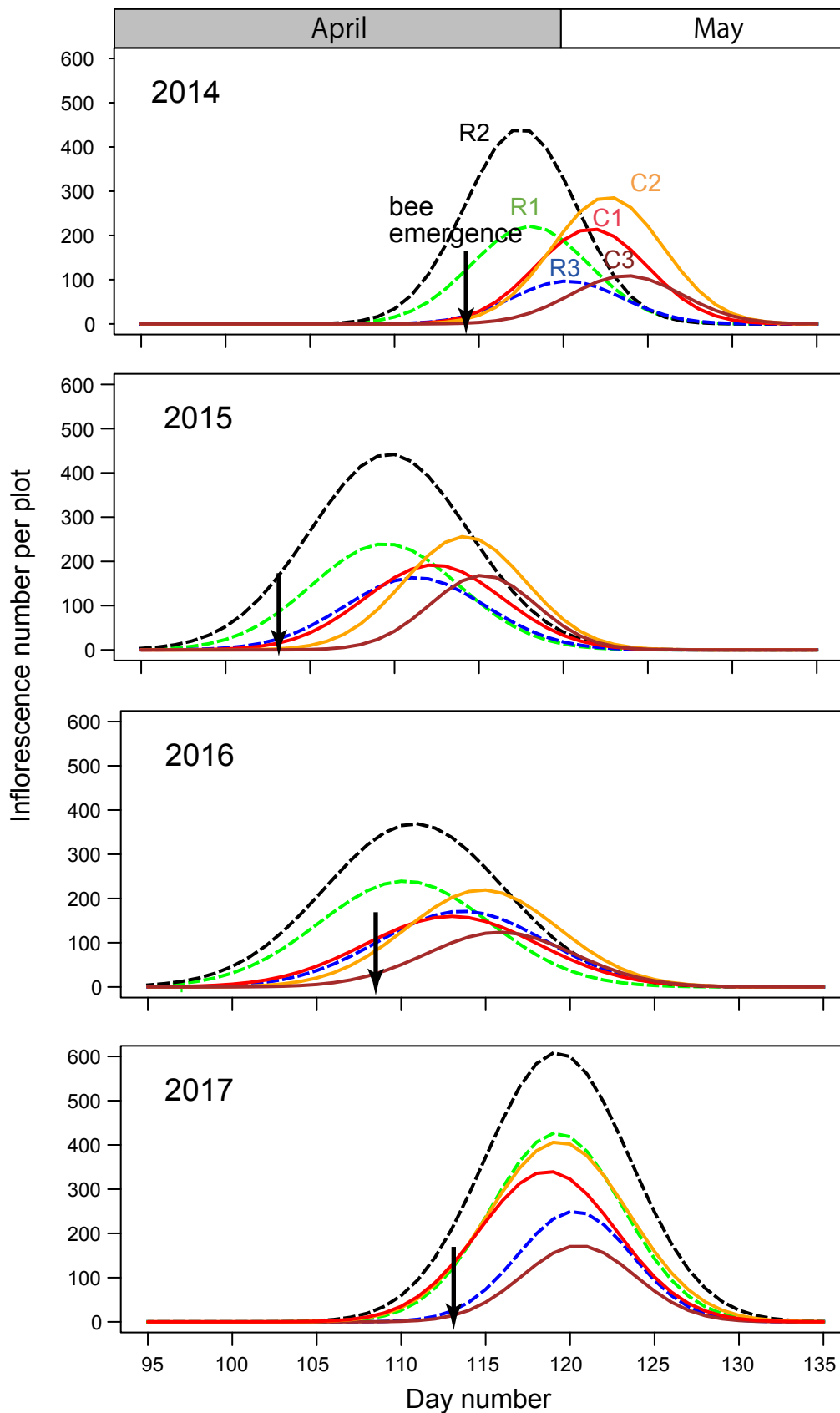
**Figure S2** (a) Snow condition of the snow removal plot (R2) on 23 March 2015, and (b) flowering peak of the same plot on 21 April 2016.



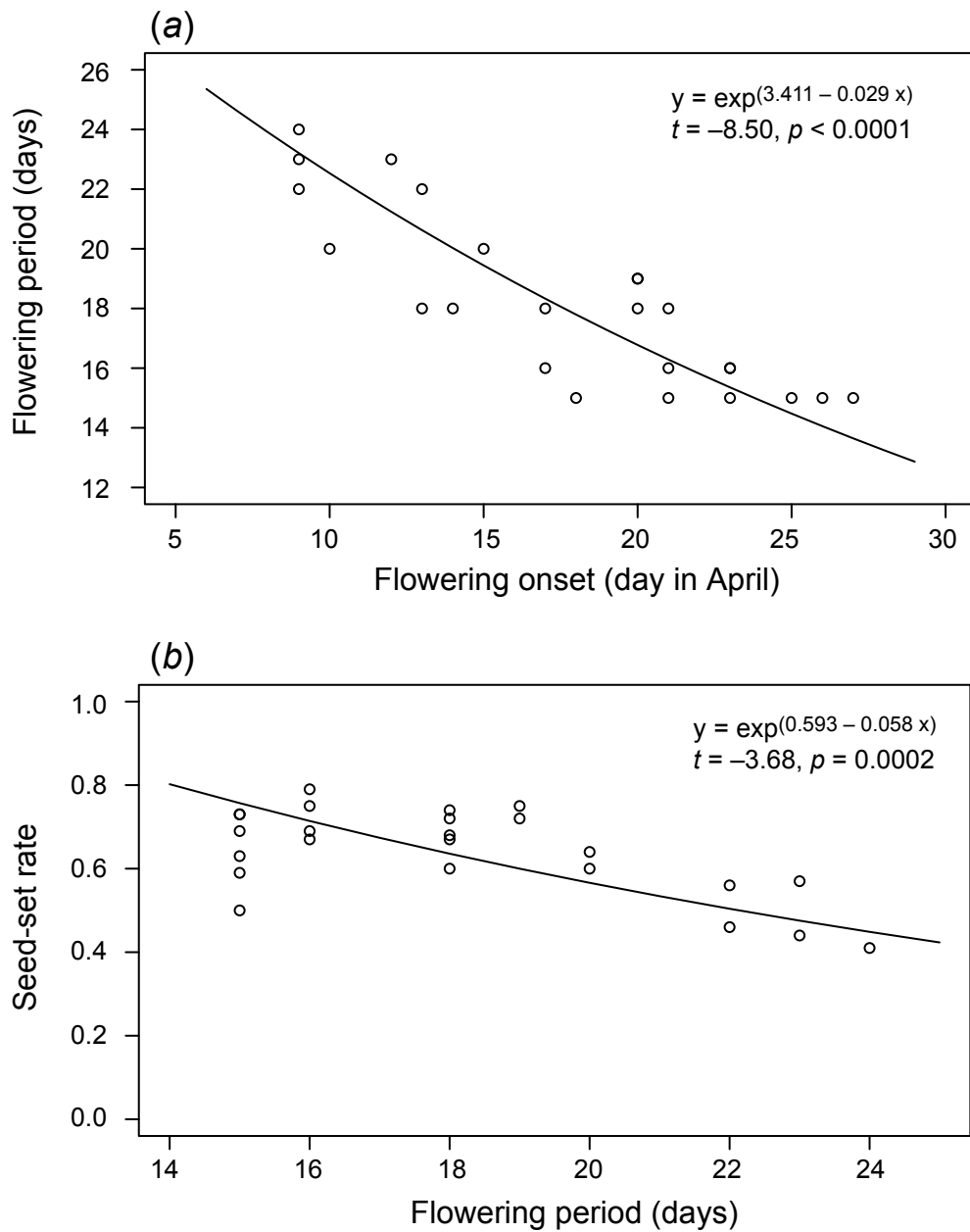
**Figure S3** Transition patterns of air temperature, surface temperature, and soil temperature (at 5 cm depth) in the spring of 2016. Day of snowmelt in C1 (92) and R1 (76), flowering onset day in C1(103) and R1 (100), and first emergence of bumble bees (108) are indicated.



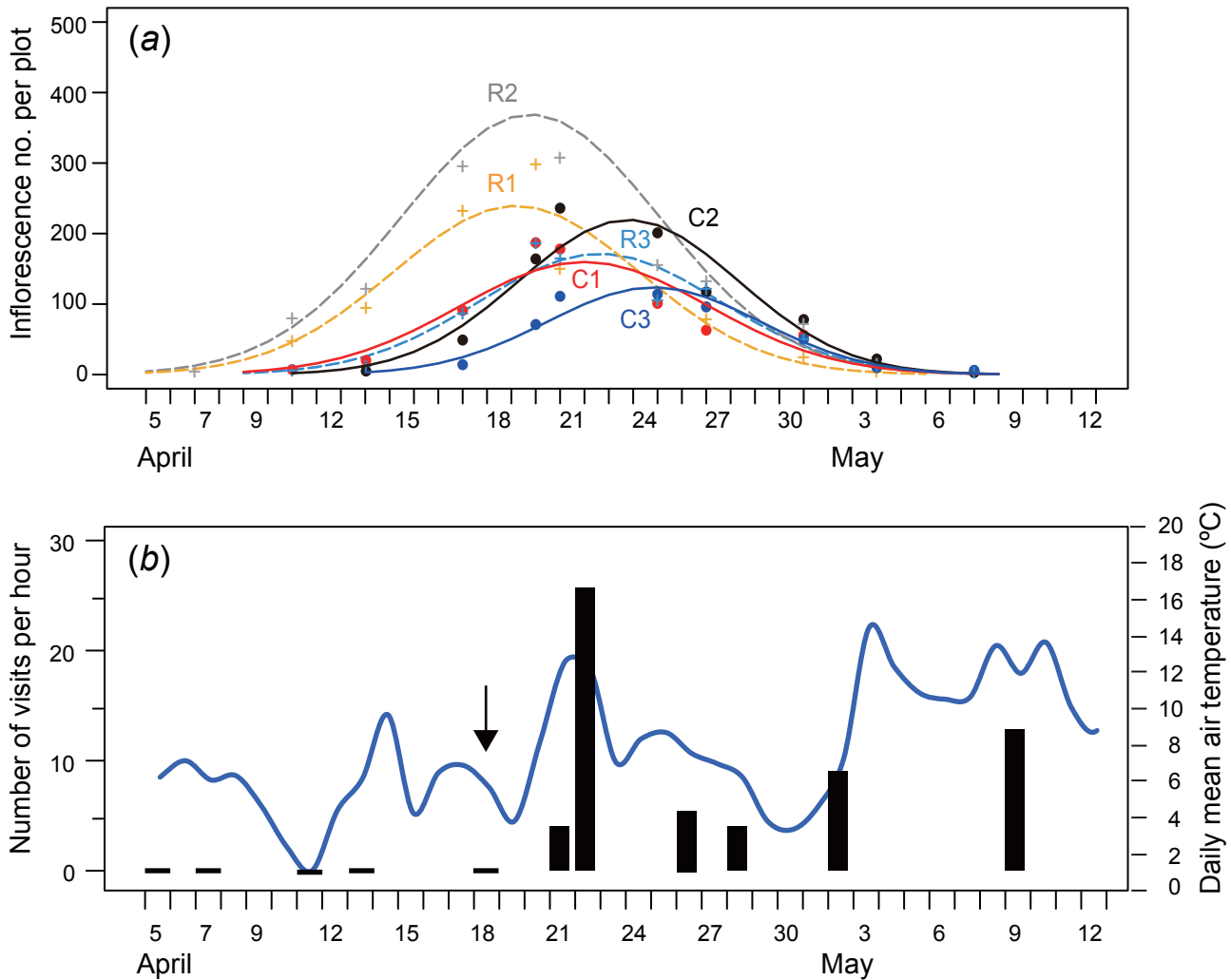
**Figure S4** Variation in the timing (day of year) of snowmelt, flowering onset, and queen bee emergence in the study forest over 1999–2017. The timing of snowmelt in the control and snow removal plots are indicated with light blue and yellow bars, respectively, during the experimental period (2014–2017). Note that the snow removal treatment was not performed in 2017 and all plots were treated as a control.



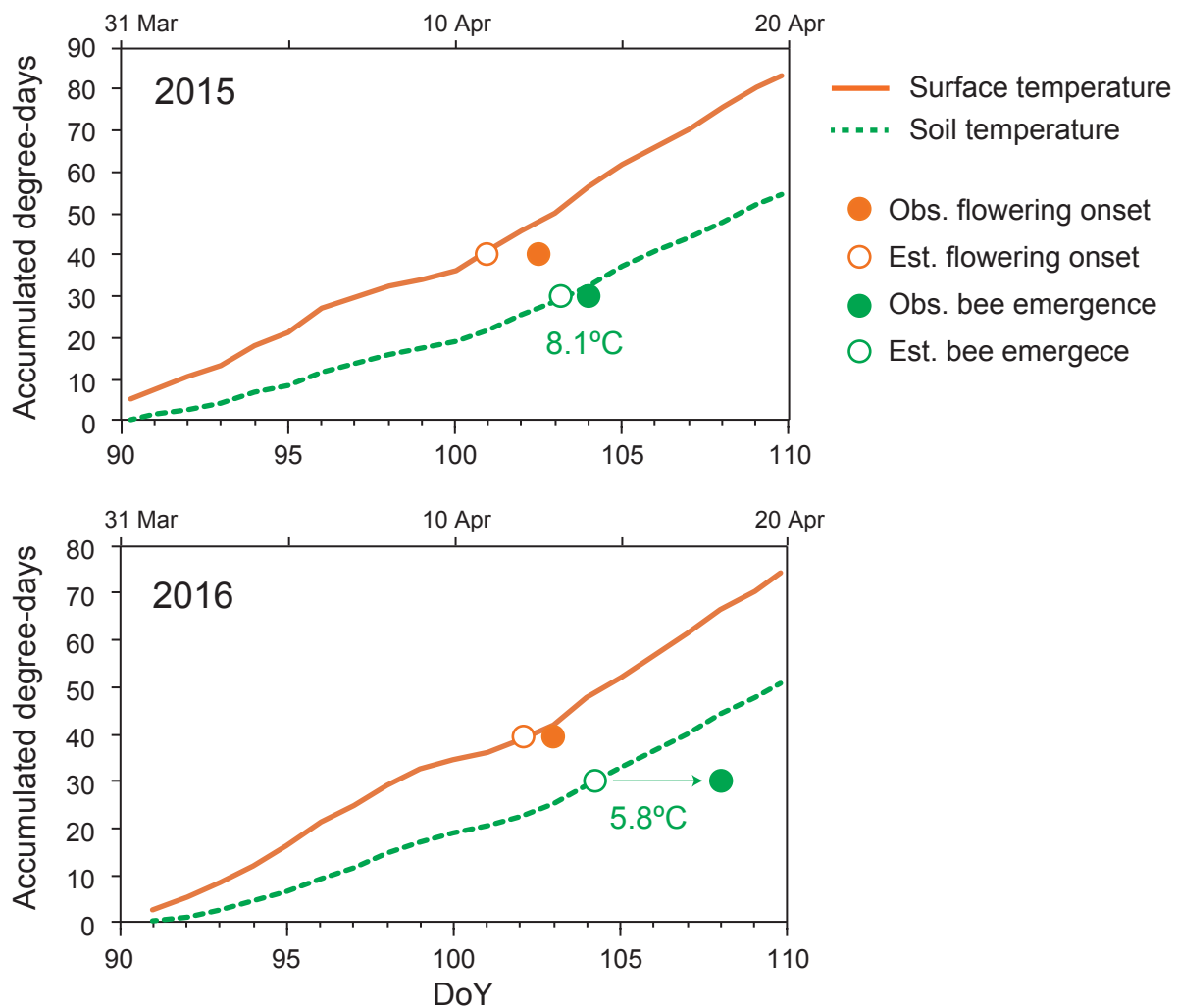
**Figure S5** Flowering patterns of *Corydalis ambigua* in each plot during 2014 to 2017. Only fitted curves to real data are shown. C1–C3: control plot, R1–R3: snow removal plot. In 2017, snow removal was not conducted and all plots were used as a control treatment. Plot size is 5 m x 5 m. The arrow indicates the day of bee emergence.



**Figure S6** (a) Relationship between flowering onset day and flowering period length within plots, and (b) relationship between flowering period and seed-set rate across plots (C1-3, R1-3) over years (2014-2017). The line indicates the result of GLMM with a Gamma error distribution and log-link function in which year (2014-2017) and plot (C1-3, R1-3) are included in random factors.



**Figure S7** (a) Modelled (lines) and actual inflorescence numbers (dot and crosses) within plots, and (b) hourly bumble bee visitation frequency to the plots in 2016. In (a), solid lines indicate control plots (C1, C2, C3) and dashed lines indicate snow removal plots (R1, R2, R3). The arrow in (b) indicates bee emergence date in the forest (no bees were observed before 21 April). Daily mean air temperature (blue line) is shown together with bee frequency (columns).



**Figure S8** Increasing patterns of degree-day accumulation of surface temperature and soil temperature (at 5 cm depth) after snowmelt, estimated day of flowering onset and bumble bee emergence from the degree-days values, and observed days of flowering onset and bumble bee emergence in 2015 and 2016. Bee emergence occurred 4 days later than the estimation in 2016, probably because cool temperature suppressed bee activity after hibernation. Daily mean air temperature between the estimated and day of first observation of bees is shown in each year.