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Supplementary Information for

Woody species do not differ in dormancy progression: differences in time to budbreak due to forcing and cold hardiness

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This PDF file includes:

Supplementary Information Text
Integrating Cold Hardiness and Budbreak

Throughout the work presented, the idea of a connection between spring phenology as budbreak and cold hardiness dynamics is introduced. The two aspects are shown to be mathematically linked in many species, which suggests a new way of studying dormancy that may bring clarity to this elusive aspect of perennial plants. Because of the novelty of the parameters shown, here I present examples of how each of the parameters related to cold hardiness can affect the universally measured time to 50% budbreak (BB_{50}). The hypothetical examples presented are cases explored in relation to the following **Eq. 1** and **Eq. 4** presented in the main text:

$$Time\ to\ Budbreak = \frac{|CH_0 - CH_{BB}|}{k^*_{deacc}} \quad [Eq. 1]$$

$$k^*_{deacc_T} = \max k_{deacc_T} \times \Psi_{deacc} \quad [Eq. 4]$$

where CH_0 is the initial cold hardiness (referred to in the main text as the "departure point"), CH_{BB} is the cold hardiness at budbreak, k^*_{deacc} is the effective rate of deacclimation. $k^*_{deacc_T}$ is the effective rate of deacclimation at temperature T, which is a result of the product of the maximum rate of deacclimation at temperature T ($\max k_{deacc_T}$) and the deacclimation potential (Ψ_{deacc}). The cold hardiness at budbreak (CH_{BB}) is estimated based on the estimated cold hardiness from the deacclimation assay at the time when 50% budbreak is observed (**SI Appendix Fig. S1**).

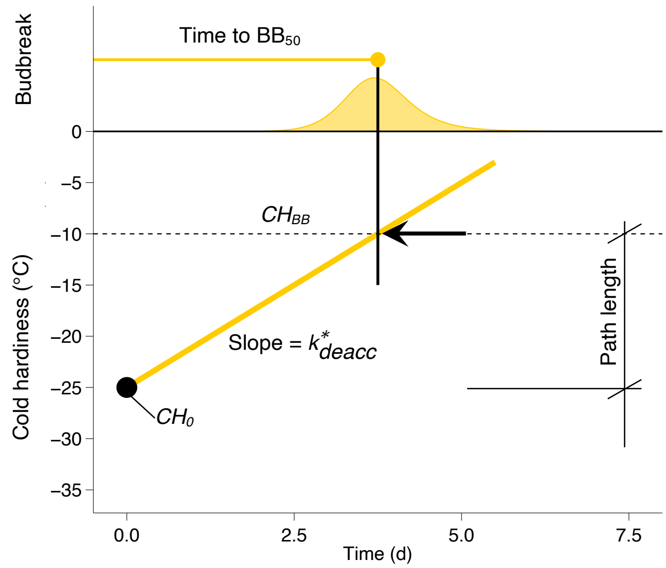


Figure S1. Schematic view of variables used in this study. The initial cold hardiness (CH_0) is the cold hardiness of buds collected from the field. The effective rate of deacclimation k^*_{deacc} is the slope of the deacclimation of buds in controlled environment. The time to 50% budbreak (BB_{50}) is measured in the same controlled environment as deacclimation. Cold hardiness at budbreak (CH_{BB}) is estimated based on the cold hardiness estimate when BB_{50} occurs. The path length is the distance in °C from CH_0 to CH_{BB}.

1. Differing rates of deacclimation, with constant initial cold hardiness and cold hardiness at budbreak

When comparing two samples that have the same initial cold hardiness (CH_0) and same cold hardiness at budbreak (CH_{BB}), this means the path length is the same for these samples (**SI Appendix Fig. S2**). The path length (in °C) is a measurement of how much cold hardiness must be lost before budbreak is observed. In this example, two different effective rates of deacclimation (k^*_{deacc}) are presented (the slopes of the lines), where the rate is higher in "***A***" than in "***B***". What occurs, in terms of visible phenotype, is that budbreak in "***A***" is observed earlier than in "***B***". In addition, the duration of budbreak is shorter, or more concentrated, in "***A***" than in "***B***". This is a result of the "shallower angle" with which the buds deacclimating in "***B***" reach the cold hardiness at budbreak.

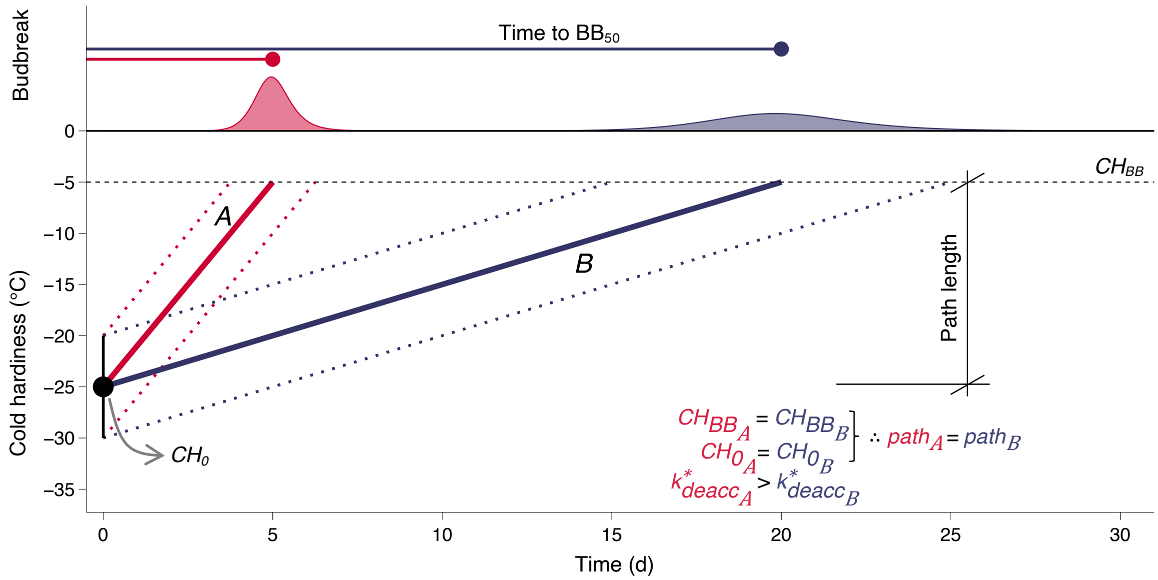


Figure S2. Different rates of deacclimation. Without varying initial cold hardiness ($CH0_A = CH0_B$) or cold hardiness at budbreak ($CH_{BB_A} = CH_{BB_B}$), the path length remains the same ($path_A = path_B$). However, as rate of deacclimation in *A* ($k^*_{deacc_A}$) is greater than in *B* ($k^*_{deacc_B}$), 50% budbreak (BB_{50}) is earlier and more concentrated in time.

2. Different cold hardiness at budbreak, with constant rate of deacclimation and initial cold hardiness

In this example, initial cold hardiness and rates of deacclimation are kept constant, but cold hardiness for budbreak is greater in "***B***" than in "***A***" (**SI Appendix Figs. S3A** and **S3B**). It is important to note that greater cold hardiness means a more negative value, so the greater is in a magnitude sense. This being the case, the greater CH_{BB} leads to a shorter path length to budbreak. Therefore, budbreak is observed later in "***A***" compared to "***B***" (**SI Appendix Fig. S3C**), although the distribution of budbreak is similar.

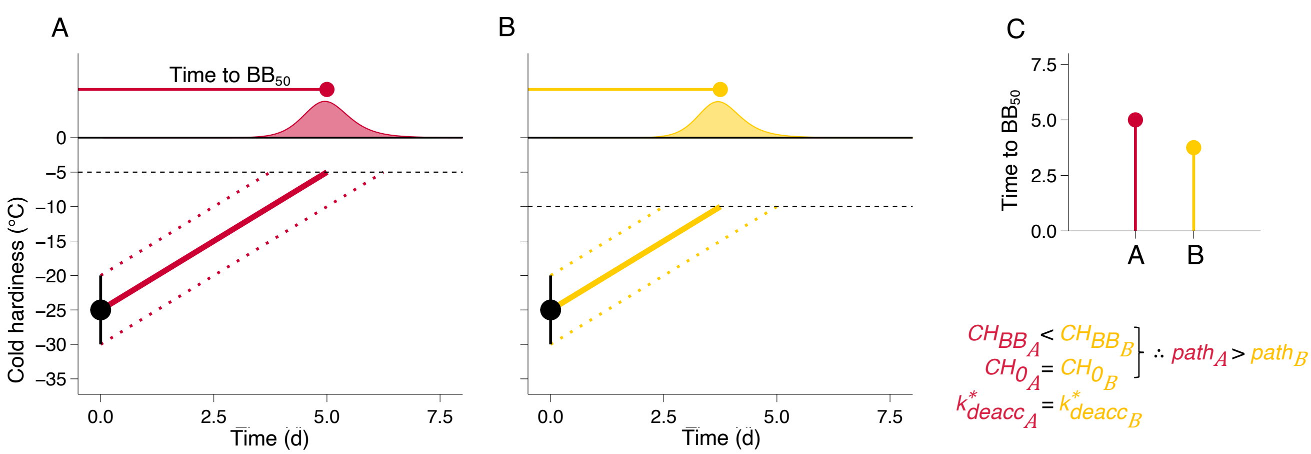
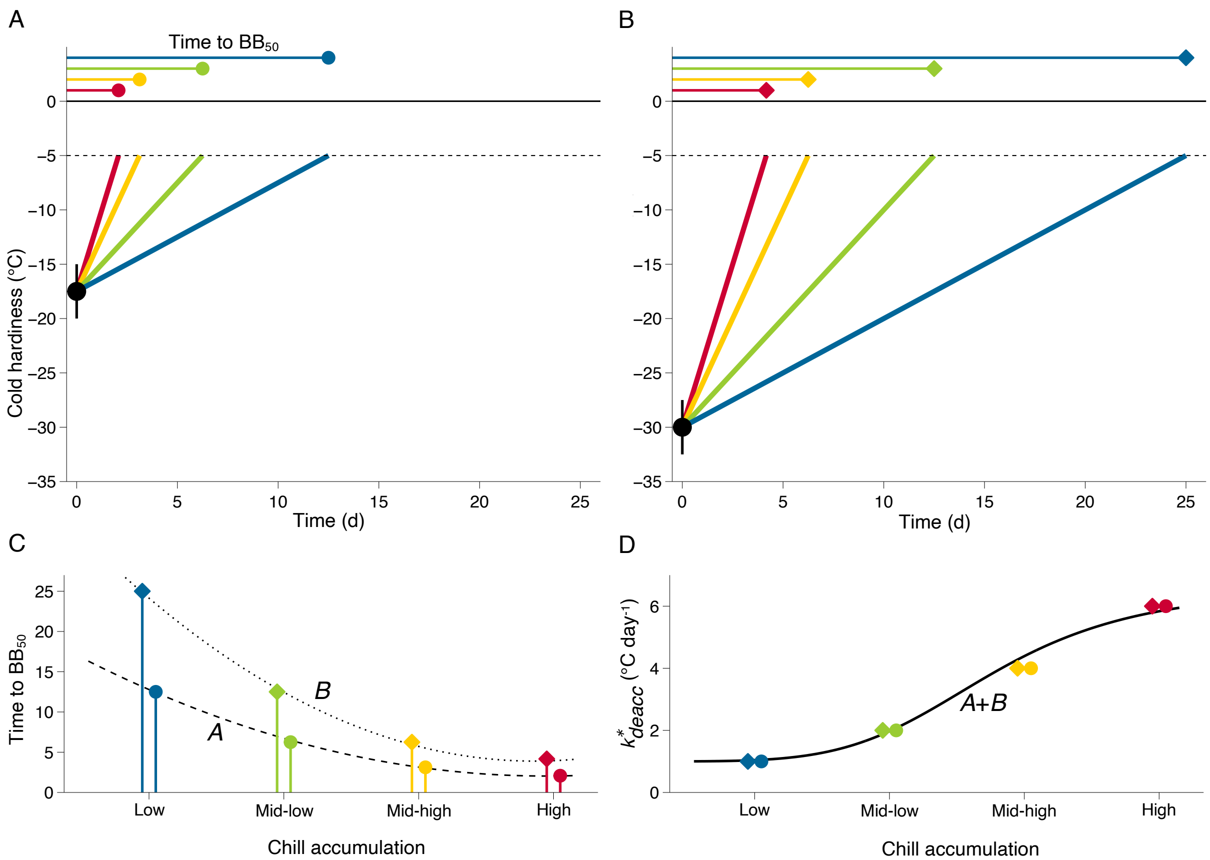


Figure S3. Different cold hardiness at budbreak. Without varying initial cold hardiness ($CH0_A = CH0_B$) but having *A* be less cold hardy at budbreak than *B* ($CH_{BB_A} < CH_{BB_B}$), the path length is greater in *A* ($path_A > path_B$). Therefore, even as the rates of deacclimation are the same ($k^*_{deacc_A} = k^*_{deacc_B}$), there is a perceived difference in time to 50% budbreak between the two *(C).*

3. Different initial cold hardiness, at different levels of chill accumulation, with constant rate of deacclimation and cold hardiness at budbreak

Here, two samples are presented at two different initial cold hardiness (CH_0; where "***A***" is less cold hardy than "***B***"), while the cold hardiness at budbreak (CH_{BB}) is kept constant (**SI Appendix Figs. S4A** and **S4B**). In addition the rate of deacclimation (k^*_{deacc}) is kept constant for the same color curves, where colors represent different levels of chill accumulation. The more cold hardy sample thus takes longer to budbreak (**SI Appendix Fig. S4C**) at any chill accumulation than the less cold hardy sample. By looking at the time to budbreak (**SI Appendix Fig. S4C**), it appears as if "***B***" is decreasing the time to budbreak faster than "***A***" as chill accumulates. The distance in time to budbreak at any given point between "***A***" and "***B***" is the difference in cold hardiness between the samples divided by the rate of deacclimation, which explains the seemingly asymmetrical decrease in time to budbreak. However, when the rates of deacclimation are observed in relation to chill accumulation, no difference is observed between the two samples (**SI Appendix Fig. S4D**). This suggests that the physiological state in response to chilling is the same for both, but presumably lower temperatures experienced by "***B***" led to greater gain of cold hardiness in the field prior to hypothetical deacclimation assays compared to "***A***".



$$\left.\begin{matrix} CH_{BB_A} = CH_{BB_B} \\ CH_{0_A} < CH_{0_B} \end{matrix}\right\} \therefore path_A < path_B$$

$$k^*_{deacc_A} = k^*_{deacc_B} \text{ (for corresponding colors)}$$

Figure S4. Different initial cold hardiness, at different levels of chill accumulation. As *A* has a lesser initial cold hardiness than *B* ($CH_{0_A} < CH_{0_B}$), while having the same cold hardiness at budbreak ($CH_{BB_A} = CH_{BB_B}$), the path length in *A* is shorter than in *B* ($path_A < path_B$). The time to 50% budbreak (*C*) therefore differs for same levels of chill accumulation (corresponding colors). However, the effective rates of deacclimation (k^*_{deacc}; *D*) are the same at the same levels of chill accumulation.

4. **Different rates of deacclimation, at different levels of chill accumulation, with constant initial cold hardiness and cold hardiness at budbreak**

In this example, the initial cold hardiness and cold hardiness at budbreak are kept constant, but the effective rates of deacclimation (k^{*}_{deacc}) at the same levels of chill accumulation (same colors) are greater in "***A***" compared to "***B***" (**SI Appendix Figs. S5A** and **S5B in next page**). Because of the lower rates, "***B***" shows a longer time to budbreak at same levels of chill accumulation (same colors) compared to "***A***" (**SI Appendix Fig. S5C**). If we look at the effective rates of deacclimation in response to chilling (**SI Appendix Fig. S5D**), "***B***" has lower rates of deacclimation at the same chill accumulations compared to "***A***". However, if the rates are standardized based on the highest rate measured at high chill accumulation (shown in red in **SI Appendix Fig. S5**), we obtain the deacclimation potential at any point in chill accumulation (**SI Appendix Fig. S5E**). The curves describing deacclimation potential of "***A***" and "***B***" overlap, suggesting that again the physiological state of the two samples at these points in chill accumulation are the same, but differences in time to budbreak can still be observed based on the fact that one species (or genotype) has an inherently faster deacclimation rate than the other.

5. **Considerations**

Here the examples in 1-4 describe changes in single parameters at a time to simplify the effects observed in time to budbreak. However, most parameters will differ for different species (CH_0, CH_{BB}, and $\max k_{deacc_T}$), and possibly for genotypes within species, though it appears that Ψ_{deacc} is very similar across distantly related species. This suggests that the regulation of dormancy in all plants is very conserved, and perhaps a simple process such that any changes in regulation lead to severe maladaptation. While CH_{BB} and $\max k_{deacc_T}$ are species dependent (and expected to be independent from environment), CH_0 will also vary within a species depending on the lowest temperatures experienced in any given year or region, or the time of collection within a dormant season. This will alter the path length, but at the same chilling accumulation, for the same species, the path length will still be linearly correlated to the time to budbreak (**SI Appendix Fig. S6**).

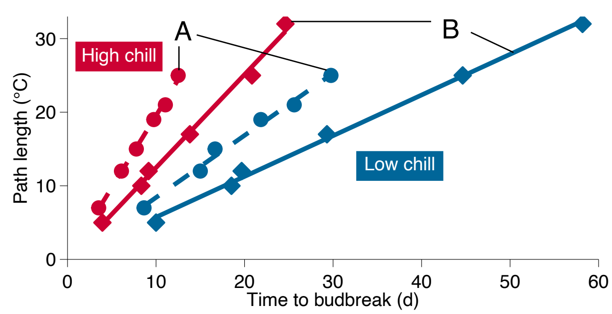


Figure S6. Relationship between path length and time to budbreak as a function of chilling and genotype. Multiple path lengths are shown for two species, *A* and *B*, . The time to budbreak is then related to the path length within a given level of chill accumulation and species. The slope of the curves represent the effective rate of deacclimation (k^{*}_{deacc}) for each species at each chilling accumulation.

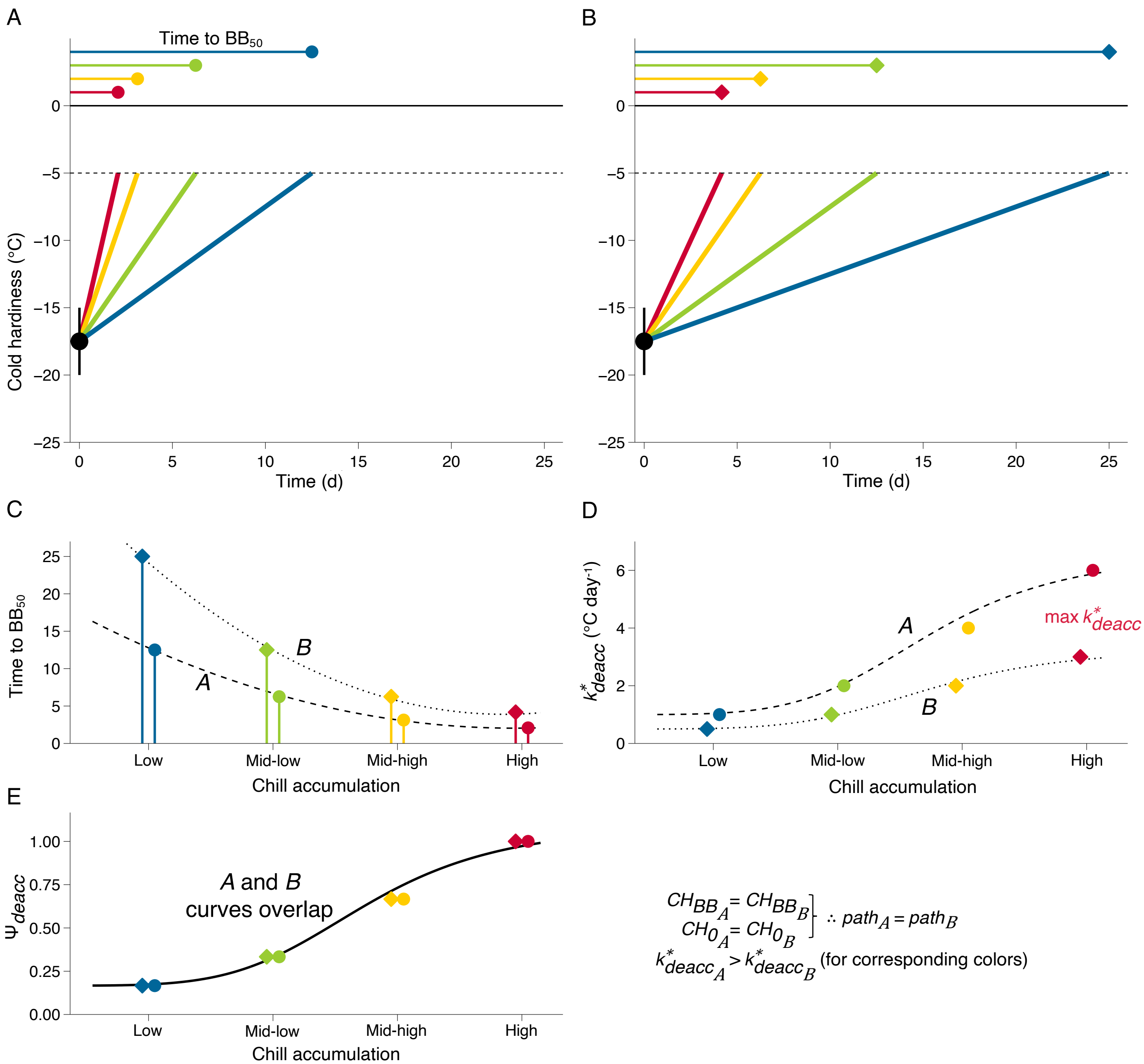


Figure S5. Different rates of deacclimation, at different levels of chill accumulation. *A* and *B* have the same initial cold hardiness and same cold hardiness at budbreak, and therefore the same path length ($path_A = path_B$). The time to 50% budbreak (*C*) differs for same levels of chill accumulation (corresponding colors). This occurs as the effective rates of deacclimation (k^*_{deacc}; *D*) are greater in *A* than in *B* at the same levels of chill accumulation. However, if the rates are standardized based on the maximum rate observed (max k^*_{deacc}), thus generating the deacclimation potential (Ψ_{deacc}; *E*), no difference is observed between *A* and *B*.

Materials and Methods

Study site and material collected. All material was collected from plants from the Arnold Arboretum of Harvard University, located in Boston, MA, USA (42°17'57” N 71°07'22” W). The climate is a humid subtropical climate (Koeppen’s Cfa), USDA Plant Hardiness Zone 6b [average annual extreme minimum temperature –17.8 to –15 °C (1)]. The 15 species collected were balsam fir (*Abies balsamea*), red maple (*Acer rubrum*), sugar maple (*Acer saccharum*), Eastern redbud (*Cercis canadensis*), flowering dogwood (*Cornus florida*), cornelian cherry (*Cornus mas*), American beech (*Fagus grandifolia*), forsythia (*Forsythia* × ‘Meadowlark’), mountain laurel (*Kalmia latifolia*), Japanese larch (*Larix kaempferi*), dawn redwood (*Metasequoia glyptostroboides*), Norway spruce (*Picea abies*), apricot (*Prunus armeniaca* ‘Mikado’), Canadian plum (*Prunus nigra*), and flame azalea (*Rhododendron calendulaceum*). Buds were collected from individual plants, except for: *Forsythia* × ‘Meadowlark’, for which multiple clones are available; and *Fagus grandifolia*, *Kalmia latifolia* and *Rhododendron calendulaceum*, which resulted in collections from multiple individuals at random located in the same mass due to large number of buds required (≳2000 over two seasons; see **SI Appendix Table S1**). Plant IDs are available in **SI Appendix Table S1**, and further details can be found using the Arboretum Explorer website (https://arboretum.harvard.edu/explorer/).

Effect of chill accumulation on budbreak. Collections for budbreak assays occurred at weekly intervals in the field during two dormant seasons: from mid-September 2019 through mid-March 2020, and mid-September 2020 through end of February 2021 (**SI Appendix, Table S2**) and were processed on the same day of collection. For **budbreak** observations, 10 cuttings for each species were separated from the rest of material collected and placed in cups with water into a growth chamber at 22 °C, 16h day/8h night (forcing conditions). Observations occurred daily and budbreak was noted for individual cuttings when it occurred in any bud within a cutting with multiple buds (all species except *Cornus florida* and *Rhododendron calendulaceum*, for which cuttings with single buds were used). Time to budbreak is therefore the time (in days) elapsed between the date of collection and the day when budbreak occurred for each cutting in the growth chamber. Generally, in early collections this resulted in a single bud breaking in cuttings with multiple buds, whereas at later collections multiple buds would break synchronously within the same cutting – resulting in an underestimation in overall time to budbreak at low chill accumulations. Due to differences in bud morphology for each species, the budbreak phenotype was different and is further described in **SI Appendix Table S1**. In general, very early signs of budbreak were used (e.g., bud scales begin to separate and leaf tips are visible) rather than leafout. In species where both vegetative and reproductive budbreak was observed, vegetative budbreak comprised most of the early observations, whereas at later collections budbreak was mostly of reproductive buds.

Effect of chill accumulation on deacclimation. Cuttings for deacclimation were collected at the same times as those for budbreak and placed under the same forcing conditions (22 °C, 16h day/8h night). The field cold hardiness (CH_{field}) was determined on the date of collection (prior to any deacclimation) and is also the initial cold hardiness (CH_0) for each deacclimation assay (details on how cold hardiness was measured below). At semi-regular intervals, buds from the material under forcing conditions was used to evaluate cold hardiness at different points in time (i.e., CH_1, CH_2, … CH_n) to estimate rates of deacclimation. Cadence of sampling to determine rates of deacclimation was based on equipment availability and expected deacclimation rates for each species. In general, a minimum number of five time points for cold hardiness measurements were sought such as to determine the two parameters of the linear relationship: species with higher deacclimation rates (e.g., Forsythia × 'Meadowlark' and *Prunus armeniaca*) were generally sampled at smaller intervals than those with lower deacclimation rates (e.g., *Picea abies*). However, at high chill accumulations, extreme rates of deacclimation in some species led to full deacclimation within a day, and therefore rates being based on only two time points [field (day 0) and day 1]. In the first season, assessments of field cold hardiness continued between mid-March 2020 and budbreak for each species, but lab access restrictions due to COVID-19 did not allow for deacclimation and budbreak assays. Deacclimation assay measurements for all species at 22 °C in every collection are available in **SI Appendix Figs. S19 to S48**.

Effect of temperature on deacclimation. Additional cuttings were collected one time per season in mid-winter [mid-February (82 chill portions) in the first, mid-January (54 chill portions) in the second season], from 13 of the 15 species in both years combined (all but *Acer saccharum* and *Metasequoia glyptostroboides*) to investigate the effect of different temperatures in deacclimation. The cuttings were placed in cups of water, and into growth chambers at seven different temperatures (2, 4, 7, 11, 15, 22 and 30 °C) to establish the relationship of deacclimation rate to temperature. With the exception of the 22 °C treatment (16h daylight), all other temperatures had 0h day/24h night as the photoperiod. Initial cold hardiness was determined on date of collection, and deacclimation measured in semi-regular intervals. Cold hardiness was generally assessed at smaller intervals in higher temperatures than lower temperatures. Measurements are available in **SI Appendix Figs. S49 and S50**.

Cold hardiness measurements. Cold hardiness of buds was measured using differential thermal analysis [DTA; (2)]. Buds were excised from stems and placed in thermoelectric modules (TEMs) in plates connected to a Keithley data logger (Tektronix, Beaverton, OR). The plates were placed in a programmable environmental chamber (Tenney, New Columbia, PA), in which temperature was decreased to –5 °C for 5h to promote initial non-lethal freezing events [high temperature exotherms (HTEs)] and then cooled at –6 °C $hour^{-1}$ to –55 °C. Due to COVID-19 related restrictions, starting 19 March 2020 until the end of the first season, the freezing was done in a common household freezer, and therefore the rate of cooling was not controlled and the minimum temperature reached was approximately –22 °C. Temperature and changes in voltage due to temperature differentials between the two surfaces of the TEMs are recorded, and therefore the release of heat due to freezing of water in buds results in voltage peaks. In DTA measurements, HTE peaks are large and occur at high below freezing temperatures as temperatures start ramping down within the assay (**SI Appendix Fig. S51**). These are non-lethal and usually understood to represent extracellular water freezing (3,2). In contrast, low temperature exotherms (LTEs) peaks are smaller than HTE peaks, occur at lower (more negative) temperatures, and are lethal freezing events of supercooled water within buds – thus representing their cold hardiness.. A maximum of 10 values for cold hardiness were recorded each time. Many species became less cold hardy in the field in mid-March 2020. While it is possible that the lower limit of detection (at approximately –22 °C in a household freezer) caused these errors, this shift also overlaps with considerable increase in air temperature and even full deacclimation and field budbreak of some species.

Field budbreak. Budbreak was observed in the field in the spring of 2020 (**SI Appendix Fig. S52**). Observations were done in quasi-daily intervals and the same phenotype for budbreak was used as that of controlled environment observations, noted as percent of total buds presenting the phenotype.

On-site meteorological data. Weather data were obtained from the Weld Hill meteorological station (HOBO RX3000 Station, Hobolink), available through the Arnold Arboretum website (arboretum.harvard.edu). The most distant plant (*Acer rubrum*) is located ~1,700 m from the weather station. Hourly air temperature was used to compute chilling accumulation at each collection point. Chilling accumulation was calculated as chill portions based on the Dynamic Model (4,5). Temperature and chilling accumulation for both years are shown in **SI Appendix Fig. S8**.

Statistical analysis. All analyses were conducted and figures produced using R [v. 4.0.4 (6)] within RStudio [v. 1.3.1093 (7)] and multiple packages therein (8-16). Deacclimation rates were determined using ordinary linear regressions for all deacclimation assays (weekly at 22 °C, and once per season at multiple temperatures), where cold hardiness is the dependent variable, and time in days is the independent variable:

$$y_i = \alpha + \beta x_i + \epsilon_i$$

where the intercept *a* represents the cold hardiness at collection (CH_{field} or CH_0), and regression slope *b* is the effective deacclimation rate k^*_{deacc} in °C day^{-1}. Because of detection limits at above ~–3 °C (**SI Appendix Fig. S18**), and the general trend of cold hardiness measurements to have a minimum cold hardiness of –5 °C (17), adjacent timepoints with similar cold hardiness measurements at warmer temperatures were manually removed to prevent reductions in the deacclimation rates due to this artifact. Datapoints with studentized residuals greater than 3 were removed (1.3% of measurements) and regressions were re-fit. Some gains in cold hardiness were observed in earlier collection points, which is expected to be a result of buds maturing within the warm temperature chamber.

To compare the **effect of chill accumulation on deacclimation** among species, the effective rates of deacclimation from weekly collections subjected to 22 °C ($k^*_{deacc_{22\,°C}}$) were normalized within each genotype, resulting in the potential for deacclimation at each collection:

$$\Psi_{deacc_i} = \frac{\beta_i}{\sum_{k=0}^{4} \beta_{(j-k)} / 4}$$

where b_i is the deacclimation rate at the i^{th} collection, and $b_{(j)}$ is the j^{th} highest deacclimation rate, such that the rate is normalized to the average of the highest 4 measured deacclimation rates. The average of the 4 highest deacclimation rates is also presented as $\max k_{deacc_{22\,°C}}$. A three-parameter log-logistic function, with upper limit 1, was fit to these data for each species:

$$\Psi_{deacc_i}(chill) = d + {}^{(1-d)}/_{1 + e^{[b\,(\ln(chill_i) - \ln(c)]}}$$

where the potential for deacclimation at the i^{th} collection is a function of chilling accumulation at the i^{th} collection. Three estimates are thus obtained: *d* is the minimum deacclimation observed at all times (analogous to an intercept); *b* is the slope associated with the log-logistic curve, where negative values indicate increases in Ψ_{deacc} as chill accumulation increases, and greater magnitudes indicate a higher slope; and *c* is the inflection point of the log-logistic curve and therefore a chilling requirement-analogous measurement as the chilling required to reach 50% of the maximum deacclimation rate.

To establish chilling requirements based on the **effect of chill accumulation of budbreak**, time to 50% budbreak at 22 °C and a threshold of 15 days was used. The chilling requirement was calculated as the mean chilling accumulation of the four consecutive points where the average time to budbreak was closest to 15 days, using both years of data combined. For species in which the 15 days threshold was not crossed, the last four timepoints were used.

The maximum cold hardiness (CH_{max}) of each species was determined as the average of measurements from the four dates where the cold hardiness for each genotype were maximum. To estimate the cold hardiness at budbreak (CH_{BB}), the field cold hardiness dataset was merged with the budbreak dataset, such that each cold hardiness measurements had n budbreak times associated with it – n being the number of buds that broke within a collection. For this, only data after >25 chill portions had accumulated were used to select informative points where deacclimation rates were high enough and budbreak occurred with more regularity. Each cold hardiness point was then predicted to lose cold hardiness at the measured deacclimation rate until each time of budbreak (see **SI Appendix Figs. S1**). The average of all measurements then provided an estimated parameter for cold hardiness at budbreak. Because *Rhododendron calendulaceum* had very poor budbreak in controlled environment, a determined cold hardiness at budbreak was used for this species based on literature [CH_{BB} = –5 °C (18,19)].

The **effect of temperature on deacclimation** was evaluated by fitting a third-degree polynomial of determined rates in response to temperature. Third-degree polynomials were used to acknowledge the known effects of fast increases in rate at low temperatures and lower increases in rate at high temperatures for the nine species in which different temperatures were tested. To remove effects from lower chill accumulation (Ψ_{deacc} < 1) in the collections for the effect of temperatures, the slopes from each temperature ($k^*_{deacc_T}$) for each species were corrected based on the ratio of the rate measured at 22 °C at the temperature collection and $\max k_{deacc_{22\,°C}}$, thus resulting in $\max k_{deacc_T}$ for each temperature. Corrected rates were then used to calculate the function that describes k_{deacc} for each species:

$$\max k_{deacc_T} = \begin{cases} 0 & if\ T \leq 0\ °C \\ 0 + \beta_1 T + \beta_2 T^2 + \beta_3 T^3 & if\ T > 0\ °C \end{cases}$$

where T is the air temperature. For those genotypes in which the response to different temperatures was not estimated, a linear response was used with a 0 intercept; and $\max k_{deacc_{22\,°C}}$ divided by 22 as β_1.

Although there were no acclimation experiments in this study, a rate of acclimation (k_{acc}) was required to evaluate time to budbreak in relation to field cold hardiness. Therefore, a single linear rate of acclimation used was for all species:

$$k_{acc} = \begin{cases} 0 & if\ T \geq 0\ °C \\ 0.3\ \times\ T & if\ T < 0\ °C\ and\ \left(CH_{field} + 0.3\ \times\ T\right) > CH_{max} \\ CH_{field} -\ \ CH_{max} & if\ T < 0\ °C\ and\ \left(CH_{field} + 0.3\ \times\ T\right) < CH_{max} \end{cases}$$

where acclimation does not occur at above 0 °C, and is a linear response to temperature otherwise. A threshold was imposed such that the predicted cold hardiness would not surpass maximum measured cold hardiness, and therefore deacclimation starts towards budbreak when the deacclimation overcomes any acclimation that may occur within a day. The estimate of 0.3 was used based on four iterations (0.0, 0.1, 0.2, 0.3) for acclimation rates of similar magnitude to those in the literature (20,21), and the equations used are a numerical way to overcome unknowns in the acclimation process. The four manual iterations of k_{acc} were the only optimization performed in the model, and the same rate was used for all species.

Estimates, sample sizes (n), and appropriate fitness statistics (e.g., r^2s and *P*-values) for each portion of the data analyses are available in **SI Appendix Tables S3–S5**.

Supplementary Information References

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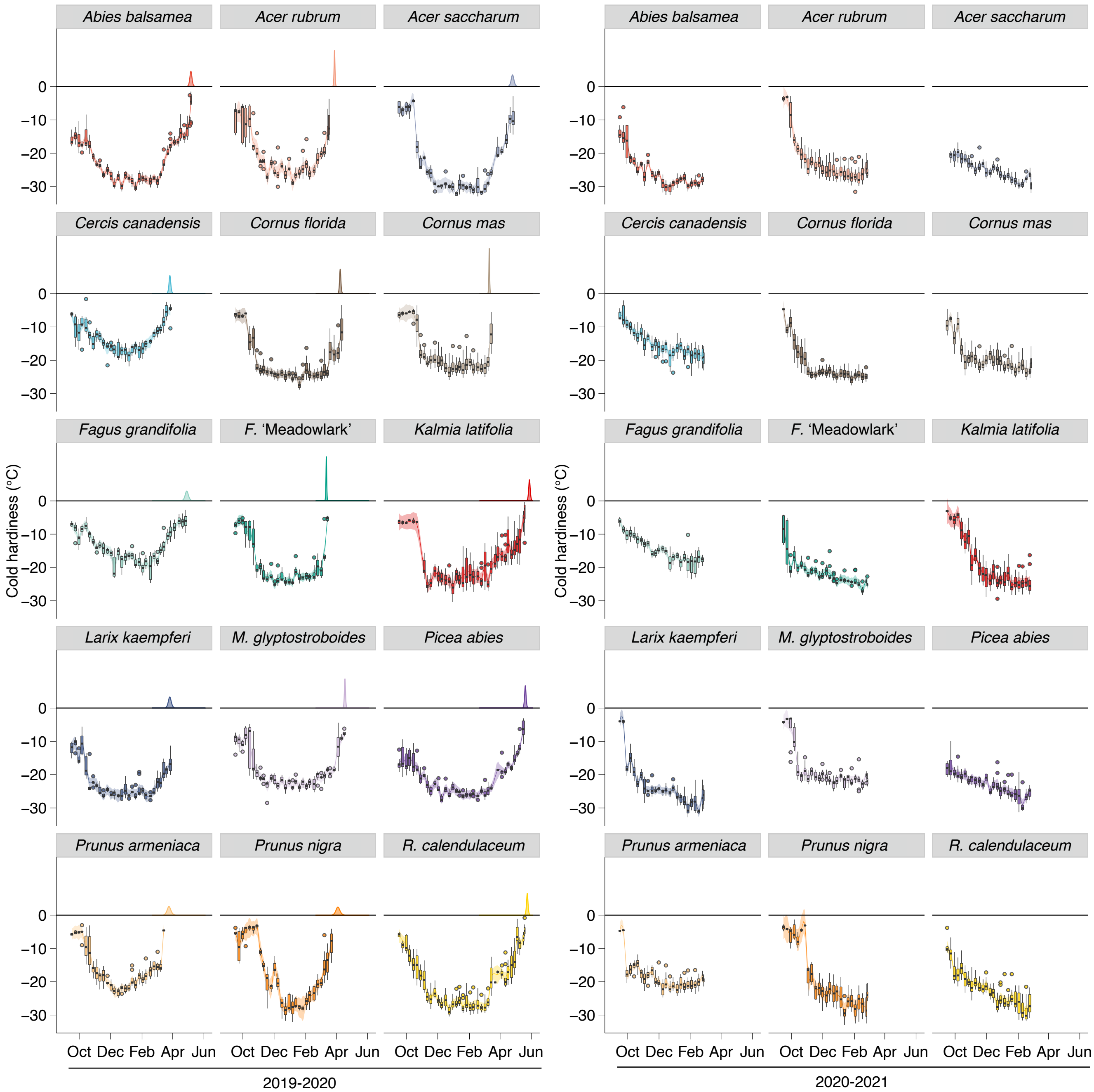

Figure S7. Field cold hardiness. Cold hardiness of buds was measured weekly throughout two dormant seasons for 15 species. These represents CH_0 for each weekly deacclimation assay. Density curves above 0 °C line in 2019-2020 represent observed budbreak in the field. Main figure equivalent is **Fig. 3**.

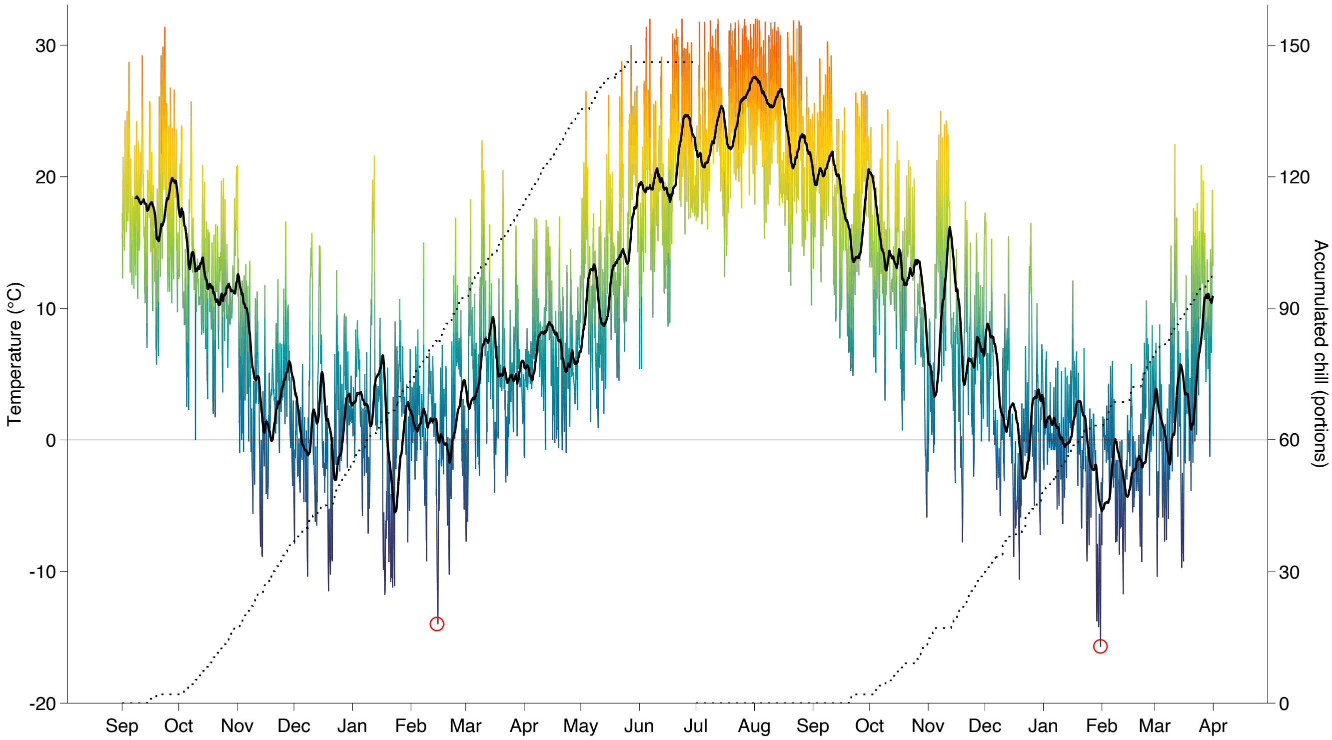

Figure S8. Temperature conditions in the field. Observed hourly temperatures (colored line, left vertical axis), seven days average temperature (solid black line) and chill accumulation (dotted black line, right vertical axis) between 1 September 2019 and 31 March 2021 at the Arnold Arboretum of Harvard University, in Boston, MA, USA. Red circles show minimum temperature observed in each season (–14.0 °C in 2020, –15.7 °C in 2021).

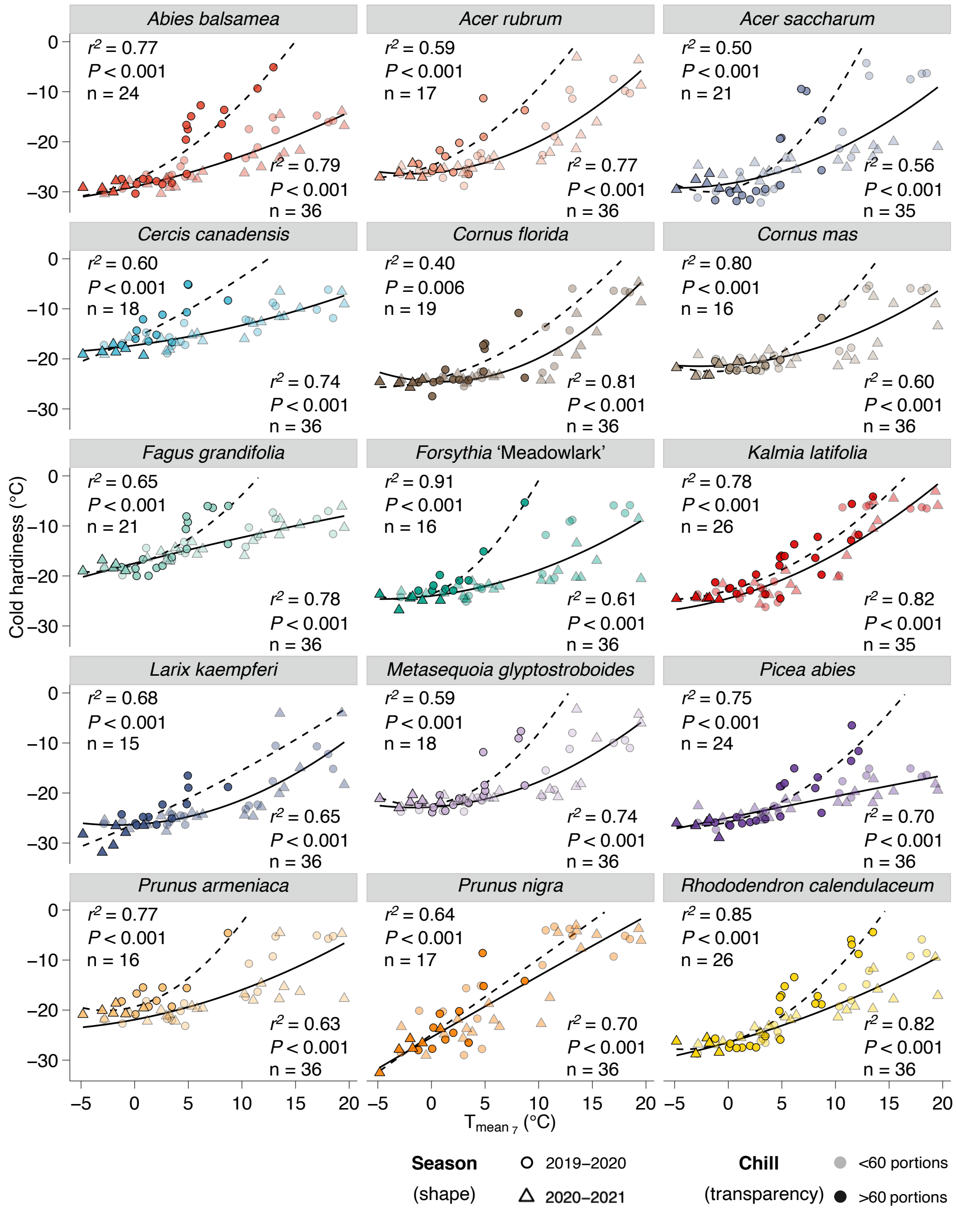

Figure S9. Relationship between weekly average temperature and cold hardiness. Second degree polynomials were fit to cold hardiness data from two seasons separated between early winter (<60 chill portions accumulated, transparent color points, full line, bottom right statistics) and late winter (>60 chill portions accumulated, vivid color points, dashed line, upper left statistics) for each species using the average temperature for the seven days preceding collection.

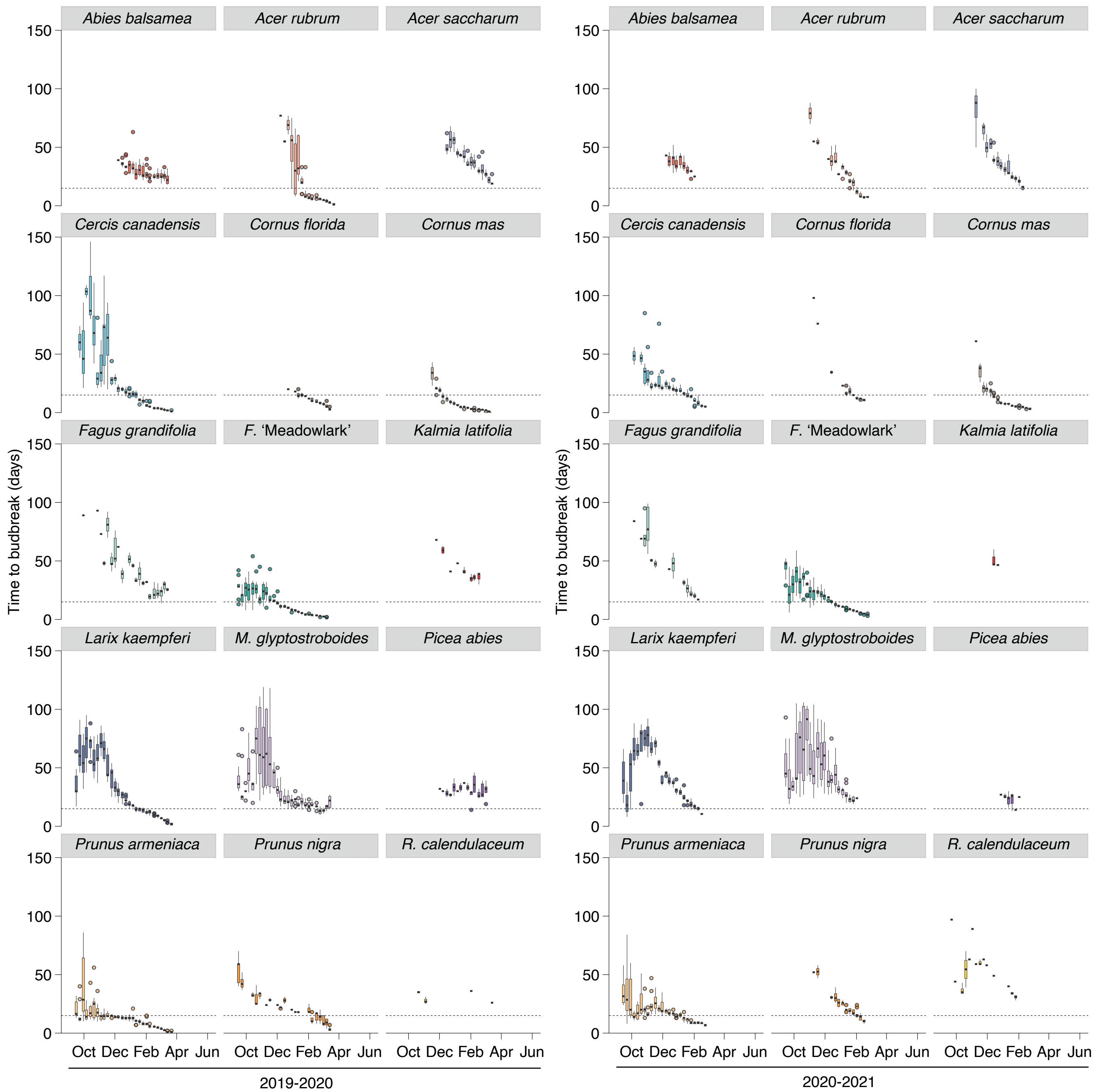

Figure S10. Budbreak in controlled environment. Time to budbreak in forcing conditions in controlled environment of buds collected weekly throughout two dormant seasons for 15 species. Main figure equivalent is **Fig. 3**.

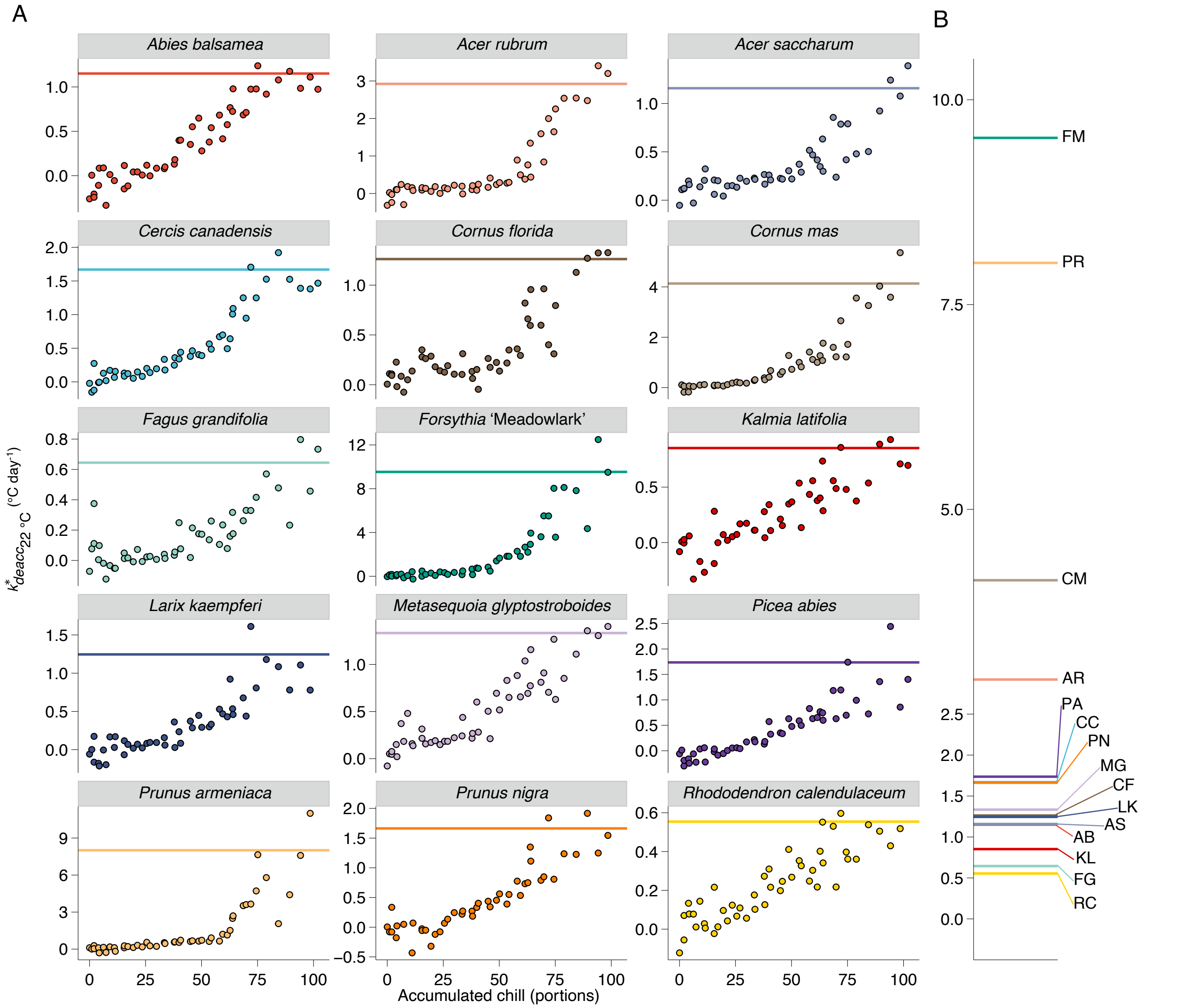

Figure S11. Deacclimation rates response to chill accumulation. Deacclimation rates obtained from weekly deacclimation assays at 22 °C for each species during two dormant seasons (*A*). Horizontal line shows maximum rate of deacclimation at 22 °C as the average of the four highest deacclimation rates in each panel. Note different y axes for each species. In the right side *(B*), maximum rates of all species are plotted together for magnitude comparisons. AB – *Abies balsamea*; AR – *Acer rubrum*; AS – *Acer saccharum*; CC – *Cercis canadensis*; CF – *Cornus florida*; CM – *Cornus mas*; FG – *Fagus grandifolia*; FM – *Forsythia* 'Meadowlark'; KL – *Kalmia latifolia*; LK – *Larix kaempferi*; MG – *Metasequoia glyptostroboides*; PA – *Picea abies*; PR – *Prunus armeniaca*; PN – *Prunus nigra*; RC – *Rhododendron calendulaceum.* Main figure equivalent is **Fig. 5A**.

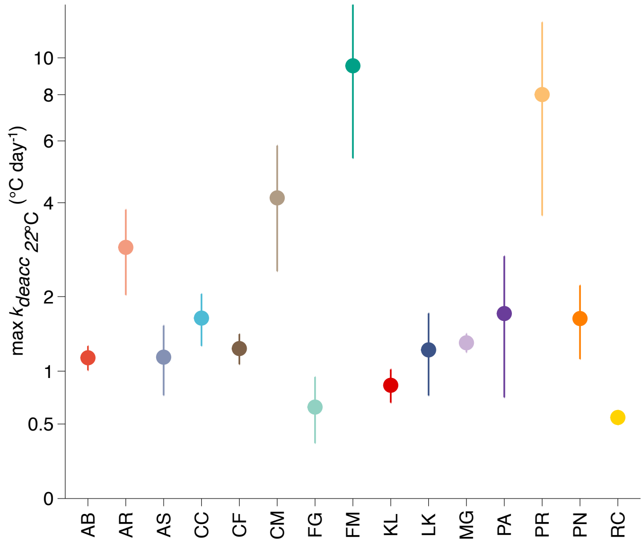

Figure S12. Maximum deacclimation rates for each species. Maximum deacclimation rates measured from weekly deacclimation assays at 22 °C for each species during two dormant seasons (log scale). Error bars indicate standard error. AB – *Abies balsamea*; AR – *Acer rubrum*; AS – *Acer saccharum*; CC – *Cercis canadensis*; CF – *Cornus florida*; CM – *Cornus mas*; FG – *Fagus grandifolia*; FM – *Forsythia* 'Meadowlark'; KL – *Kalmia latifolia*; LK – *Larix kaempferi*; MG – *Metasequoia glyptostroboides*; PA – *Picea abies*; PR – *Prunus armeniaca*; PN – *Prunus nigra*; RC – *Rhododendron calendulaceum.*

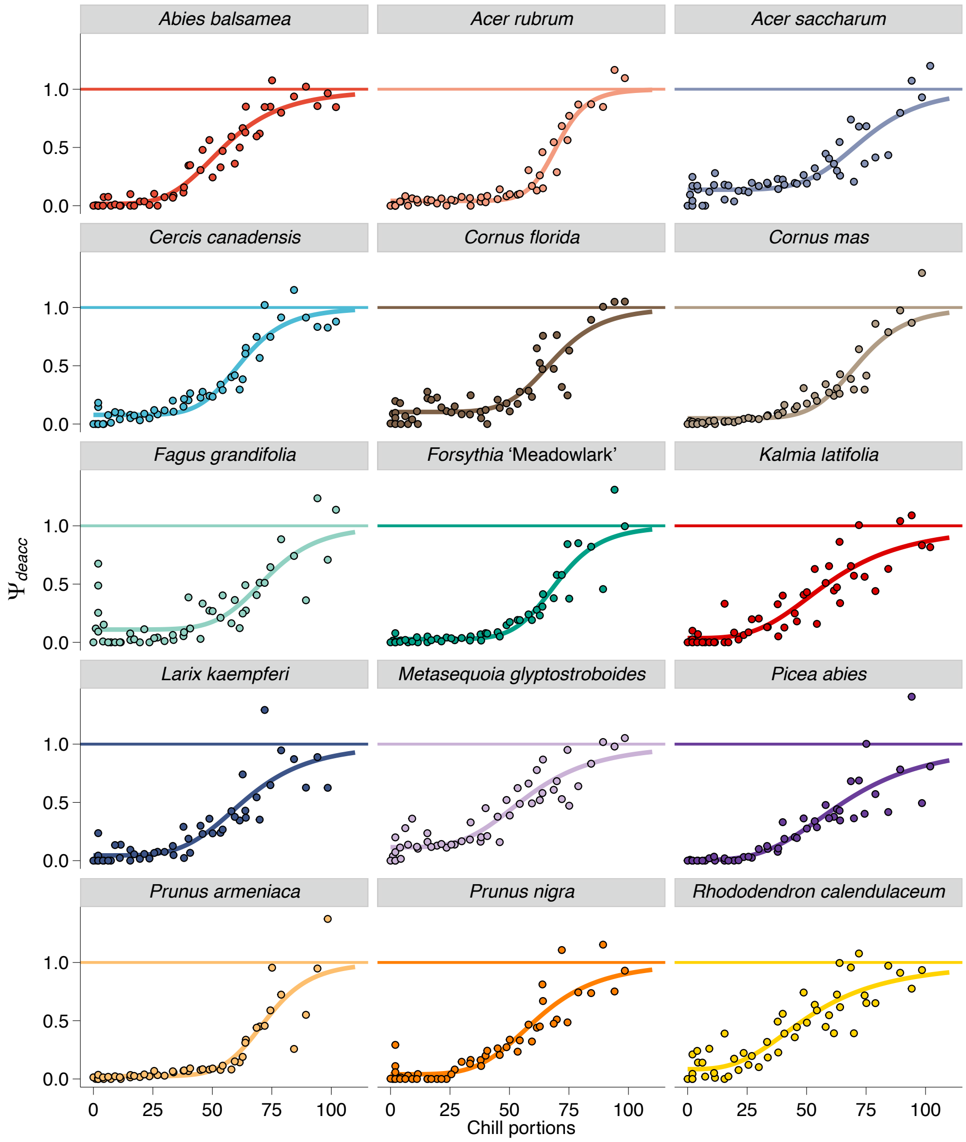

Figure S13. Normalized deacclimation rates response to chill accumulation. Deacclimation rates standardized to maximum deacclimation rate at 22 °C for each species produce values of deacclimation potential varying between 0 and 1. Main figure equivalent is **Fig. 5B**.

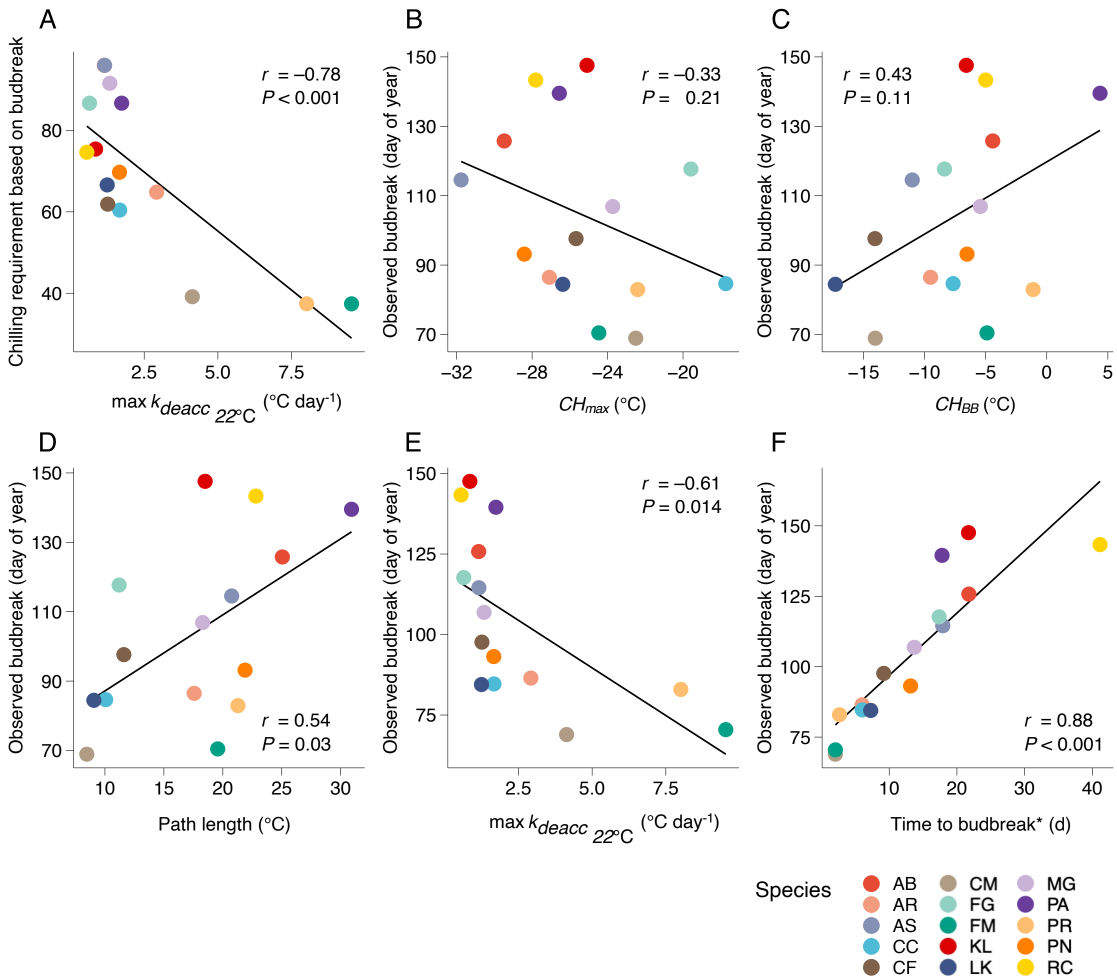

Figure S14. Correlations between several variables studied. (*A*) Chilling requirement based on budbreak is negative correlated with the maximum rate of deacclimation at 22 °C (max $k_{deacc\ 22°C}$). Observed budbreak in the field is poorly or moderately correlated with CH_{max} (*B*), CH_{BB} (*C*), path length ($|CH_{max} – CH_{BB}|$; *D*), and max $k_{deacc\ 22°C}$ (*E*). However, when an artificial time to budbreak* is calculated based on Eq. 1 (path length/ max $k_{deacc\ 22°C}$), a strong correlation exists between that and time of field budbreak (*F*). AB – *Abies balsamea*; AR – *Acer rubrum*; AS – *Acer saccharum*; CC – *Cercis canadensis*; CF – *Cornus florida*; CM – *Cornus mas*; FG – *Fagus grandifolia*; FM – *Forsythia* 'Meadowlark'; KL – *Kalmia latifolia*; LK – *Larix kaempferi*; MG – *Metasequoia glyptostroboides*; PA – *Picea abies*; PR – *Prunus armeniaca*; PN – *Prunus nigra*; RC – *Rhododendron calendulaceum.*

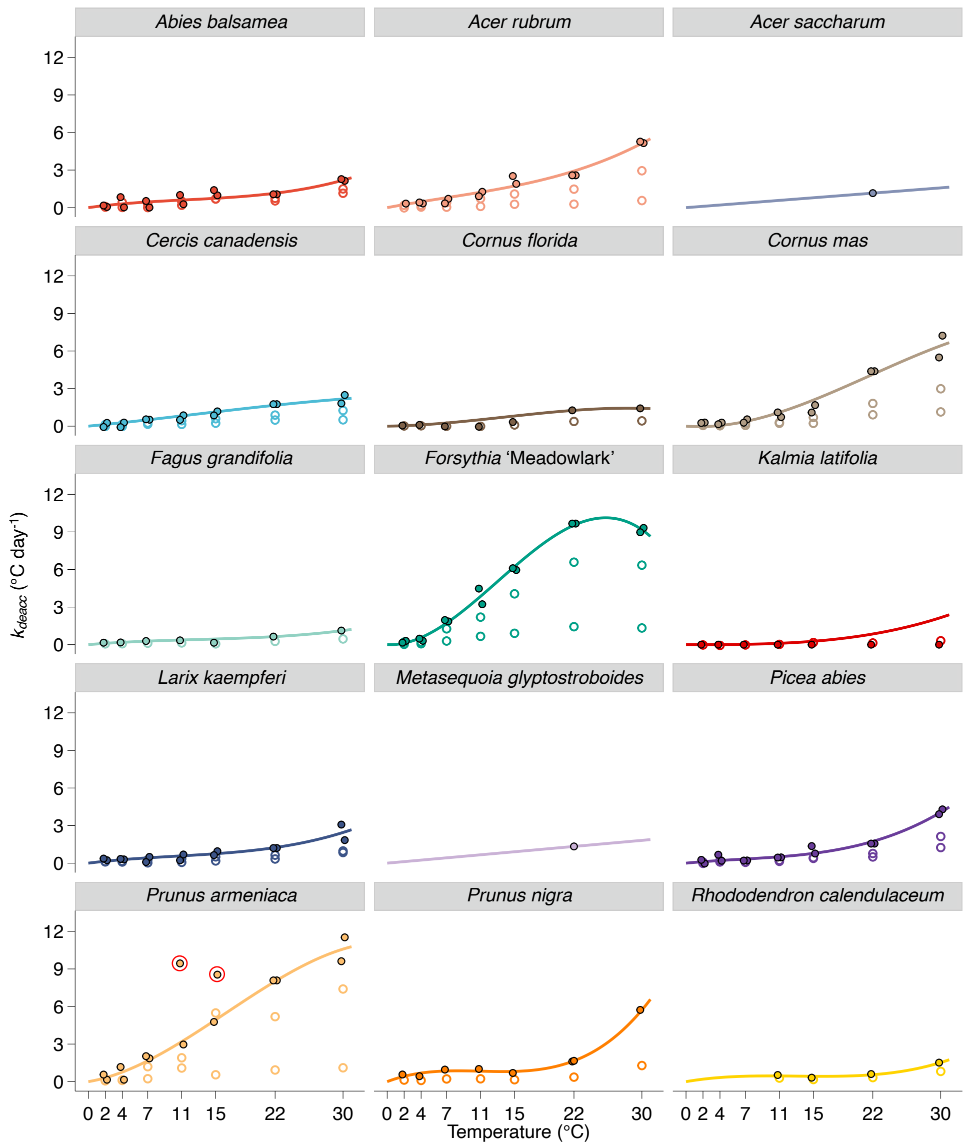

Figure S15. Deacclimation response to temperature. Temperature responses for individual species [open circles show measured rates, closed circles shows corrected rates based on $\max k_{deacc_{22\,°C}}$]. Line shows predicted model for k_{deacc} using a third-degree polynomial with intercept = 0. For species which did not have deacclimation measured at temperatures other than 22 °C *(A. saccharum* and *M. glyptostroboides*), temperature response was modeled as a linear regression with intercept = 0 using $\max k_{deacc_{22\,°C}}$. Red circles in *P. armeniaca* show rates removed from model as outliers. Main figure equivalent is **Fig. 7**.

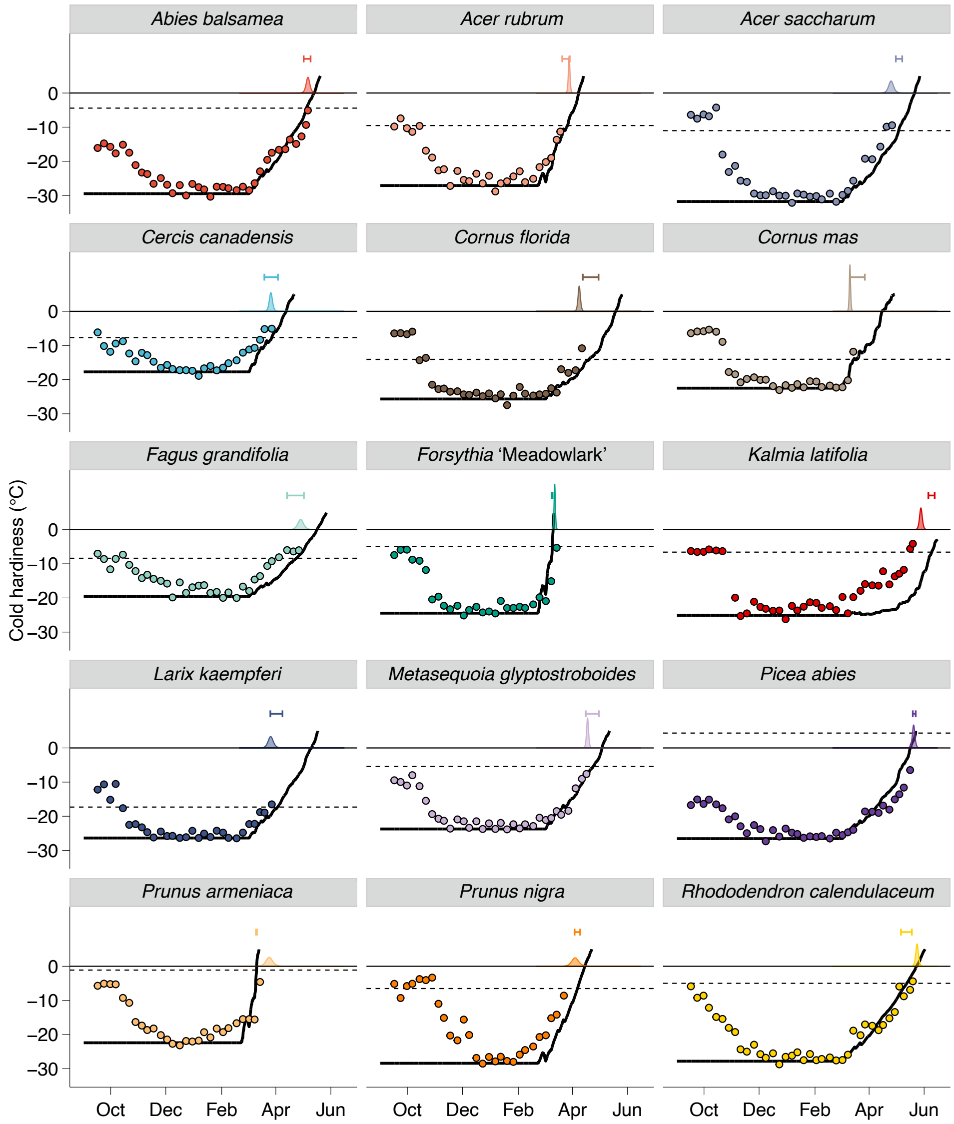

Figure S16. Predicting budbreak based on cold hardiness dynamics. Average cold hardiness [circles, no error for simplicity (see **SI Appendix Fig. S8**)] during the entire season are shown, as well as field budbreak (density plots at 0 °C). Predicted cold hardiness started at maximum cold hardiness (CH_{max}) and runs until +5 °C based on species-specific deacclimation parameters (solid line). Budbreak is predicted to occur when prediction line crosses the cold hardiness at budbreak (CH_{BB}; dashed lines) for each species. The interval is produced by adding error of ± 2.5 °C to CH_{max}. Main figure equivalent is shown as inset in **Fig. 9**.

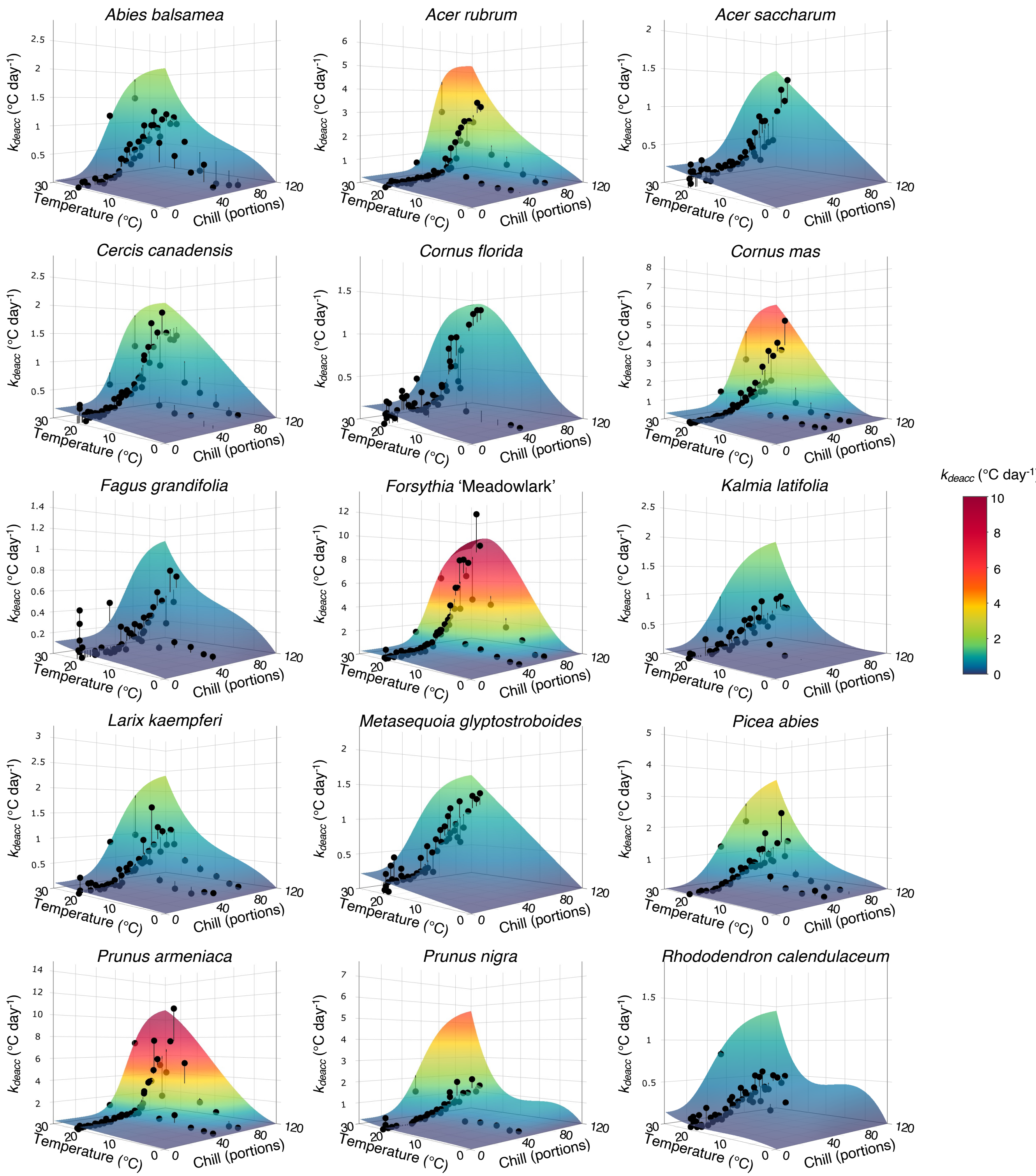

Figure S17. Plasticity in temperature and chill accumulation response. Predicted rates of deacclimation (surface plot) based on individual species measured responses (circles) to chill and temperature. Lines connect points to surface plot to demonstrate residuals. Different z axes are used such that surface curvature is visible, but color scale used is the same for all species.

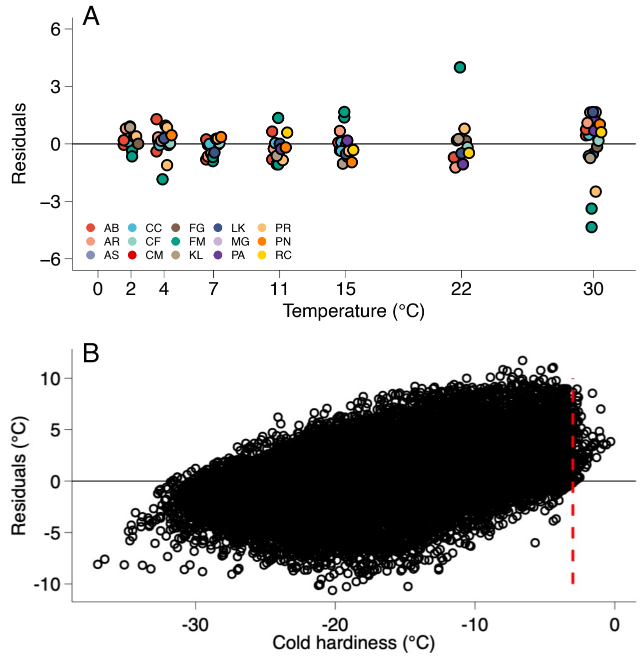

Figure S18. Residuals for rates of deacclimation and cold hardiness measurements. Studentized residuals for rates of deacclimation for 9 species based on a linear model response (*A*) and residuals based on linear deacclimation rates at 22 °C at weekly collections for all species (*B*). Red dashed line shows approximate limit of detection at –3 °C. AB – *Abies balsamea*; AR – *Acer rubrum*; AS – *Acer saccharum*; CC – *Cercis canadensis*; CF – *Cornus florida*; CM – *Cornus mas*; FG – *Fagus grandifolia*; FM – *Forsythia* 'Meadowlark'; KL – *Kalmia latifolia*; LK – *Larix kaempferi*; MG – *Metasequoia glyptostroboides*; PA – *Picea abies*; PR – *Prunus armeniaca*; PN – *Prunus nigra*; RC – *Rhododendron calendulaceum.*

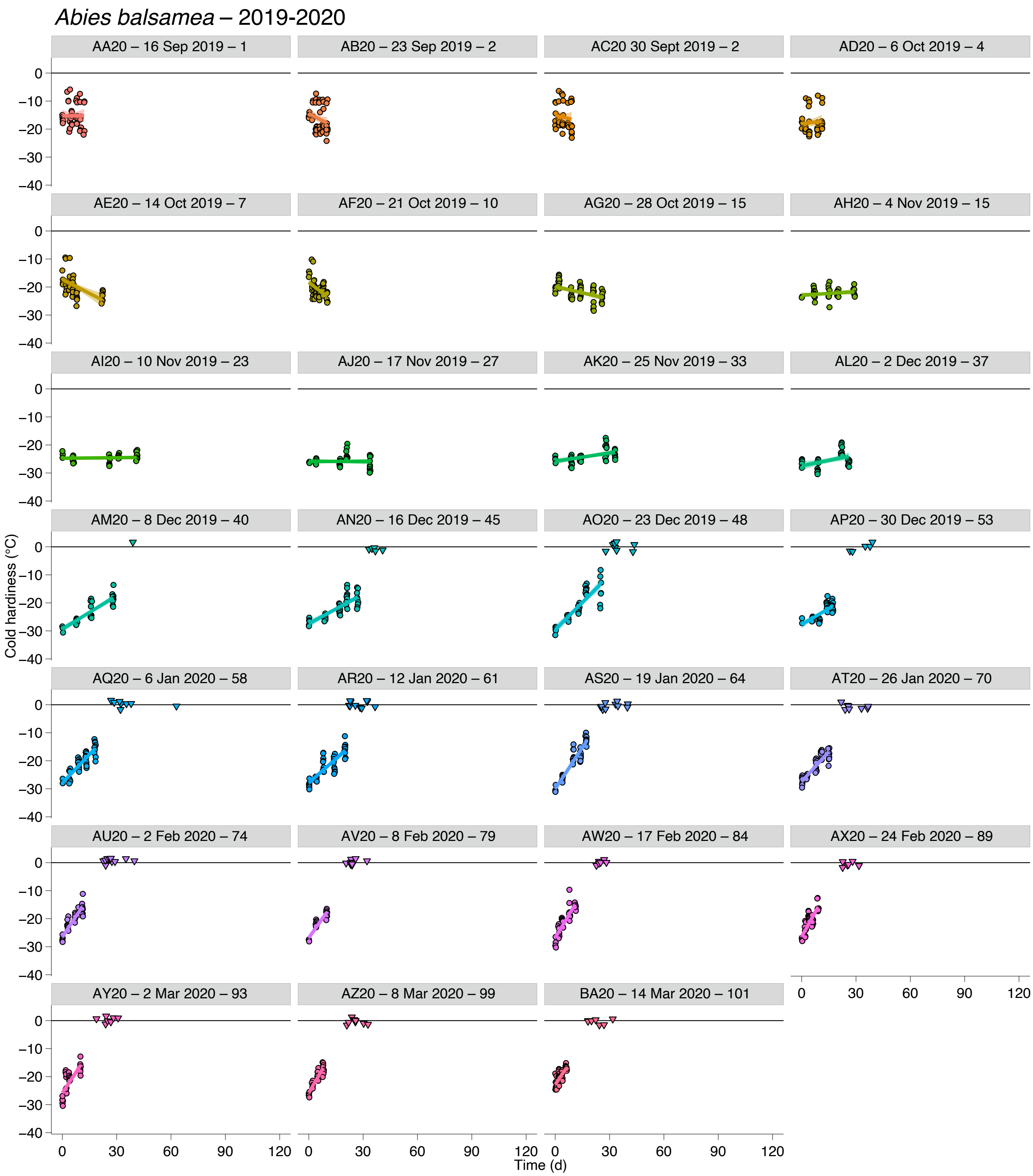

Figure S19. Deacclimation and budbreak of *Abies balsamea* buds collected during the 2019-2020 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Abies balsamea*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

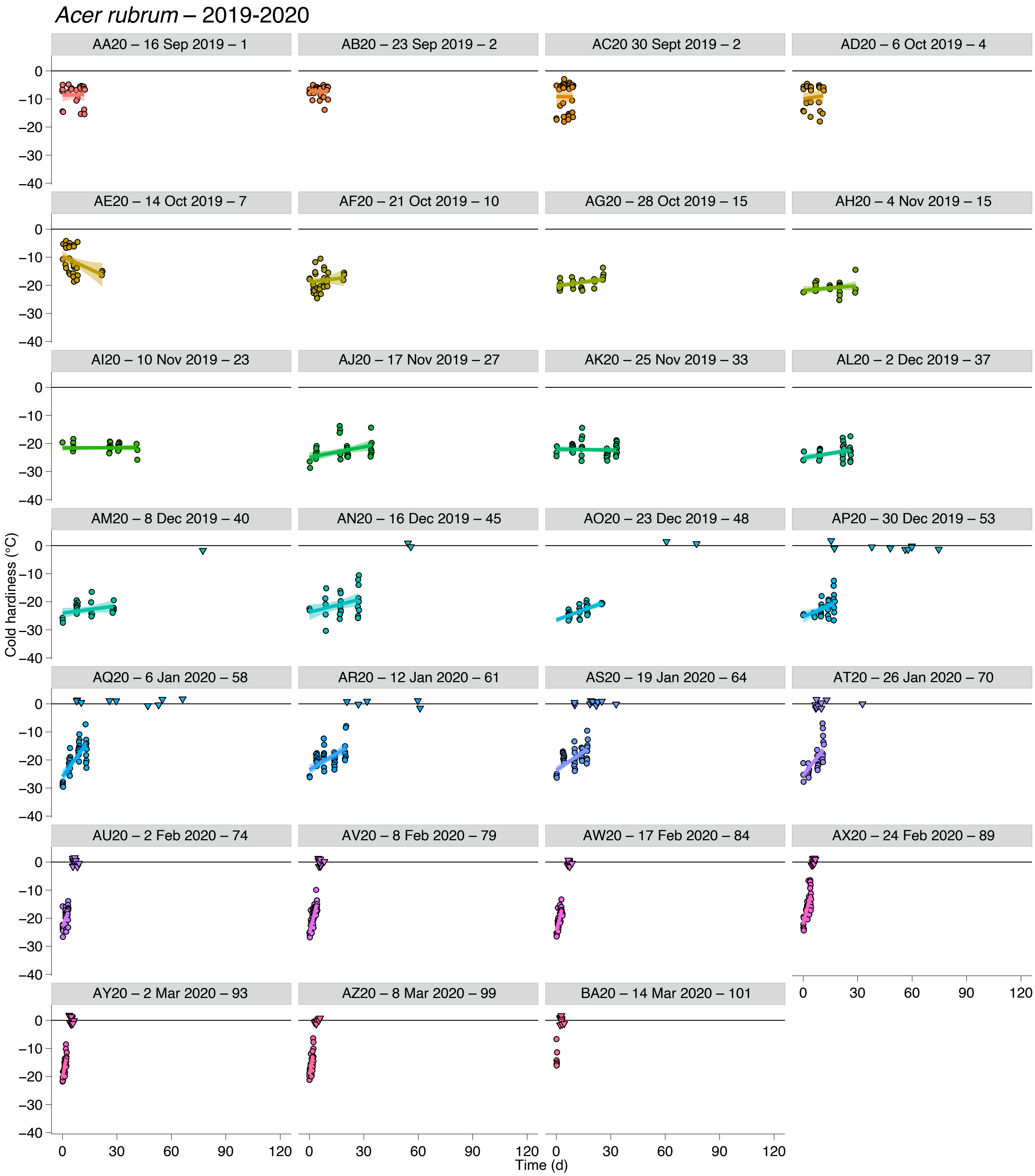

Figure S20. Deacclimation and budbreak of *Acer rubrum* buds collected during the 2019-2020 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Acer rubrum*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

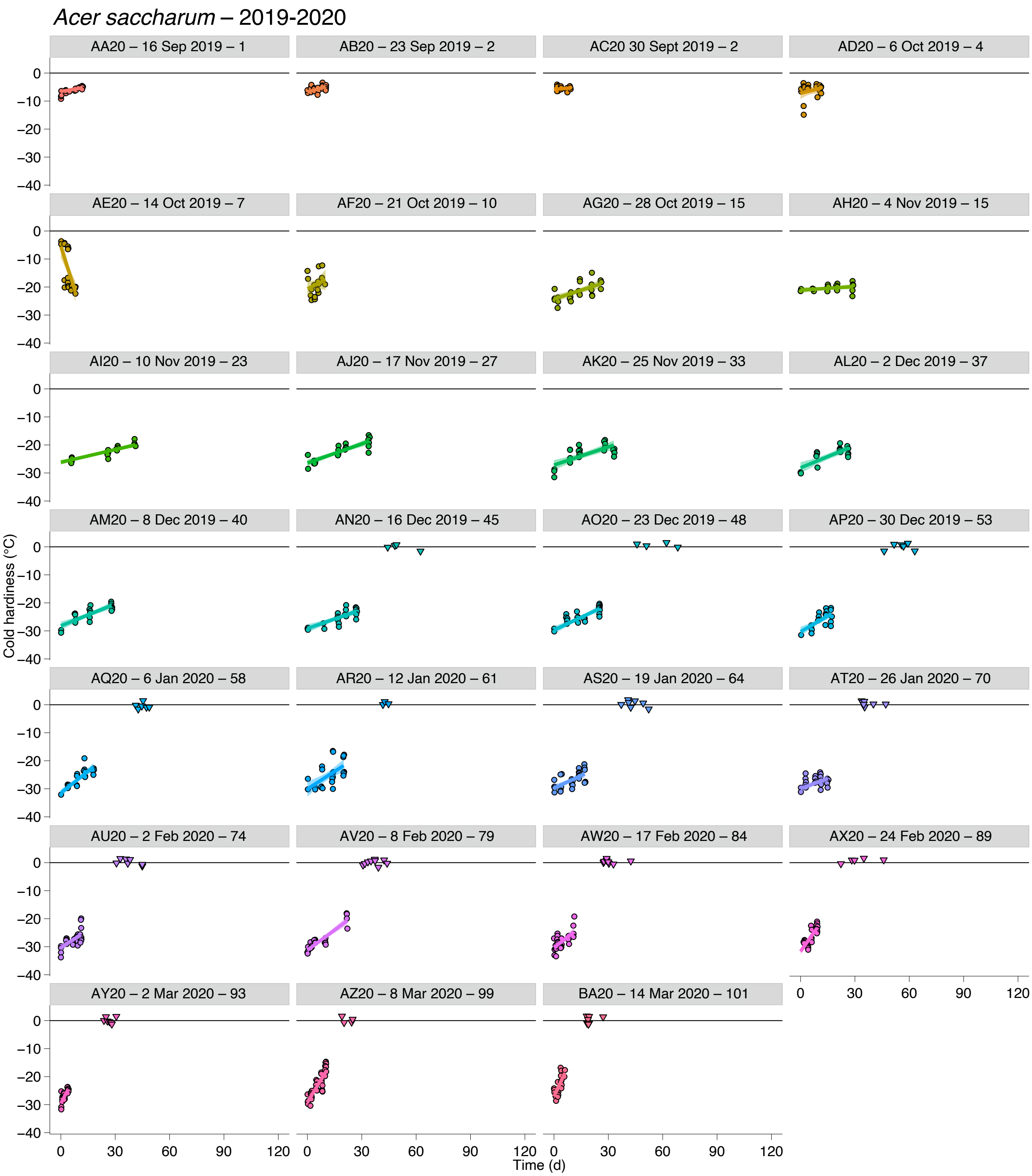

Figure S21. Deacclimation and budbreak of *Acer saccharum* buds collected during the 2019-2020 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Acer saccharum*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

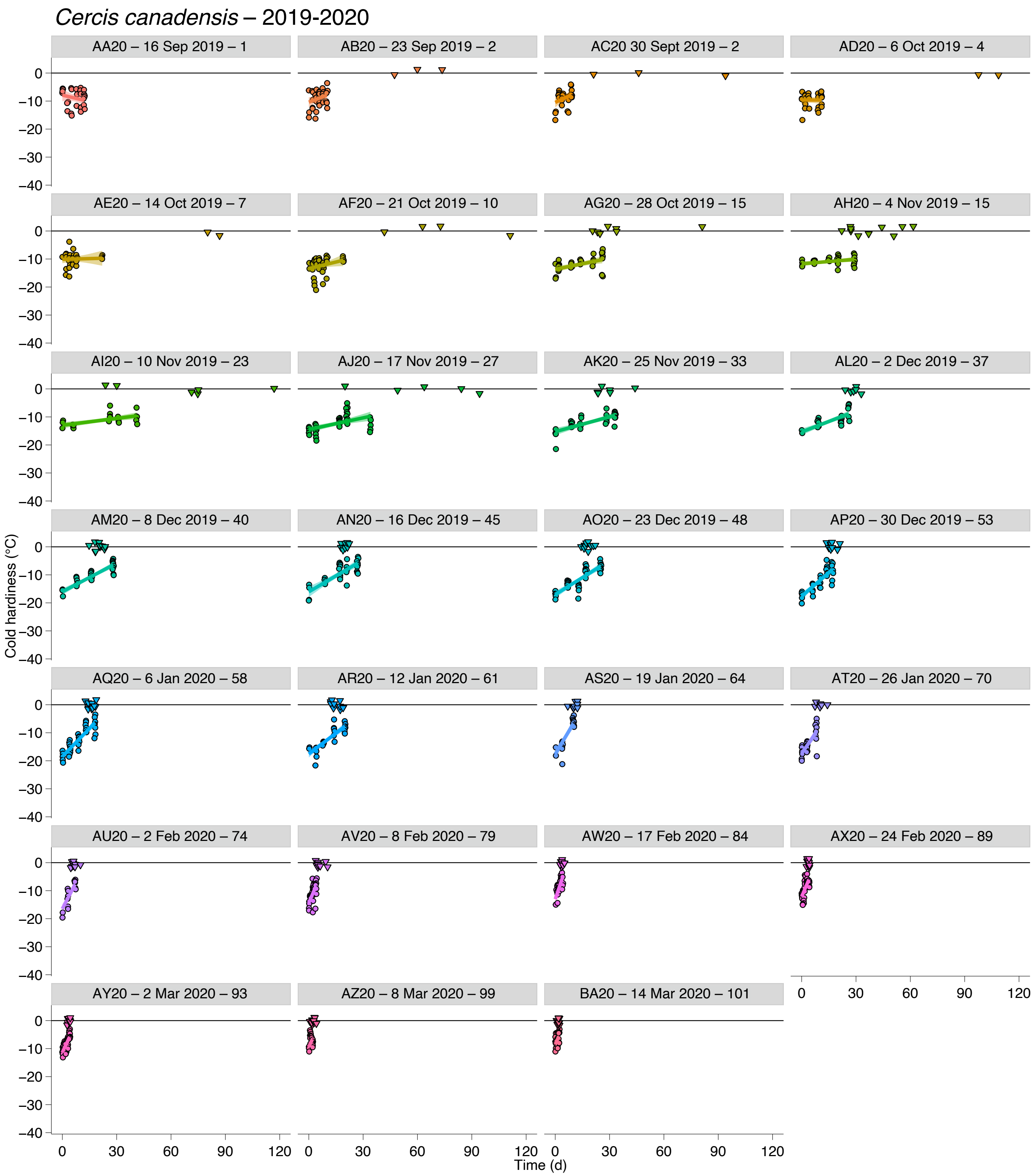

Figure S22. Deacclimation and budbreak of *Cercis canadensis* buds collected during the 2019-2020 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Cercis canadensis*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

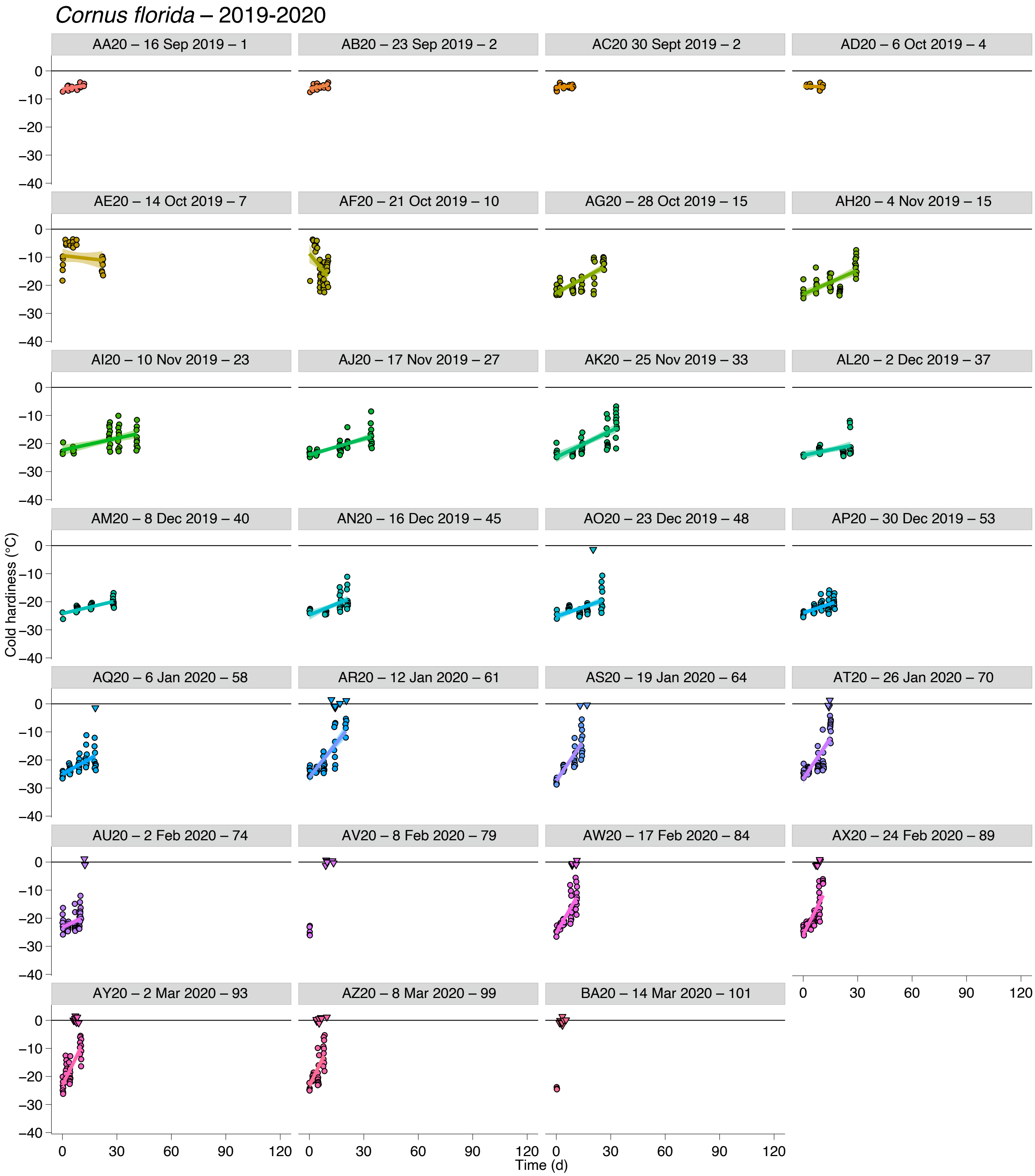

Figure S23. Deacclimation and budbreak of *Cornus florida* buds collected during the 2019-2020 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Cornus florida*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

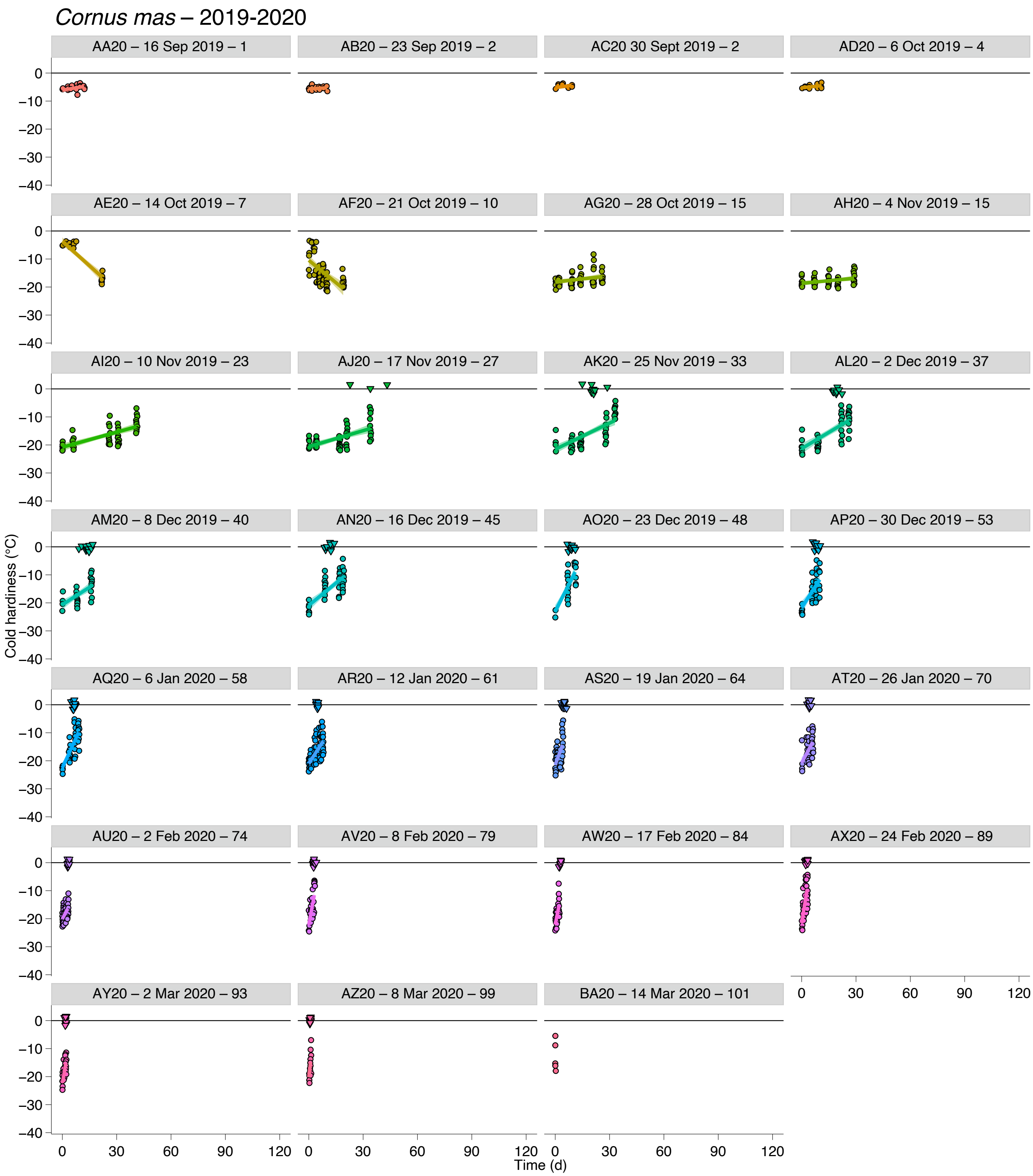

Figure S24. Deacclimation and budbreak of *Cornus mas* buds collected during the 2019-2020 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Cornus mas*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

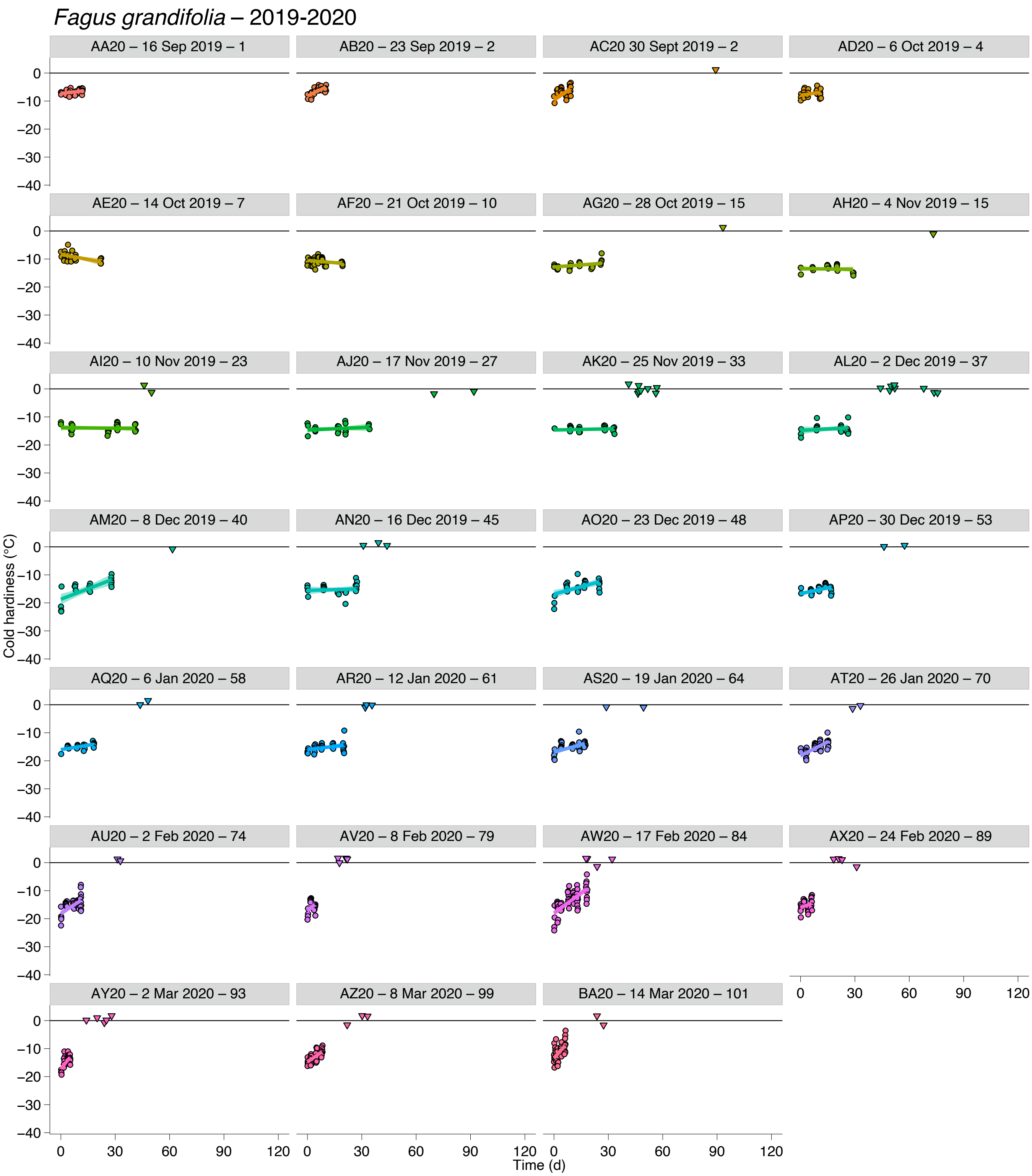

Figure S25. Deacclimation and budbreak of *Fagus grandifolia* buds collected during the 2019-2020 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Fagus grandifolia*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

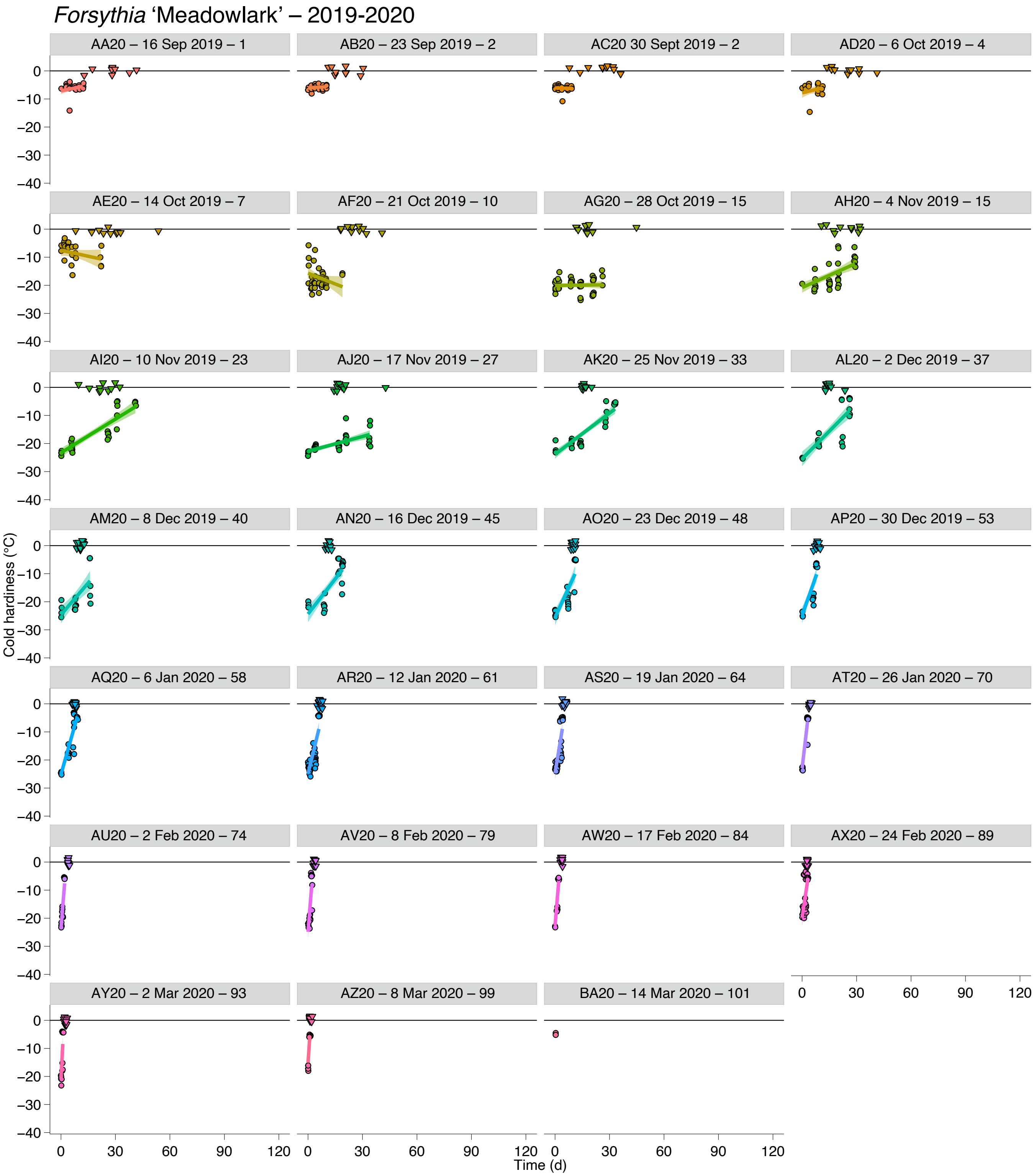

Figure S26. Deacclimation and budbreak of *Forsythia* 'Meadowlark' buds collected during the 2019-2020 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Forsythia* 'Meadowlark'. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

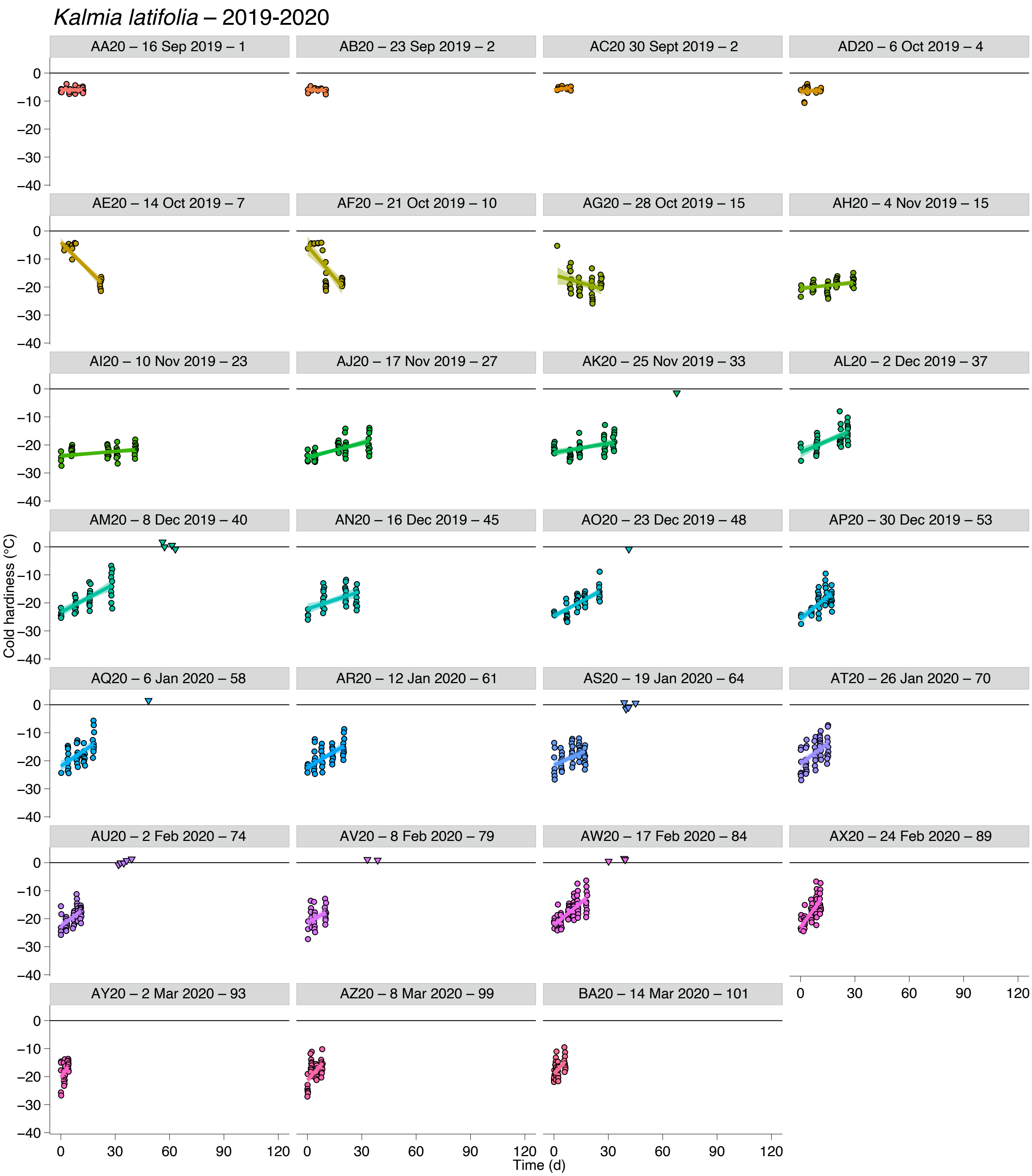

Figure S27. Deacclimation and budbreak of *Kalmia latifolia* buds collected during the 2019-2020 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Kalmia latifolia*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

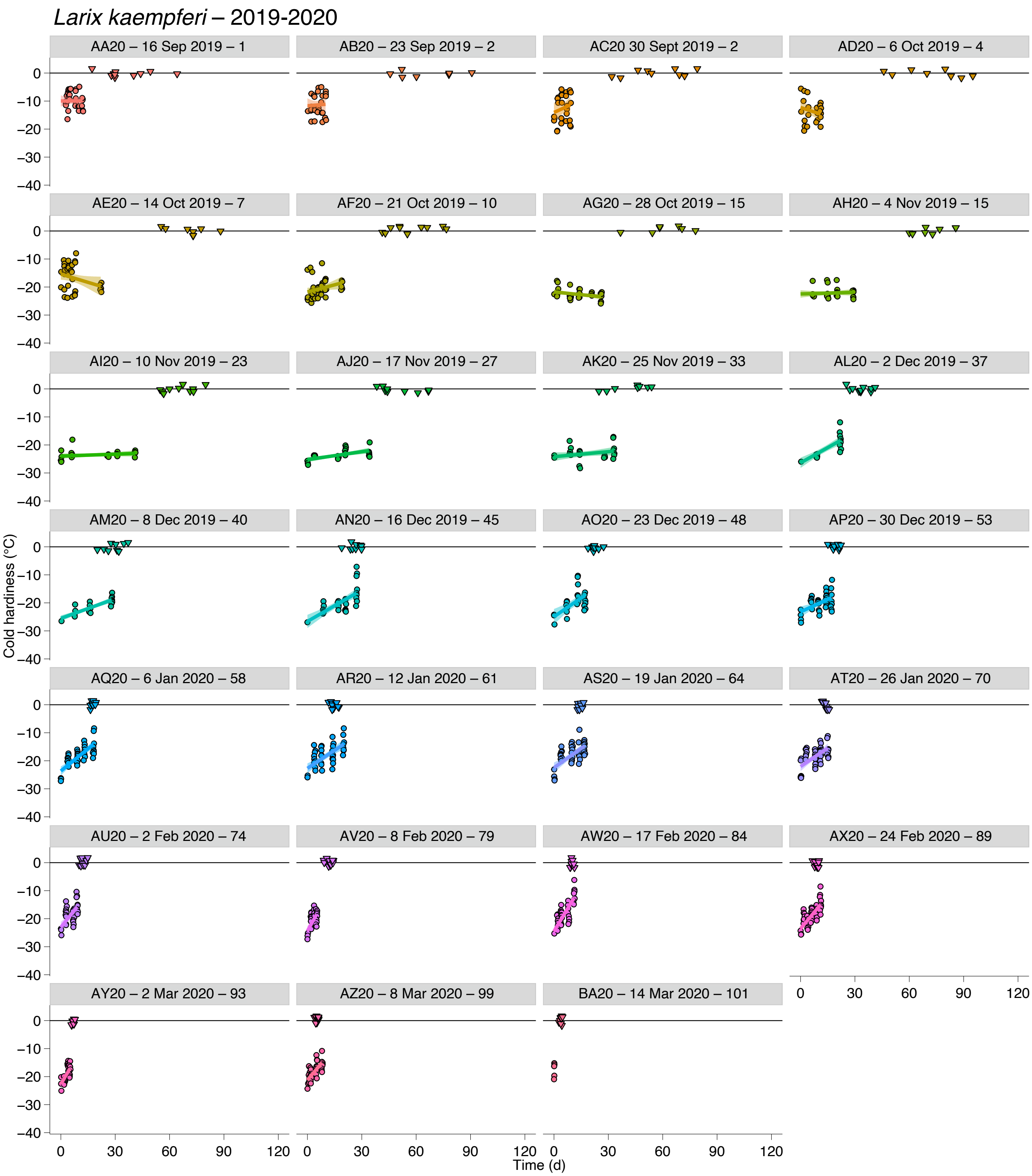

Figure S28. Deacclimation and budbreak of *Larix kaempferi* buds collected during the 2019-2020 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Larix kaempferi*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

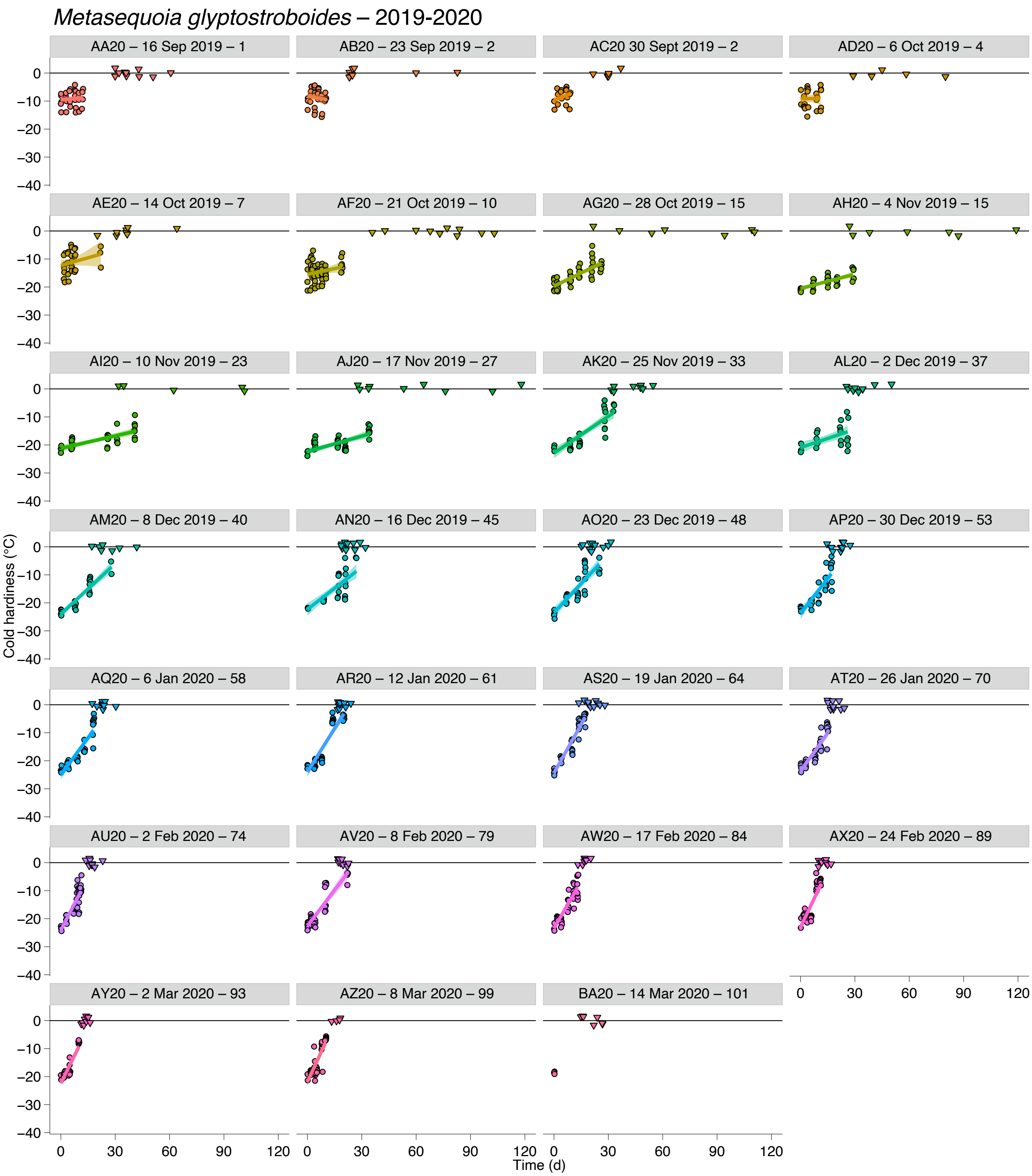

Figure S29. Deacclimation and budbreak of *Metasequoia glyptostroboides* buds collected during the 2019-2020 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Metasequoia glyptostroboides*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

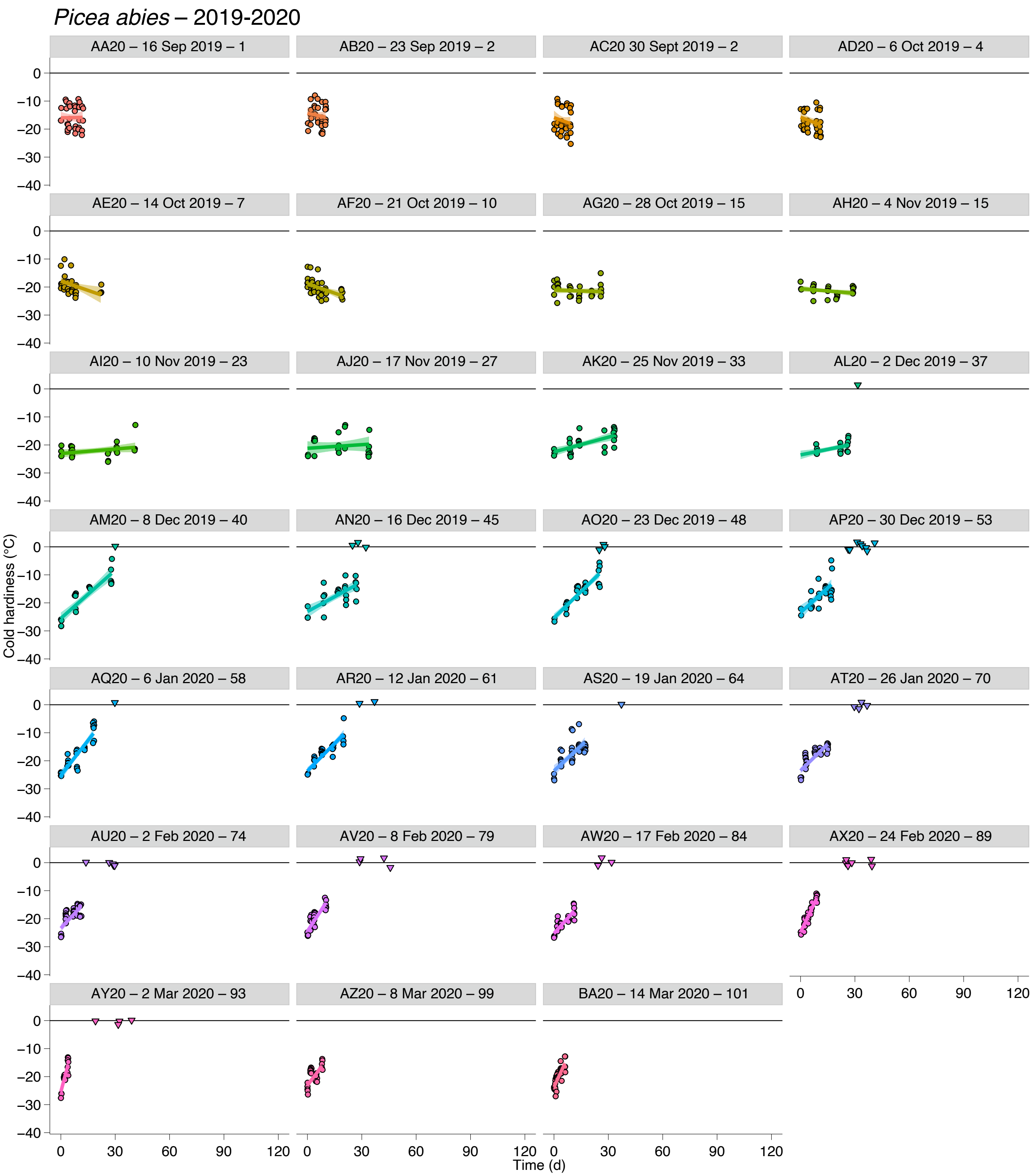

Figure S30. Deacclimation and budbreak of *Picea abies* buds collected during the 2019-2020 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Picea abies*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

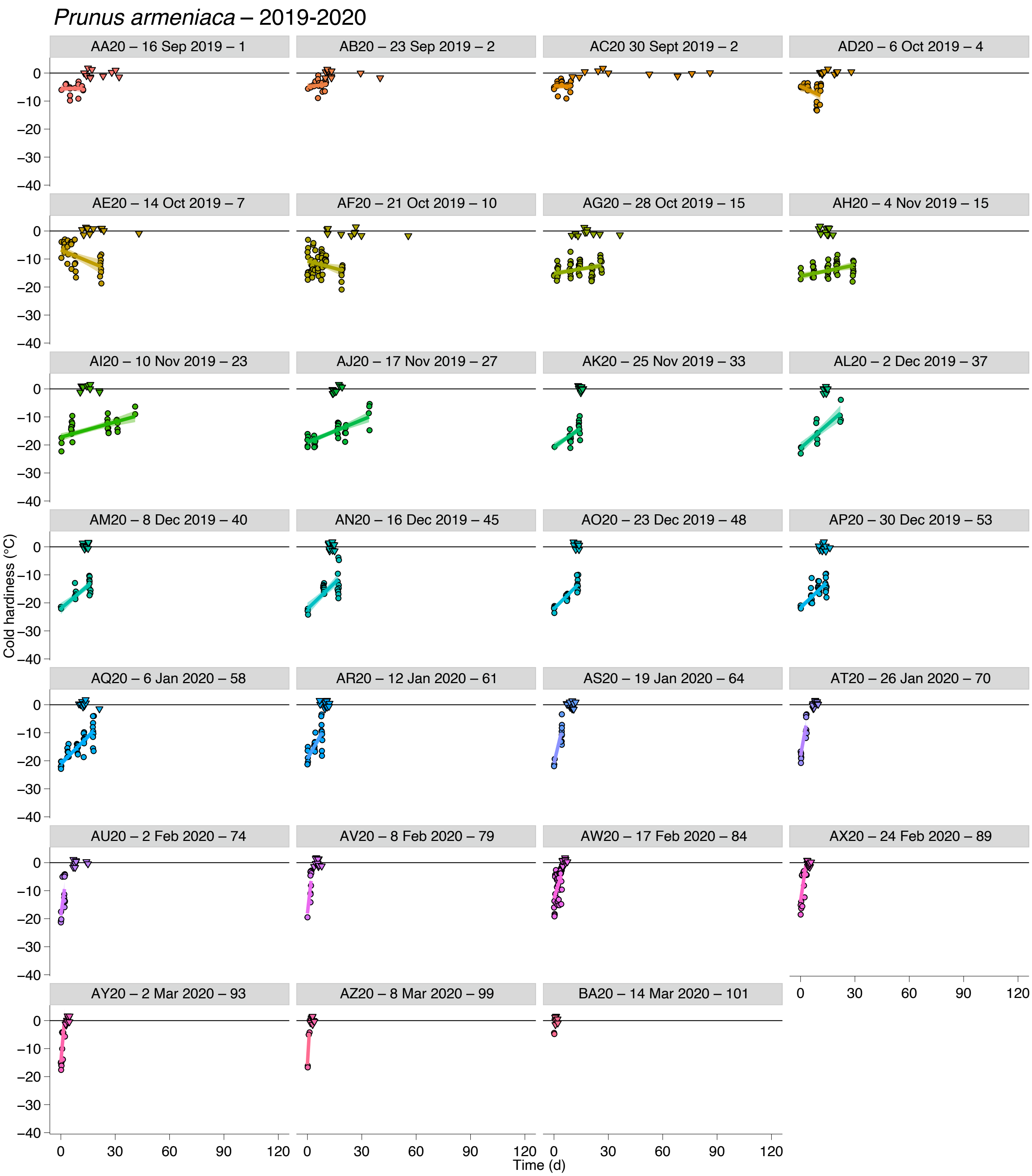

Figure S31. Deacclimation and budbreak of *Prunus armeniaca* buds collected during the 2019-2020 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Prunus armeniaca*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

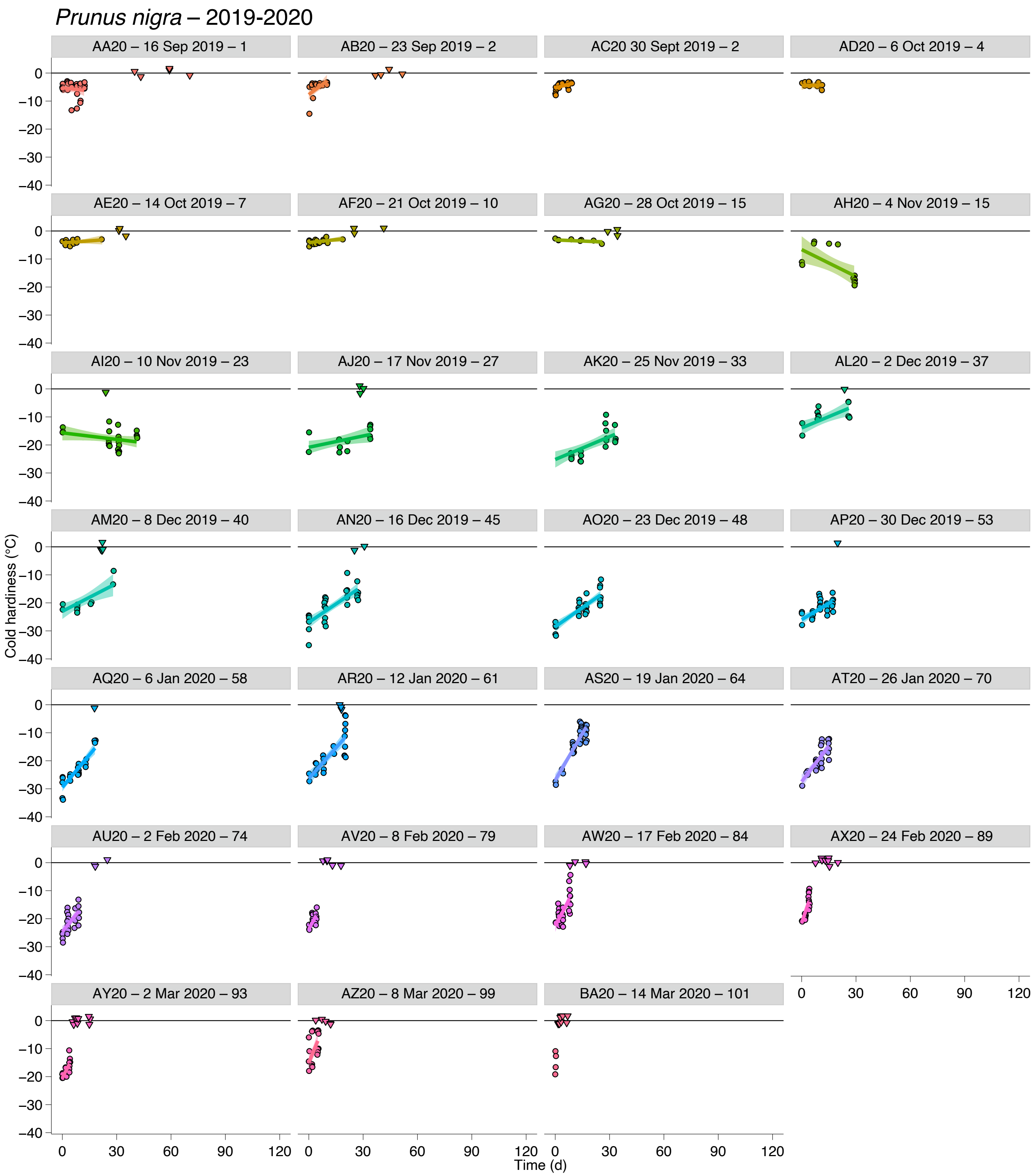

Figure S32. Deacclimation and budbreak of *Prunus nigra* buds collected during the 2019-2020 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Prunus nigra*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

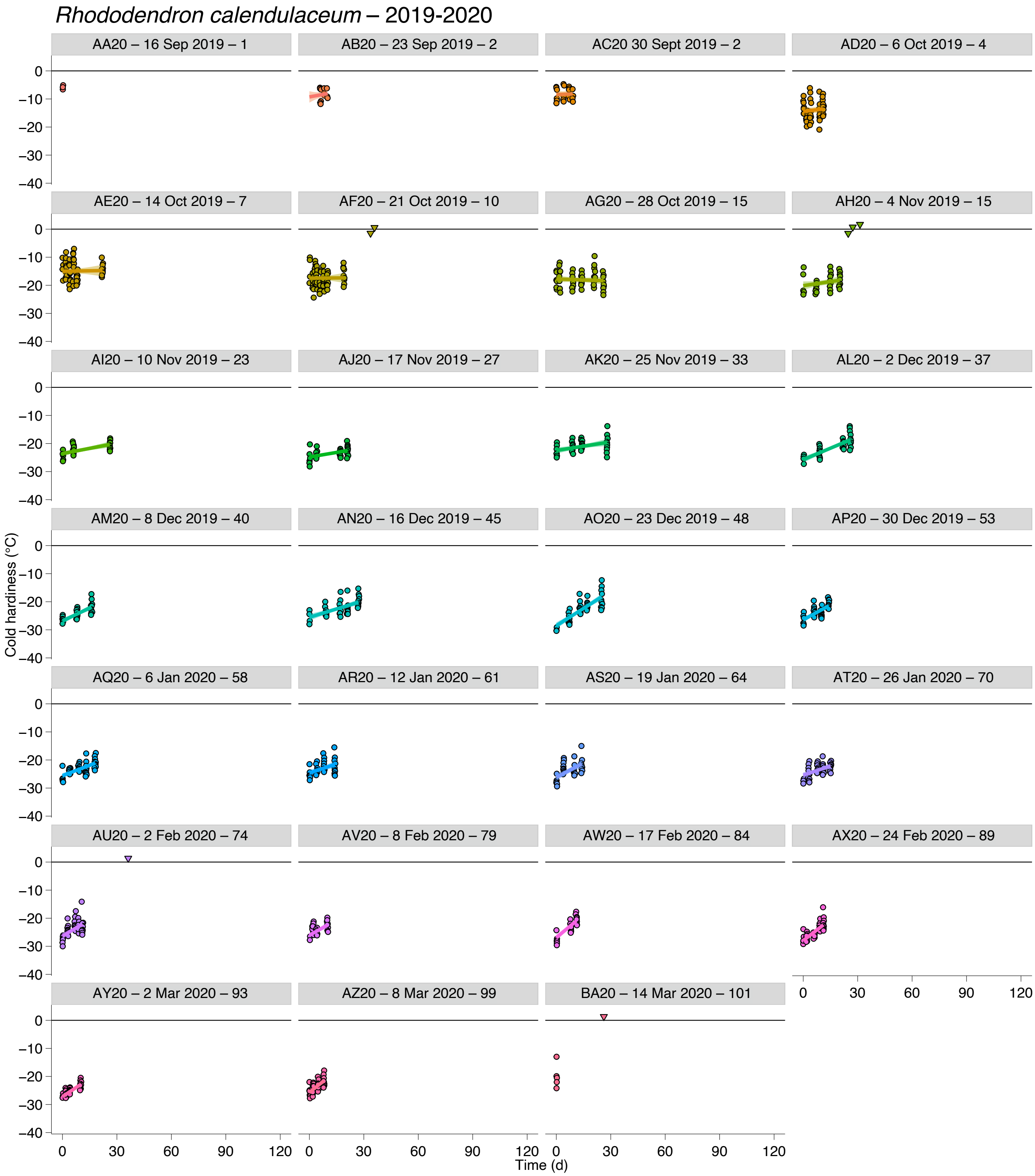

Figure S33. Deacclimation and budbreak of *Rhododendron calendulaceum* buds collected during the 2019-2020 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Rhododendron calendulaceum*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

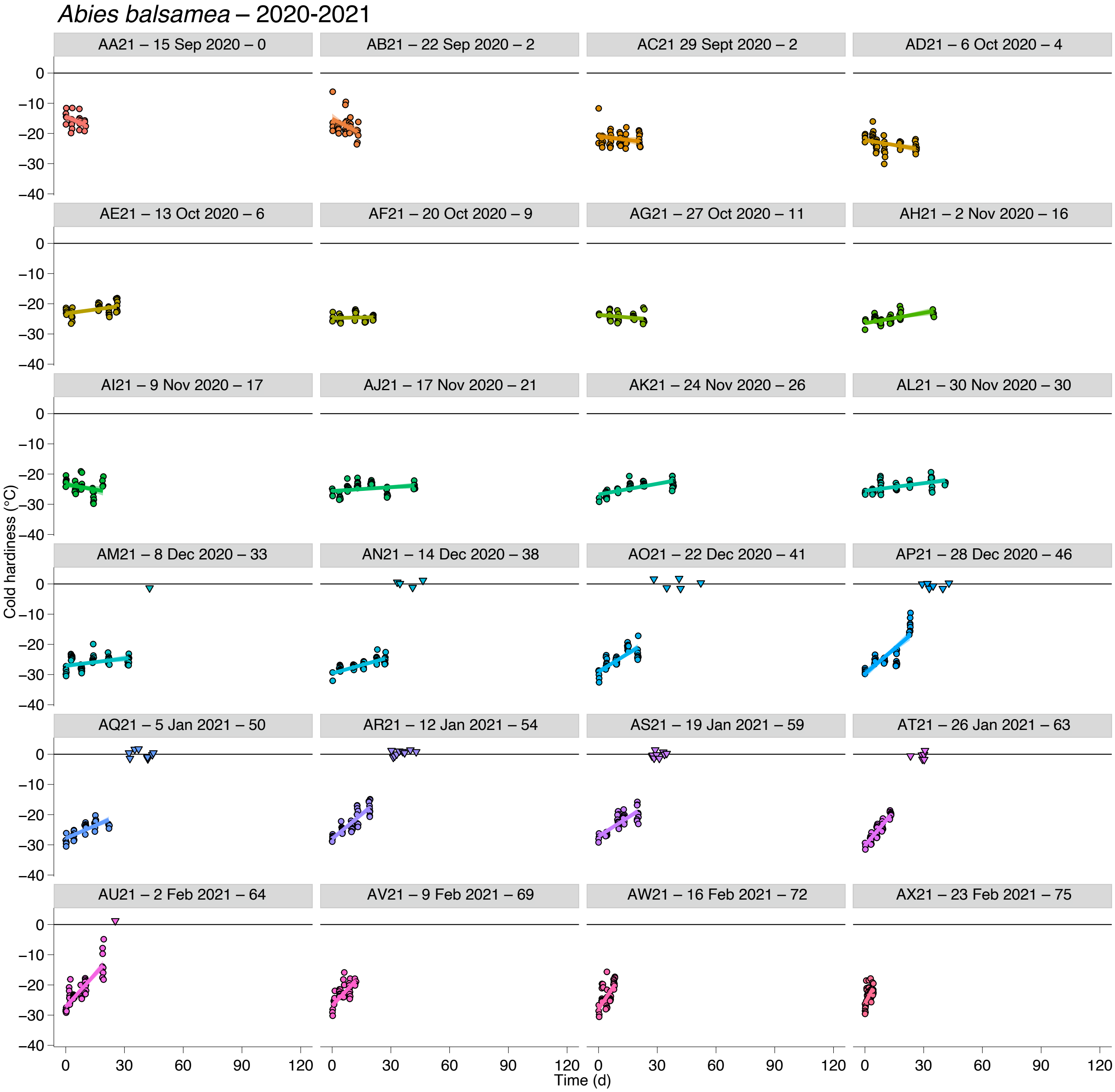

Figure S34. Deacclimation and budbreak of *Abies balsamea* buds collected during the 2020-2021 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Abies balsamea*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

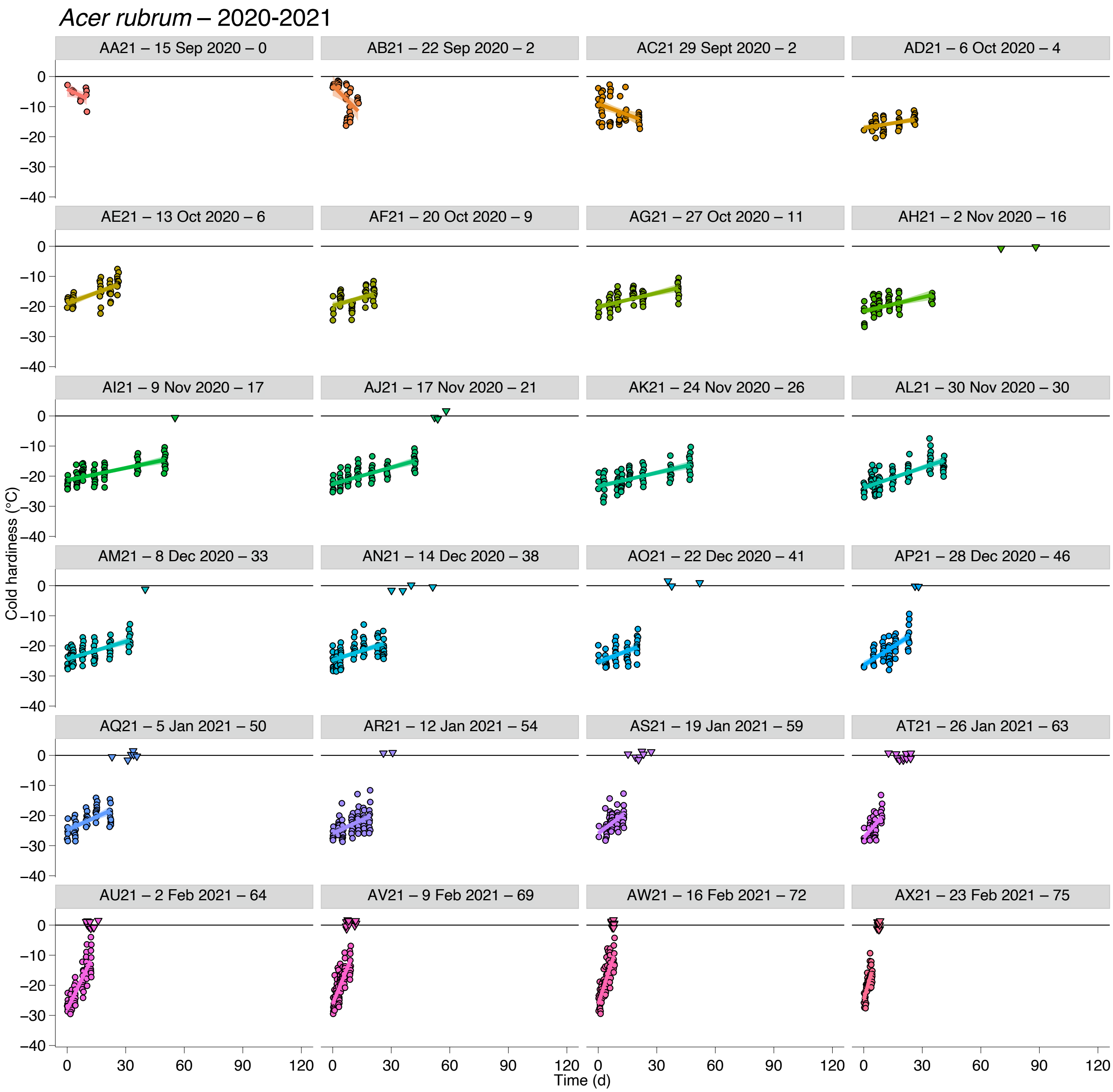

Figure S35. Deacclimation and budbreak of *Acer rubrum* buds collected during the 2020-2021 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Acer rubrum*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

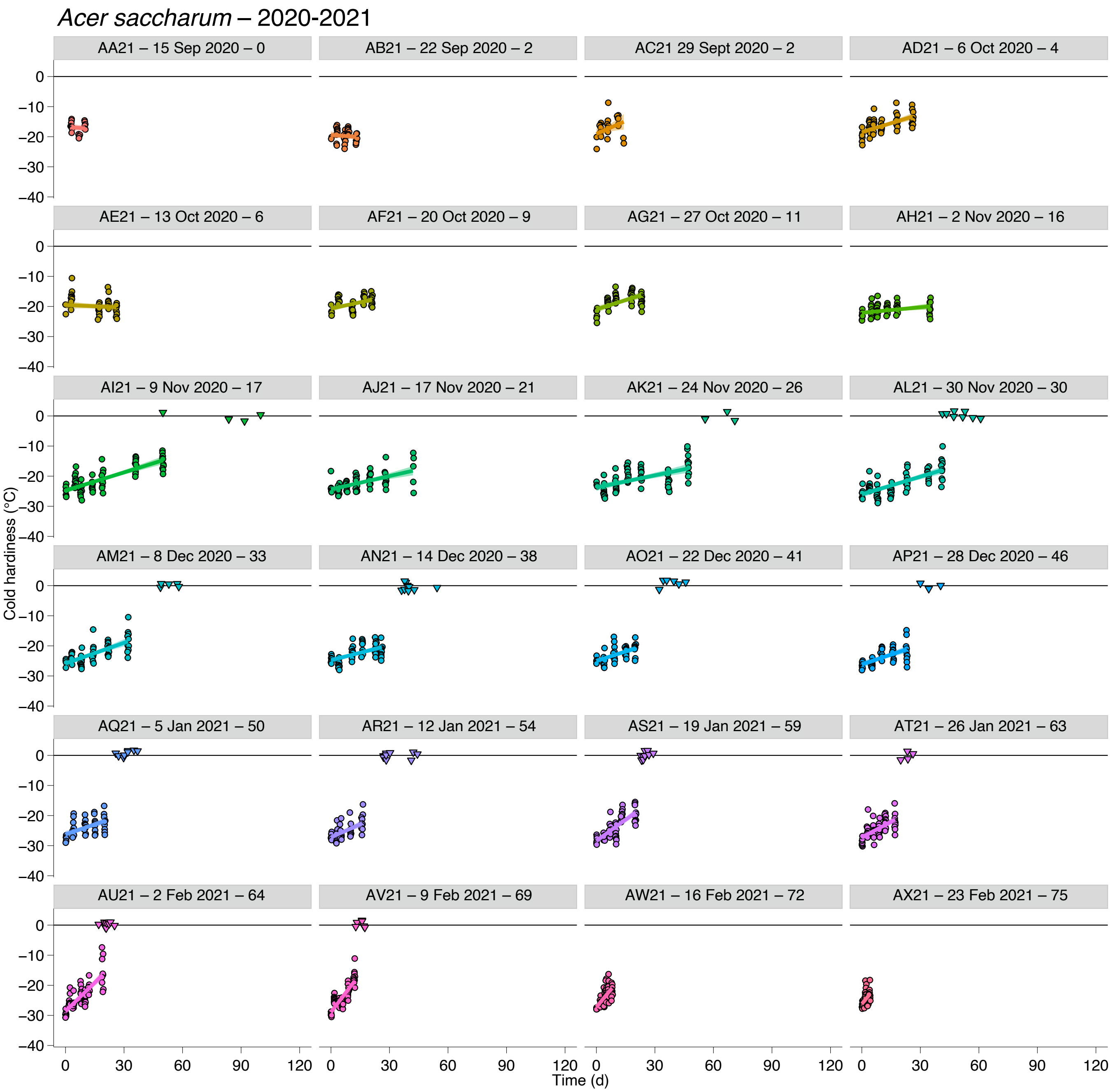

Figure S36. Deacclimation and budbreak of *Acer saccharum* buds collected during the 2020-2021 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Acer saccharum*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

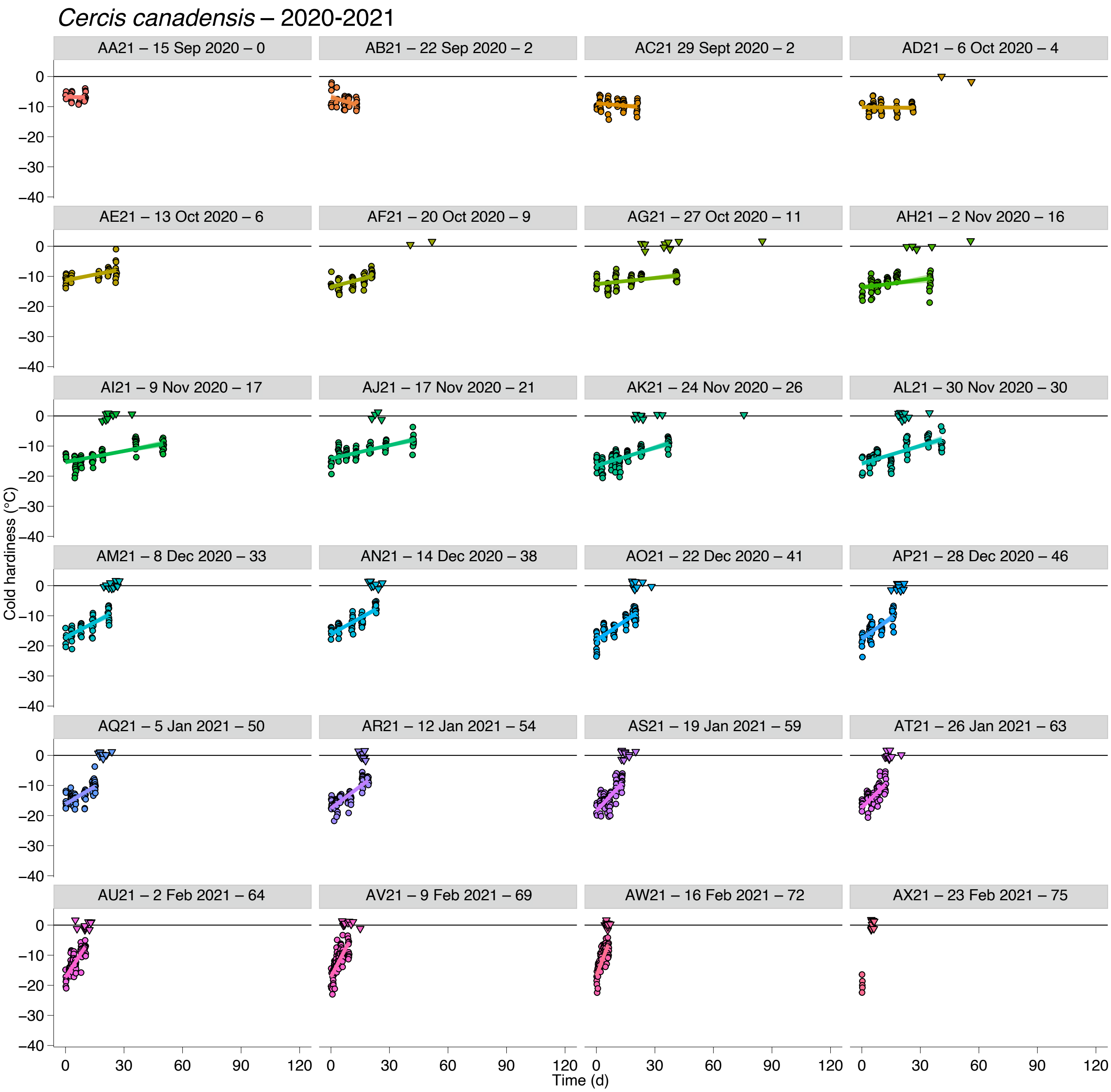

Figure S37. Deacclimation and budbreak of *Cercis canadensis* buds collected during the 2020-2021 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Cercis canadensis*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

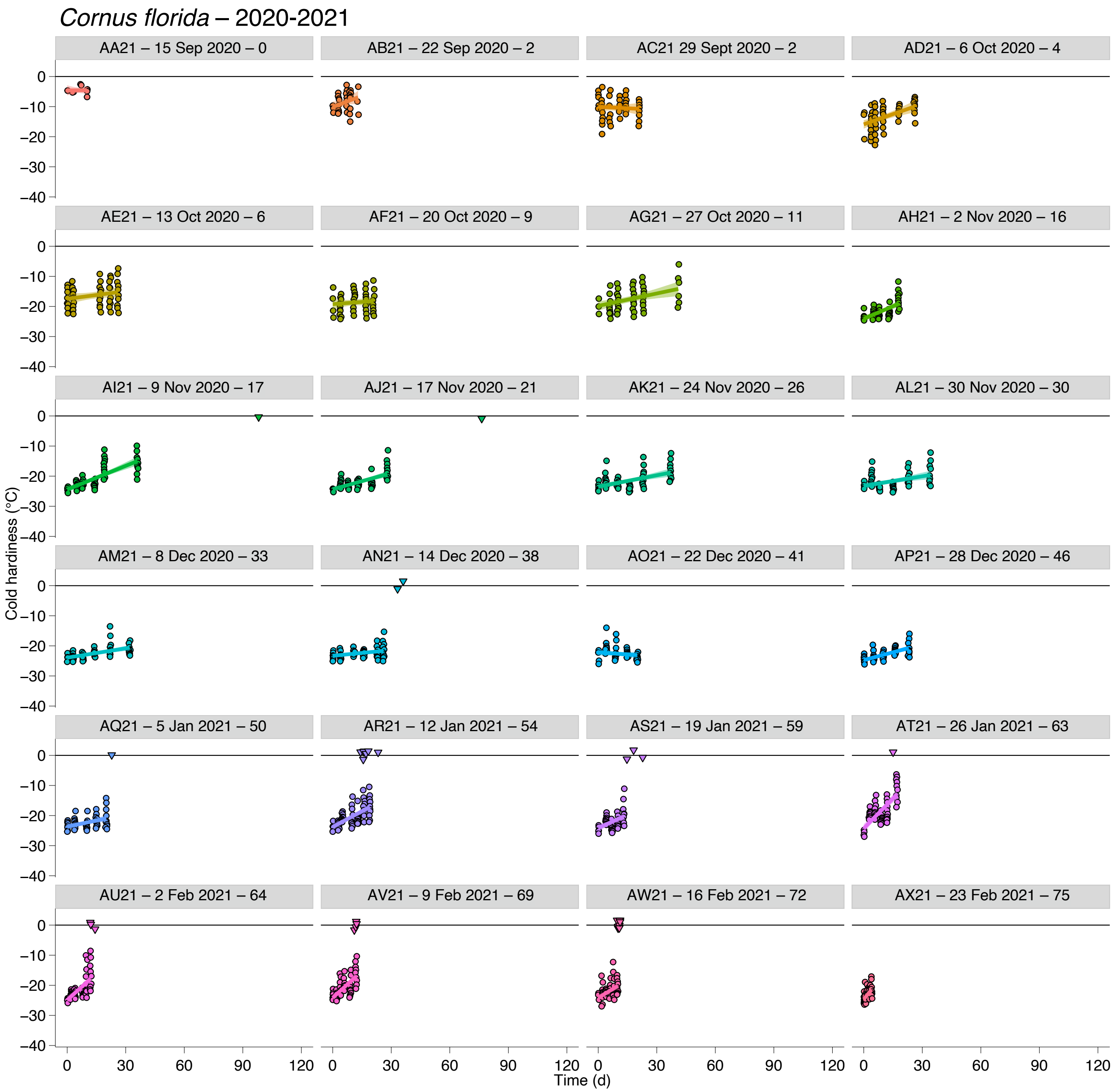

Figure S38. Deacclimation and budbreak of *Cornus florida* buds collected during the 2020-2021 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Cornus florida*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

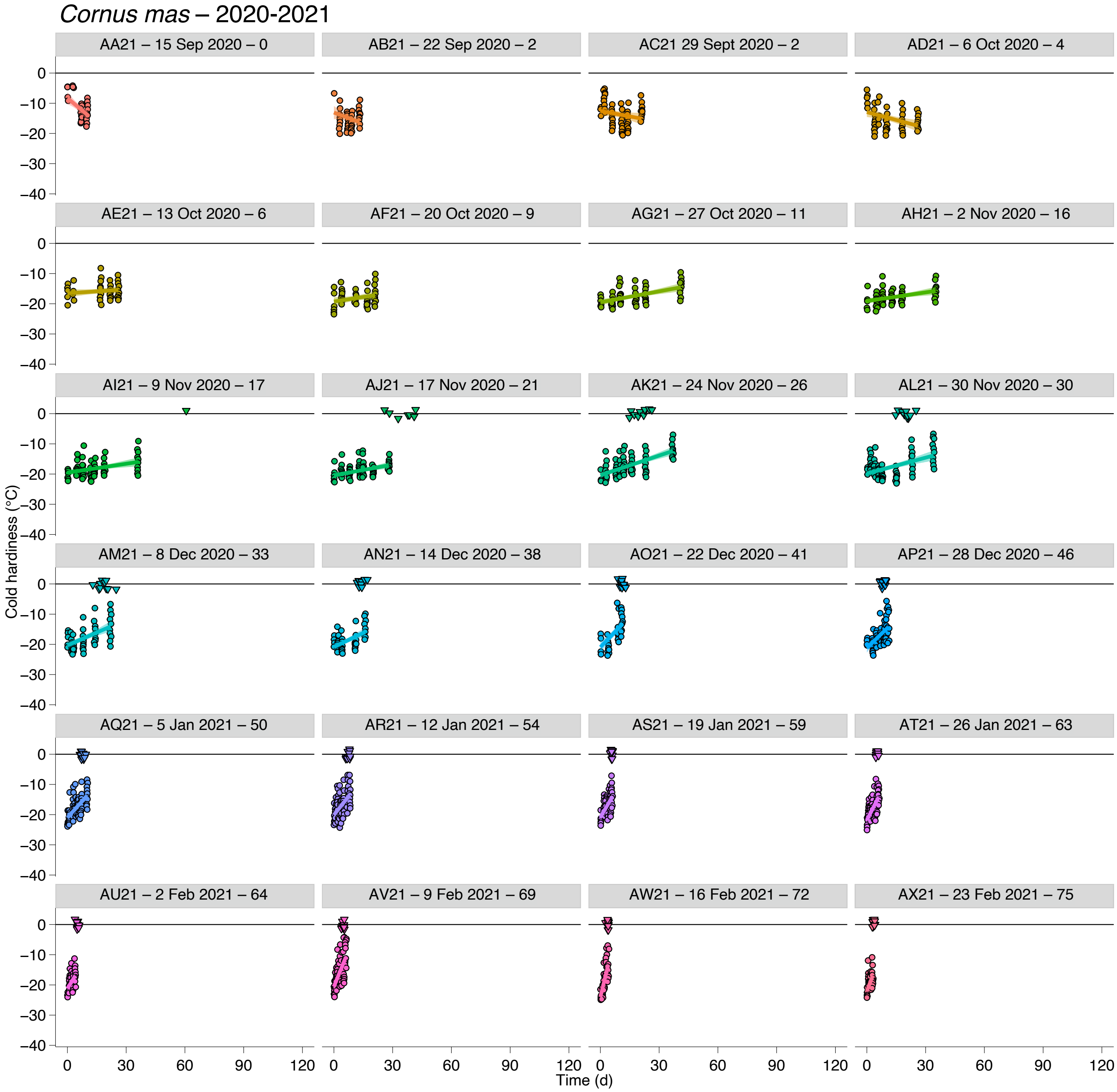

Figure S39. Deacclimation and budbreak of *Cornus mas* buds collected during the 2020-2021 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Cornus mas*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

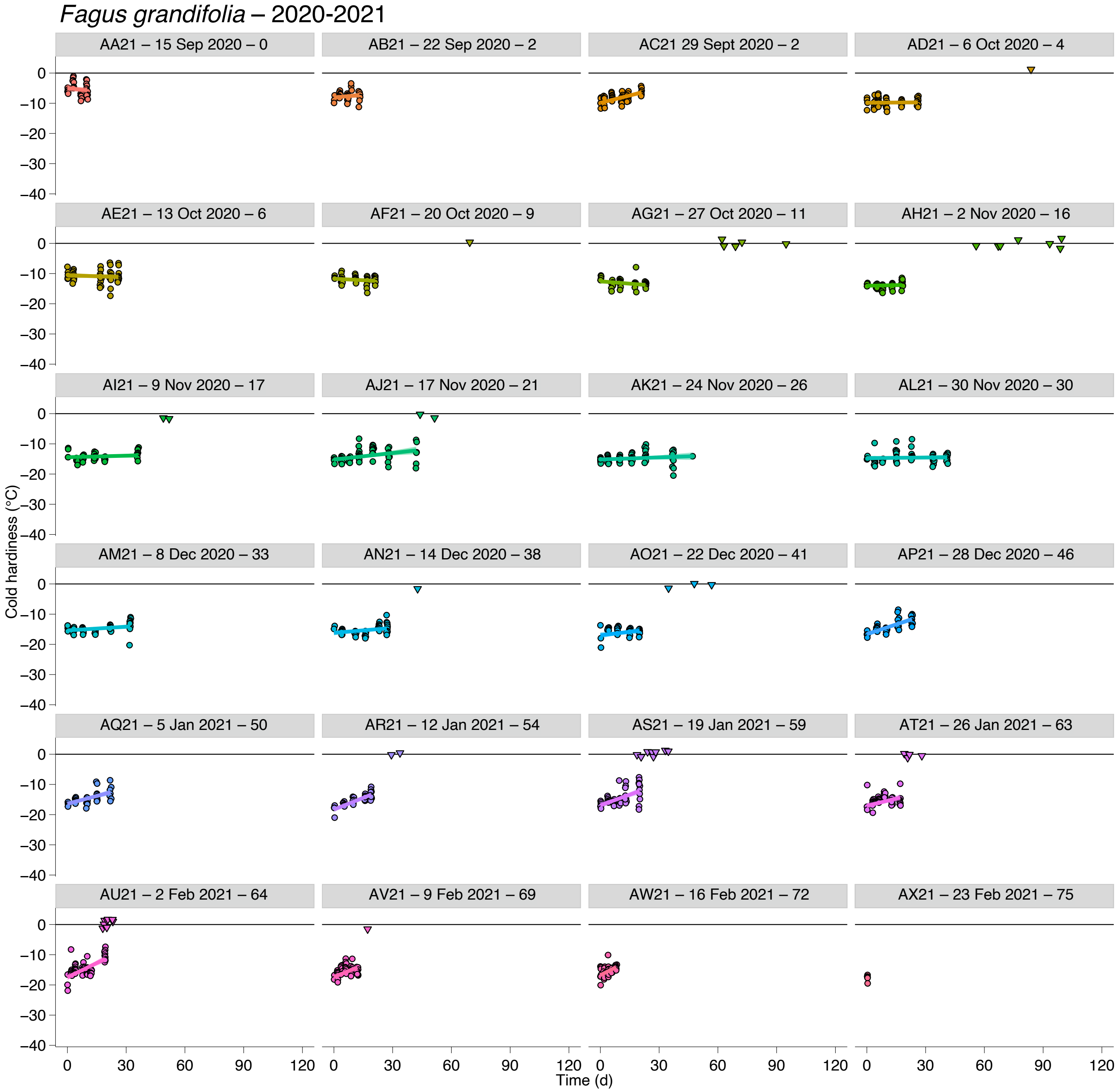

Figure S40. Deacclimation and budbreak of *Fagus grandifolia* buds collected during the 2020-2021 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Fagus grandifolia*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

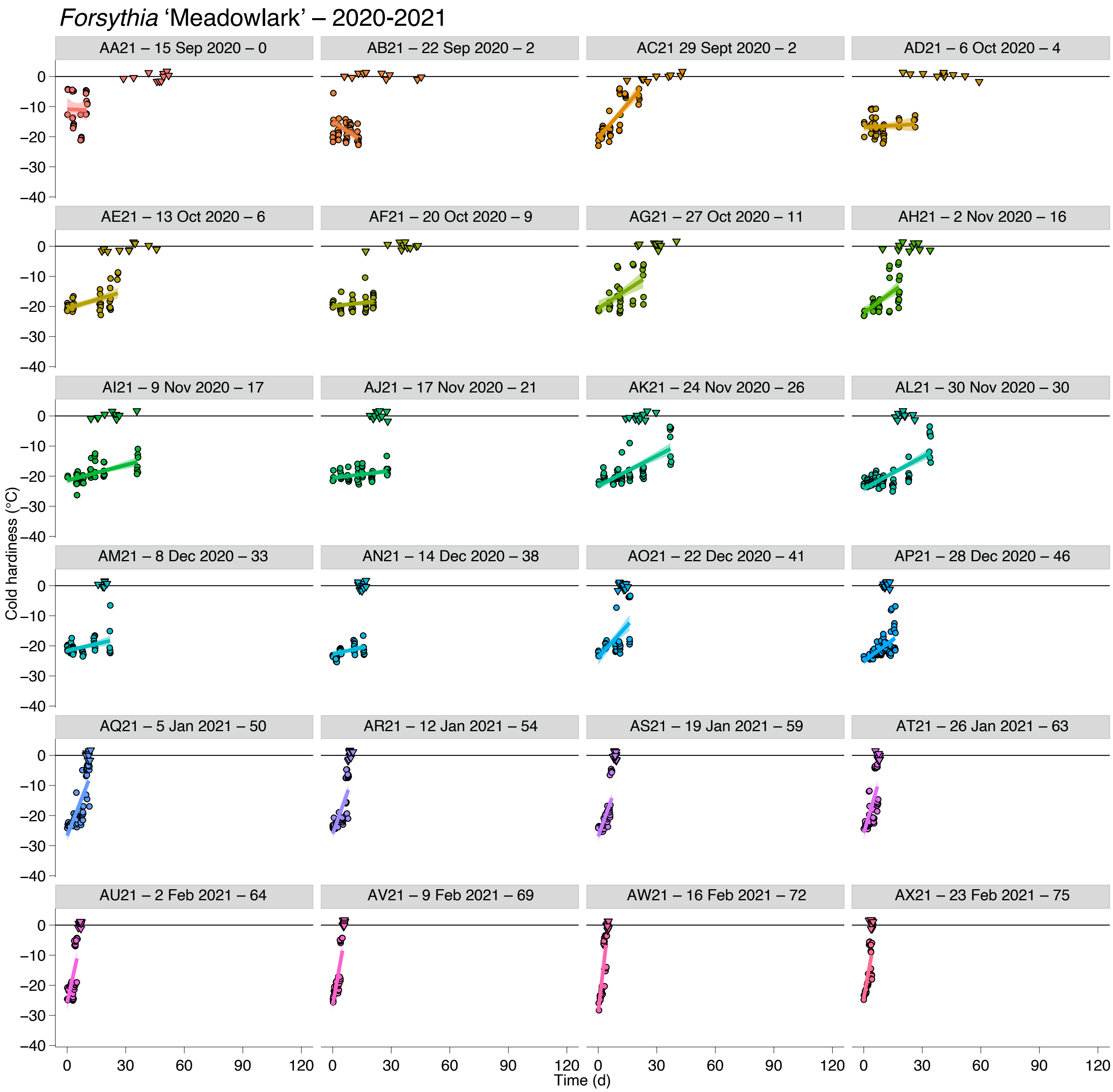

Figure S41. Deacclimation and budbreak of *Forsythia* 'Meadowlark' buds collected during the 2020-2021 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Forsythia* 'Meadowlark'. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

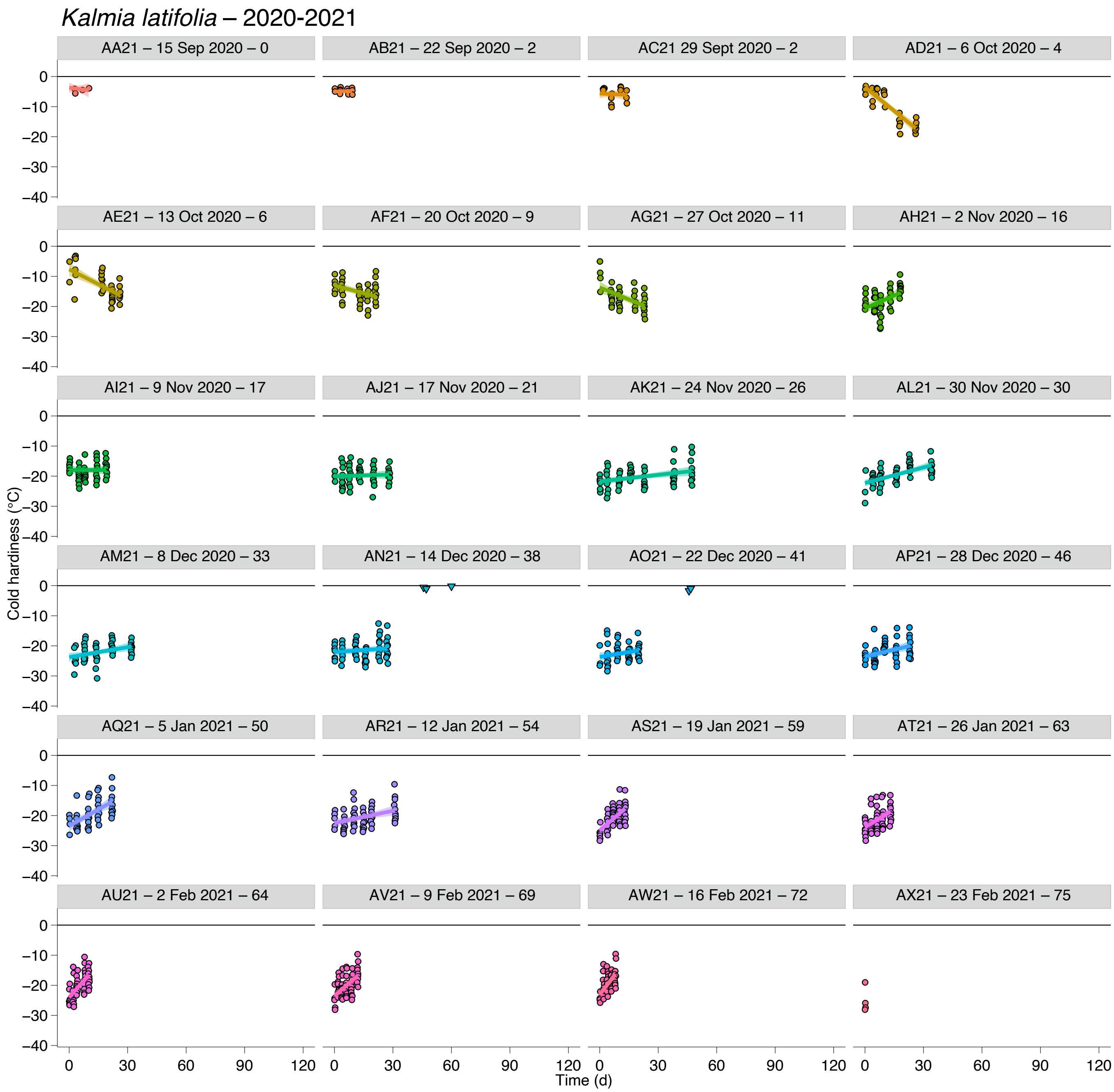

Figure S42. Deacclimation and budbreak of *Kalmia latifolia* buds collected during the 2020-2021 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Kalmia latifolia*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

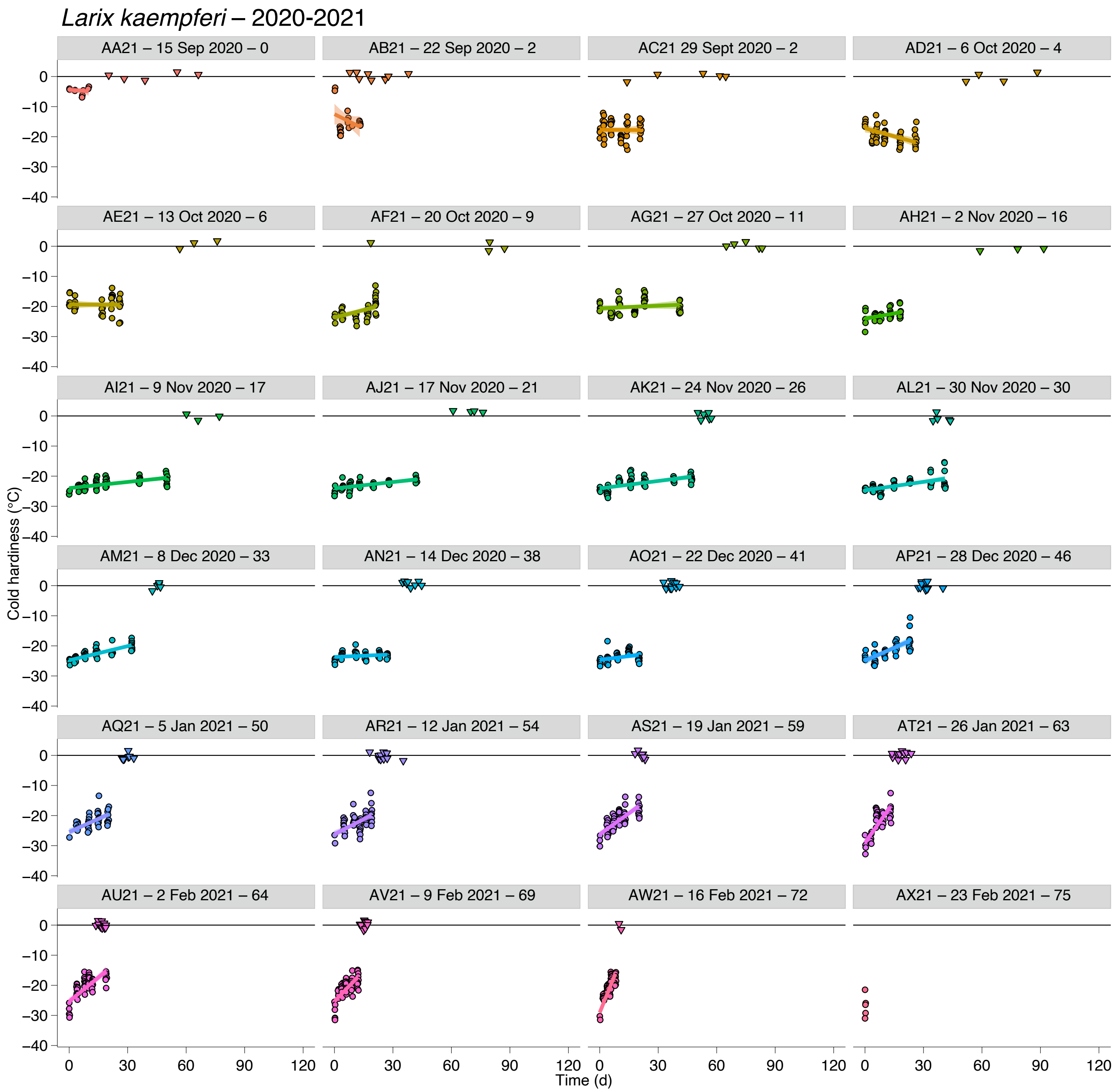

Figure S43. Deacclimation and budbreak of *Larix kaempferi* buds collected during the 2020-2021 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Larix kaempferi*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

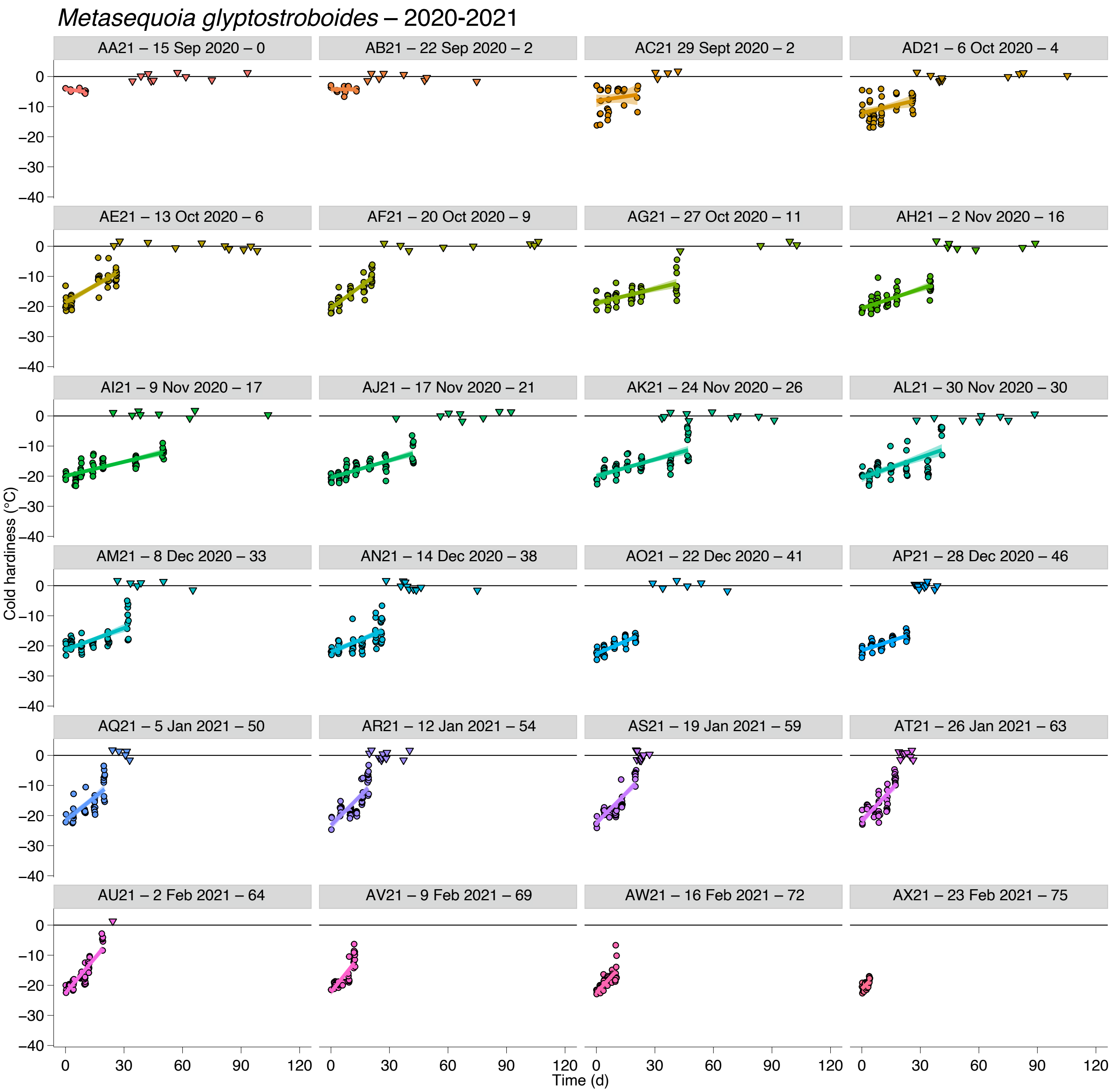

Figure S44. Deacclimation and budbreak of *Metasequoia glyptostroboides* buds collected during the 2020-2021 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Metasequoia glyptostroboides*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

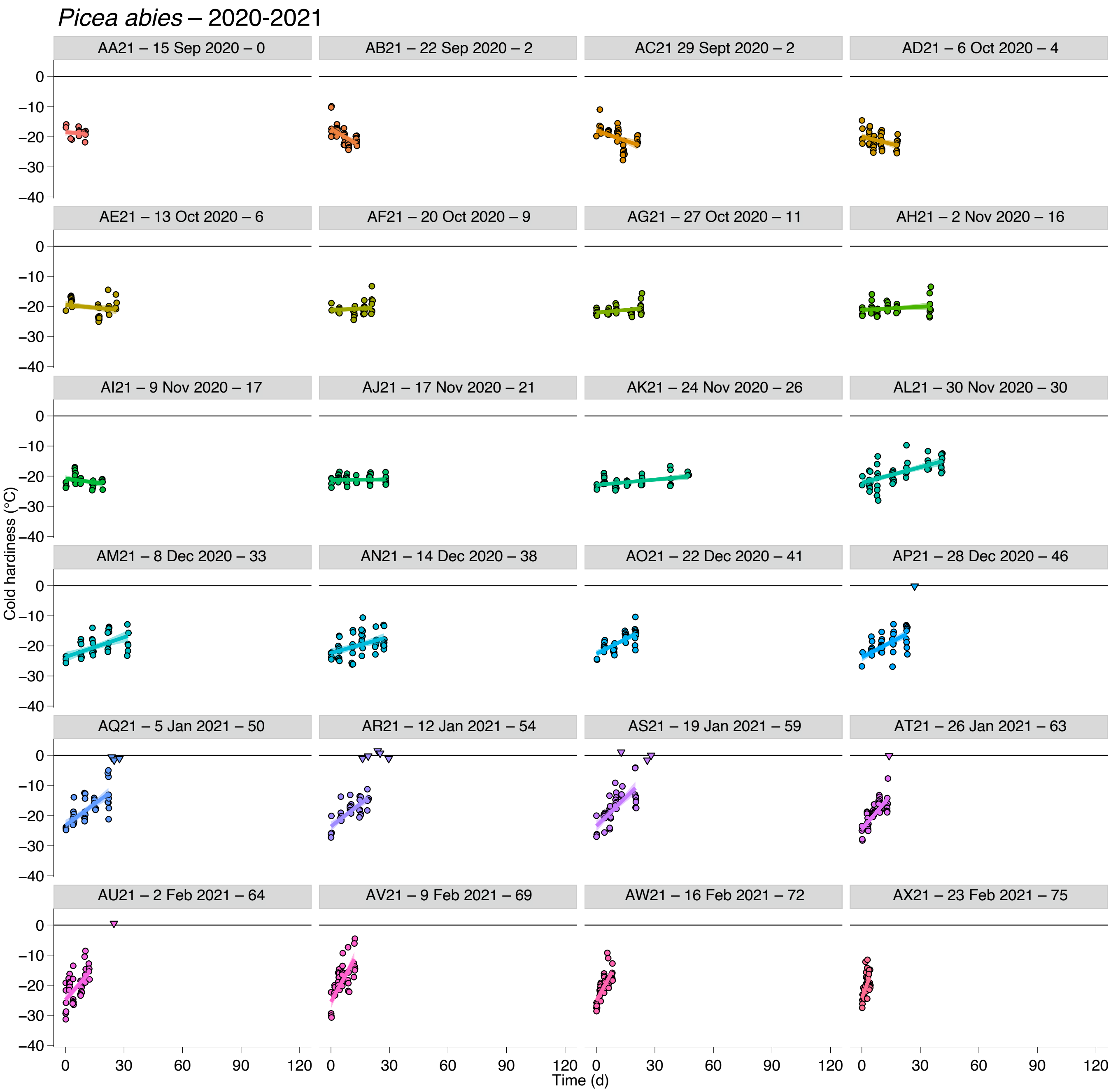

Figure S45. Deacclimation and budbreak of *Picea abies* buds collected during the 2020-2021 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Picea abies*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

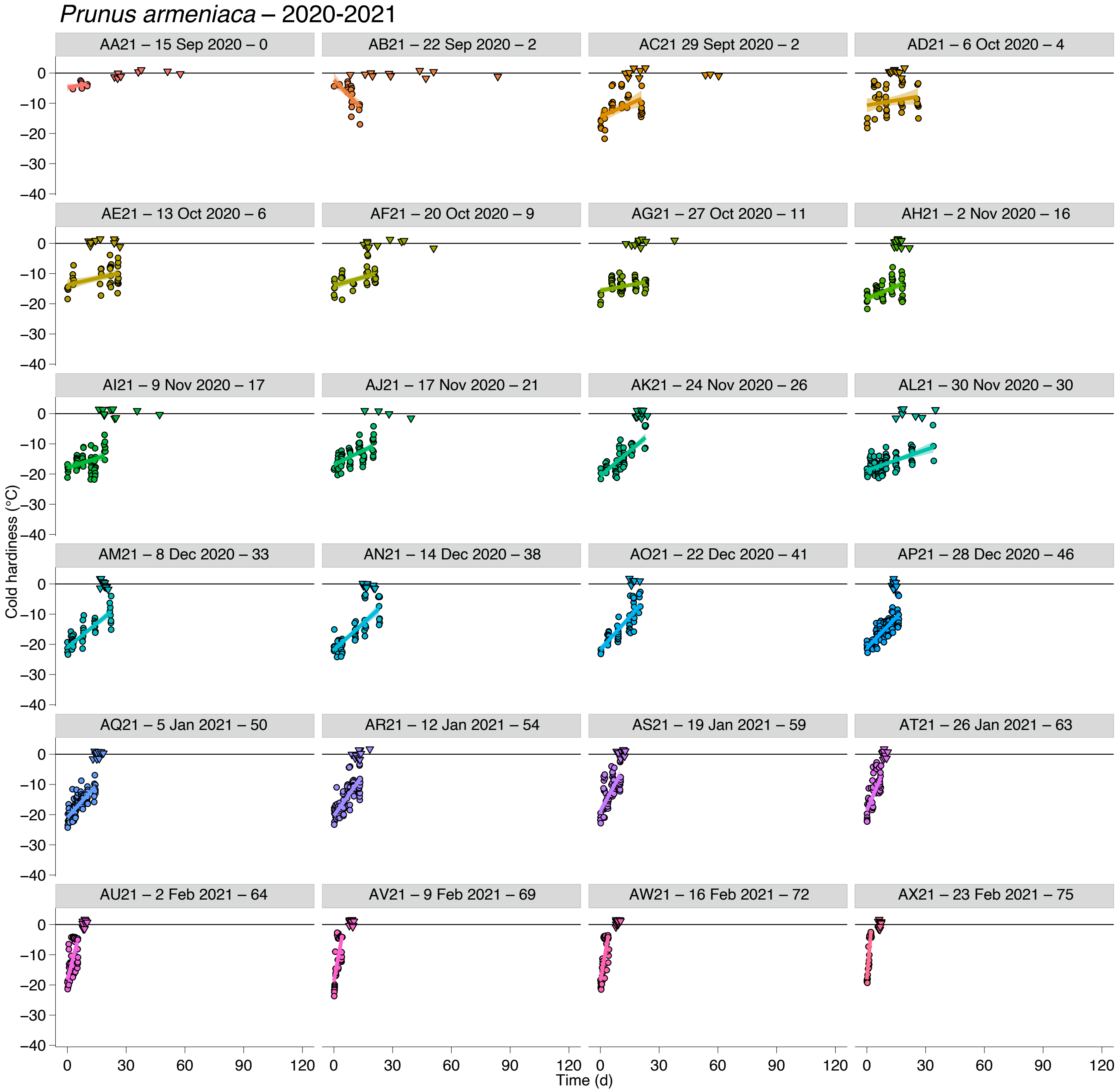

Figure S46. Deacclimation and budbreak of *Prunus armeniaca* buds collected during the 2020-2021 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Prunus armeniaca*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

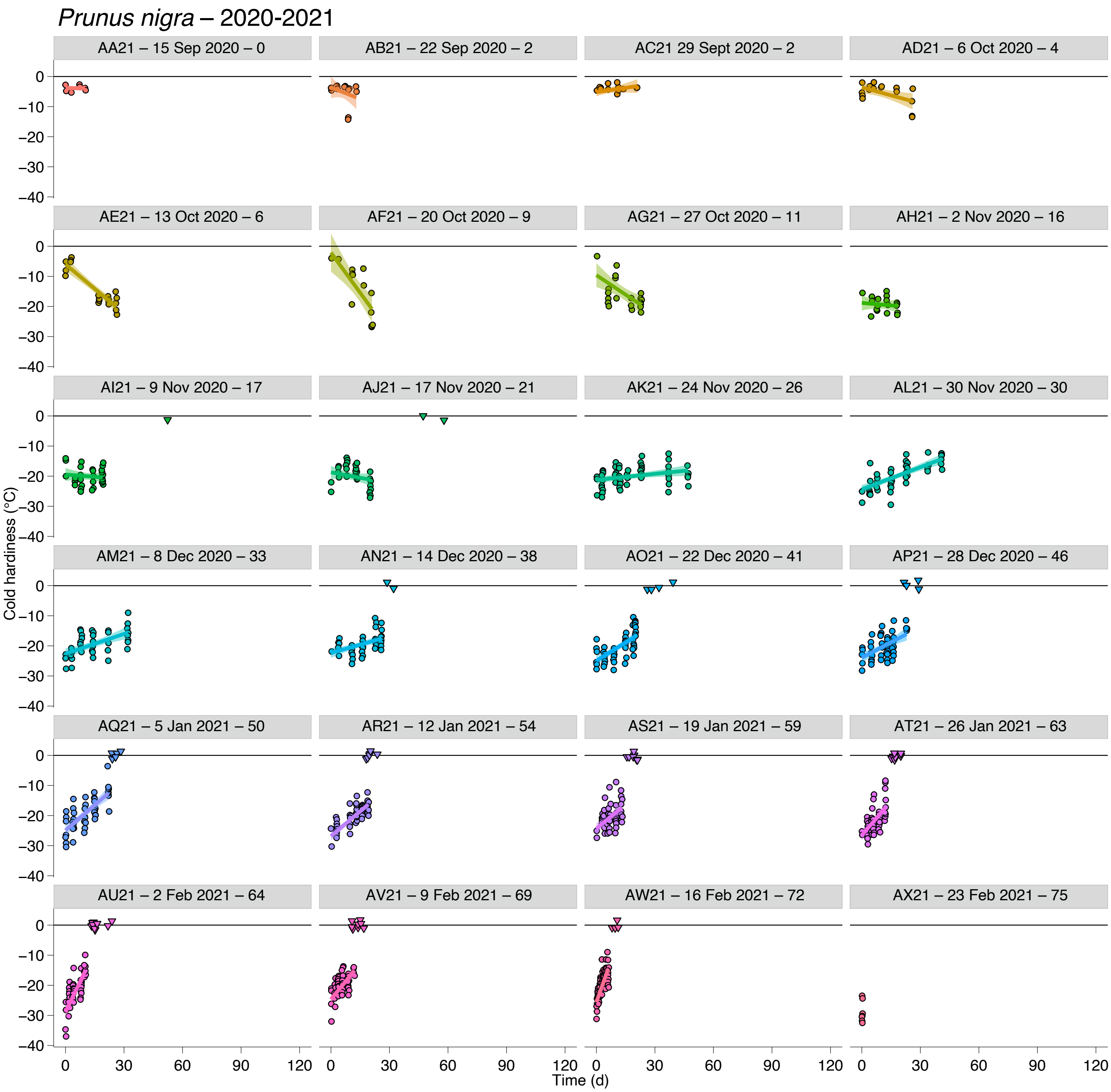

Figure S47. Deacclimation and budbreak of *Prunus nigra* buds collected during the 2020-2021 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Prunus nigra*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

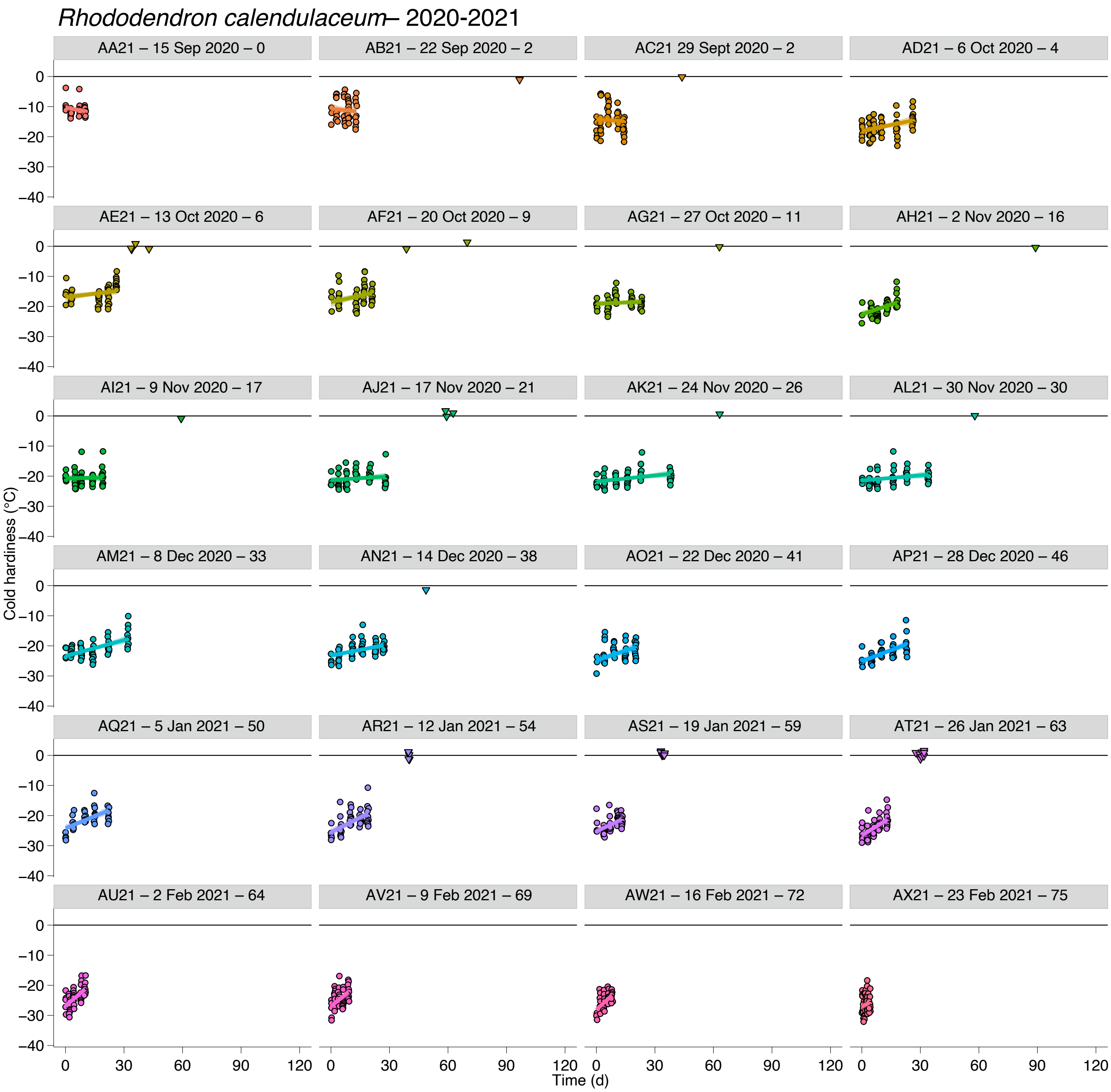

Figure S48. Deacclimation and budbreak of *Rhododendron calendulaceum* buds collected during the 2020-2021 dormant season. Loss of cold hardiness (circles) and budbreak (upside down triangles at 0 °C line) for *Rhododendron calendulaceum*. Each graph is identified by collection name, date of collection, and chill accumulated in portions.

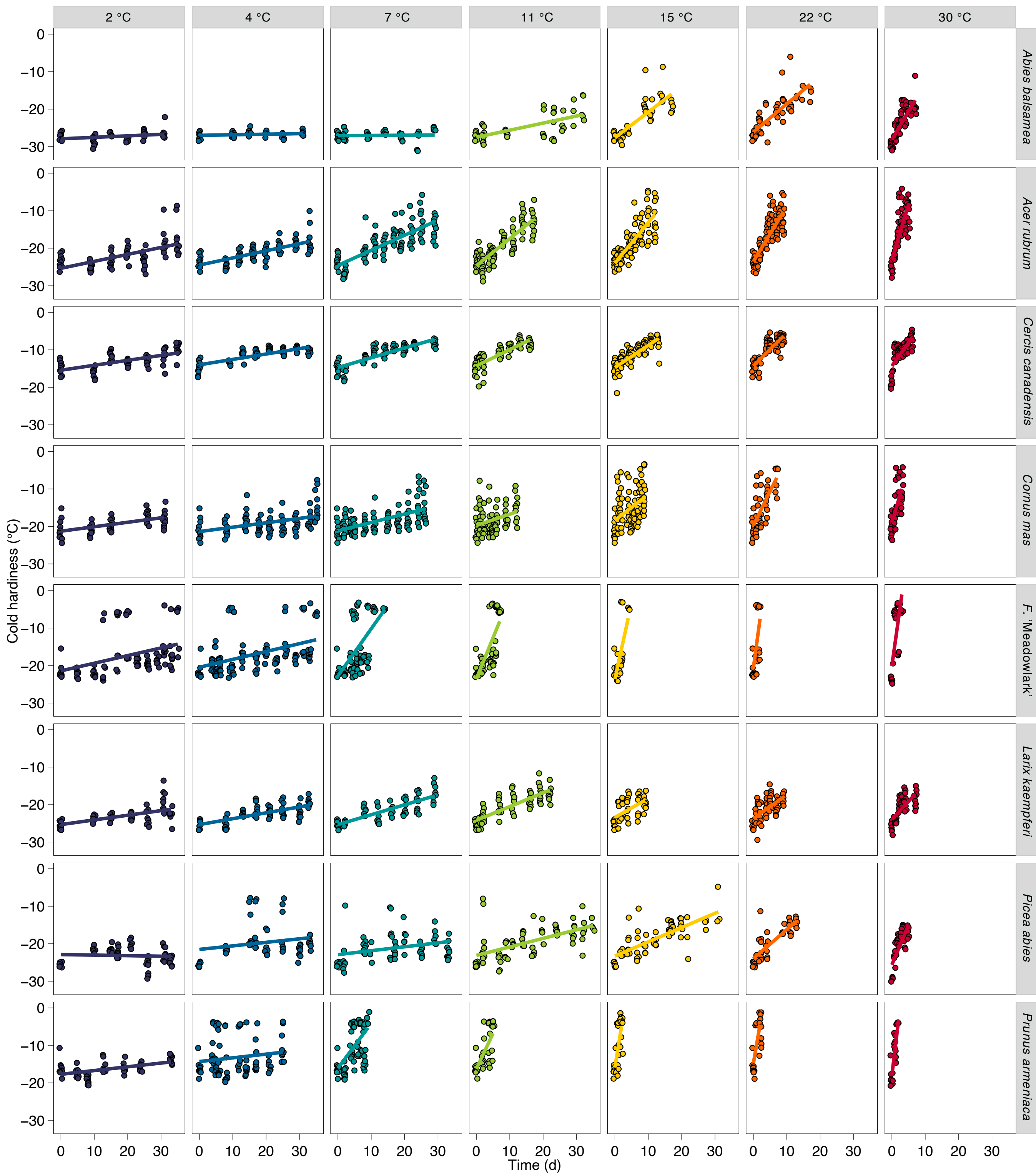

Figure S49. Deacclimation at different temperatures. Loss of cold hardiness over time of buds from eight species (rows) at seven different temperatures (columns), collected on 12 Feb 2020 (82 chill portions accumulated).

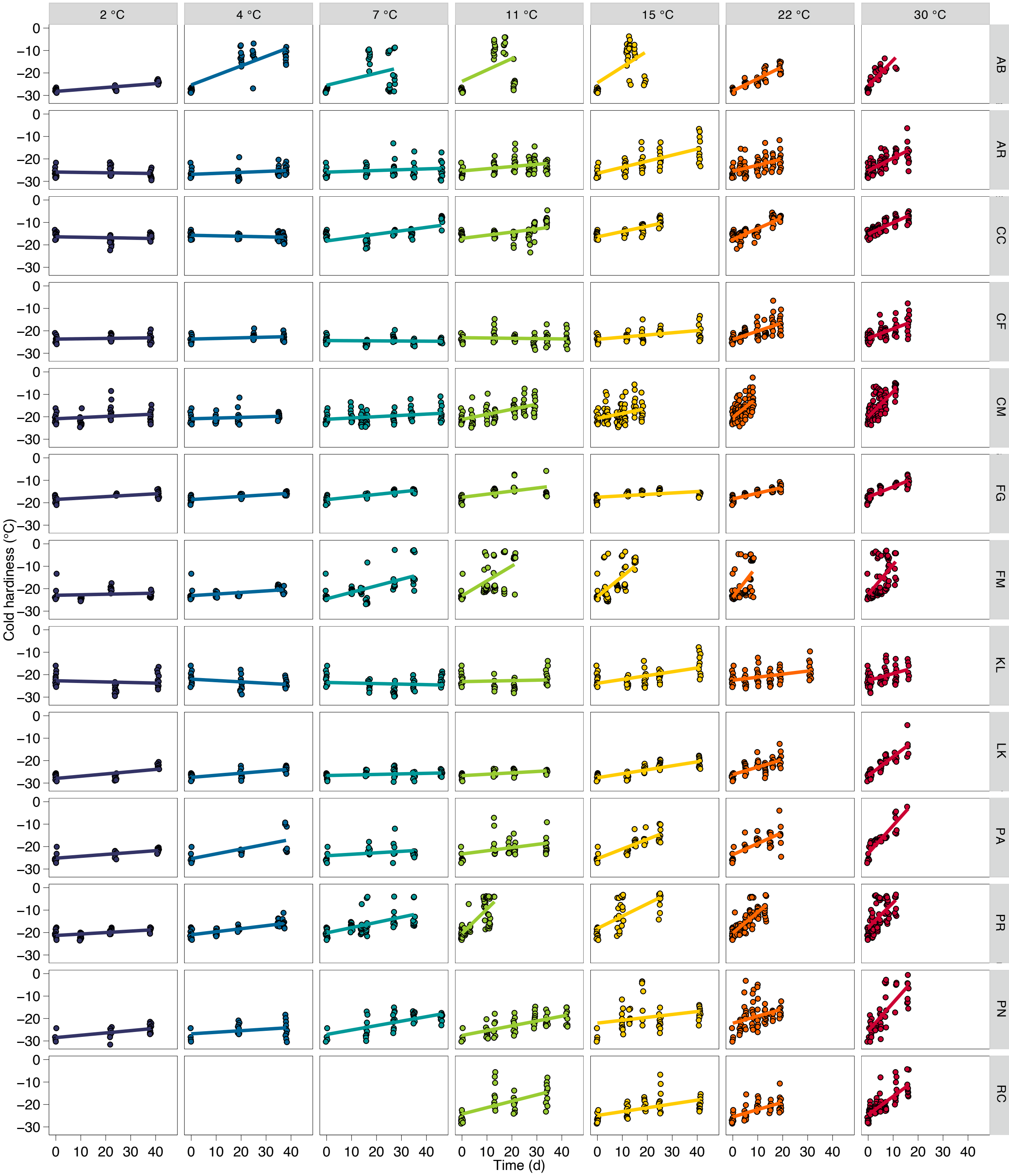

Figure S50. Deacclimation at different temperatures. Loss of cold hardiness over time of buds from nine species (rows) at seven different temperatures (columns), collected on 12 Jan 2021 (54 chill portions accumulated).

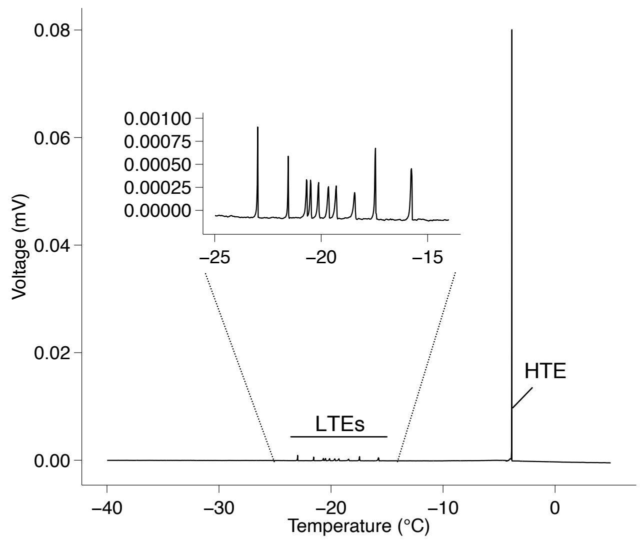

Figure S51. Differential thermal analysis example. Cooling down samples produces exotherms that are captured by thermoelectric modules as voltage peaks. A high temperature exotherm (HTE) occurs at high below freezing temperatures and is non-lethal. Peaks for low temperature exotherms (LTEs; shown in more detail within inset) are much smaller in size compared to HTE and represent lethal events. Here ten individual buds of *Forsythia* 'Meadowlark' had LTEs between –23.0 °C and –15.8 °C (these data pertain to collection AR20 after four days of deacclimation at 22 °C).

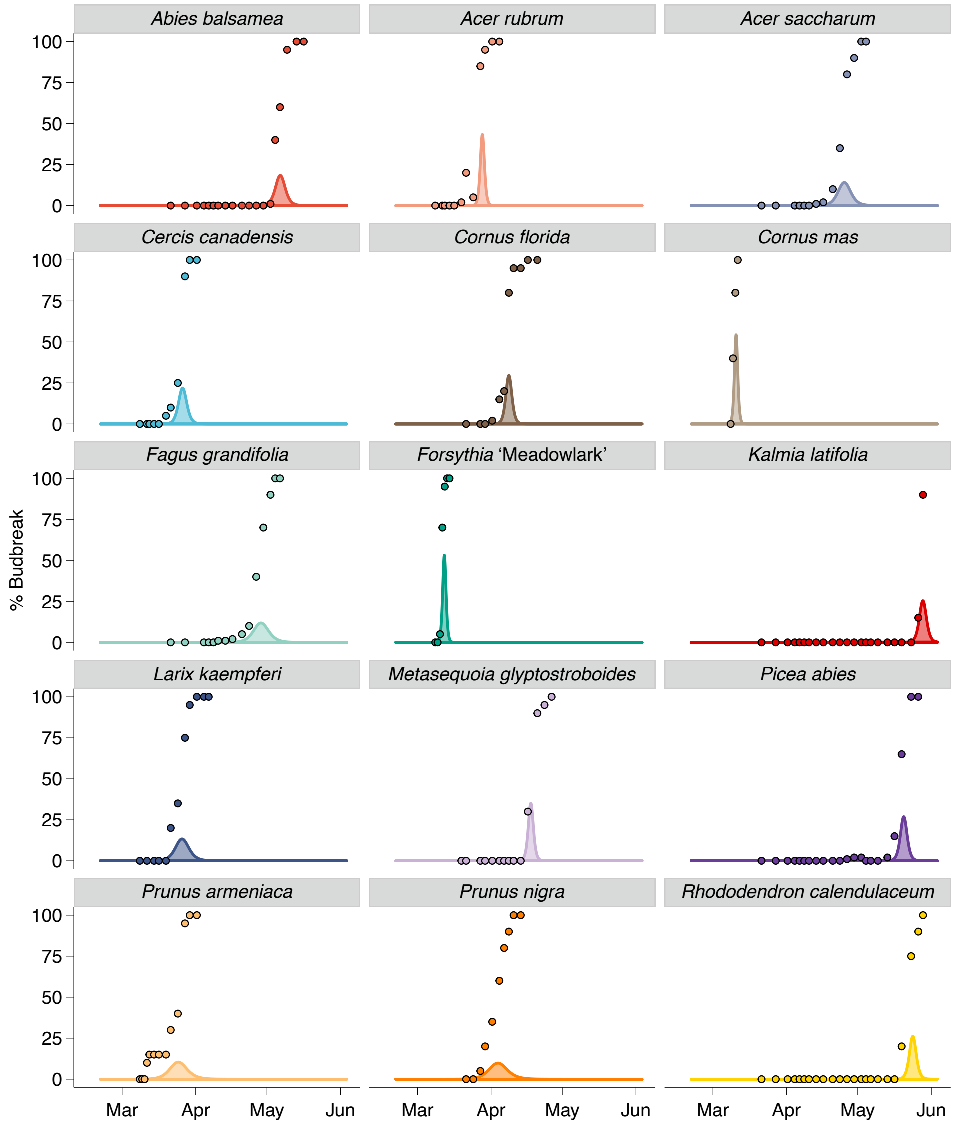

Figure S52. Field budbreak. Measured percent budbreak (circles) and density plots based on probability density function of as sigmoid response to time of different species at the Arnold Arboretum of Harvard University in the spring of 2020.

Table S1. Description of species in this study.

Species	Abbreviation	Common name	Accession	Family	Habit	Bud observed†	Description of budbreak	Total number of cold hardiness measurements
Abies balsamea	AB	Balsam Fir	610-93*C	Pinaceae	Evergreen	V	Bud scales separate and needle tips show	3,003
Acer rubrum	AR	Red Maple	688-39*H	Sapindaceae	Deciduous	R	Flower bud opens	3,286
Acer saccharum	AS	Sugar Maple	655-93*G	Sapindaceae	Deciduous	V	Multiple bud scales separate and leaf tips are visible	2,054
Cercis canadensis	CC	Eastern Redbud	403-95*B	Fabaceae	Deciduous	R	Multiple bud scales separate and flower tips are visible	3,174
Cornus florida	CF	Flowering Dogwood	216-2014*A	Cornaceae	Deciduous	R	Two pairs of bud scales separate and flowers are visible	2,683
Cornus mas	CM	Cornelian-Cherry	645-79*A	Cornaceae	Deciduous	R	Two pairs of bud scales separate and flowers are visible	3,386
Fagus grandifolia	FG	American Beech	6XX-2008*A	Fagaceae	Deciduous	V	Bud swells and scales fall to show leaves/flowers	2,323
Forsythia × *'Meadowlark'*	FM	Forsythia	198-2007*MASS-A	Oleaceae	Deciduous	V/R	Flower bud elongates, points downwards and petals are visible and yellow. For vegetative, vegetative growth starts below a floral bud.	2,904
Kalmia latifolia	KL	Mountain Laurel	440-66*A; 150-58*A; 728-54*B; 728-54*D	Ericaceae	Evergreen	R	Inflorescence elongates, at least one flower expands into "balloon" stage	2,521
Larix kaempferi	LK	Japanese Larch	11276*F	Pinaceae	Deciduous	V	Multiple bud scales separate and leaf tips are visible	2,730
Metasequoia glyptostroboides	MG	Dawn Redwood	524-48*Z	Cupressaceae	Deciduous	V	Multiple bud scales separate and leaf tips are visible	2,541
Picea abies	PA	Norway Spruce	23026*M	Pinaceae	Evergreen	V	Multiple bud scales separate and leaf tips are visible	2,652
Prunus armeniaca	PR	Apricot	382-92*B	Rosaceae	Deciduous	V/R	Multiple bud scales separate; for reproductive, sepals open and petals are visible; for vegetative, leaf tips are visible.	2,829
Prunus nigra	PN	Canadian Plum	107-78*A	Rosaceae	Deciduous	V/R	Multiple bud scales separate; for reproductive, sepals open and petals are visible; for vegetative, leaf tips are visible.	1840
Rhododendron calendulaceum	RC	Flame Azalea	17759*A; 656-70*MASS; 19483*MASS	Ericaceae	Deciduous	R	Multiple bud scales separate and flower tips are visible	2630

†V – Vegetative; R – Reproductive.

Table S2. Details on field collections.

2019-2020				2020-2021			
Collection	Date of Collection	Chill portions accumulated	Deacclimation and budbreak assay	Collection	Date of Collection	Chill portions accumulated	Deacclimation and budbreak assay
AA20	16 Sep 2019	1	×	AA21	15 Sep 2020	0	×
AB20	23 Sep 2019	2	×	AB21	22 Sep 2020	2	×
AC20	30 Sep 2019	2	×	AC21	29 Sep 2020	2	×
AD20	6 Oct 2019	4	×	AD21	6 Oct 2020	4	×
AE20	14 Oct 2019	7	×	AE21	13 Oct 2020	6	×
AF20	21 Oct 2019	10	×	AF21	20 Oct 2020	9	×
AG20	28 Oct 2019	15	×	AG21	27 Oct 2020	11	×
AH20	4 Nov 2019	15	×	AH21	2 Nov 2020	16	×
AI20	10 Nov 2019	23	×	AI21	9 Nov 2020	17	×
AJ20	17 Nov 2019	27	×	AJ21	17 Nov 2020	21	×
AK20	25 Nov 2019	33	×	AK21	24 Nov 2020	26	×
AL20	2 Dec 2019	37	×	AL21	30 Nov 2020	30	×
AM20	8 Dec 2019	40	×	AM21	8 Dec 2020	33	×
AN20	16 Dec 2019	45	×	AN21	14 Dec 2020	38	×
AO20	23 Dec 2019	48	×	AO21	22 Dec 2020	41	×
AP20	30 Dec 2019	53	×	AP21	28 Dec 2020	46	×
AQ20	6 Jan 2020	58	×	AQ21	5 Jan 2021	50	×
AR20	12 Jan 2020	61	×	AR21	12 Jan 2021	54	×
AS20	19 Jan 2020	64	×	AS21	19 Jan 2021	59	×
AT20	26 Jan 2020	70	×	AT21	26 Jan 2021	63	×
AU20	2 Feb 2020	74	×	AU21	2 Feb 2021	64	×
AV20	8 Feb 2020	79	×	AV21	9 Feb 2021	69	×
AW20	17 Feb 2020	84	×	AW21	16 Feb 2021	72	×
AX20	24 Feb 2020	89	×	AX21	23 Feb 2021	75	× (Not all species)
AY20	2 Mar 2020	93	×	AY21	26 Feb 2021	77	
AZ20	8 Mar 2020	99	×				
BA20	14 Mar 2020	101	× (Not all species)				
BB20	18 Mar 2020	105					
BC20	19 Mar 2020	106					
BD20	22 Mar 2020	107					
BE20	27 Mar 2020	111					
BF20	4 Apr 2020	117					
BG20	8 Apr 2020	119					
BH20	11 Apr 2020	122					
BI20	13 Apr 2020	123					
BJ20	16 Apr 2020	125					
BK20	20 Apr 2020	128					
BL20	23 Apr 2020	130					
BM20	26 Apr 2020	132					
BN20	29 Apr 2020	134					
BO20	2 May 2020	135					
BP20	4 May 2020	135					
BQ20	6 May 2020	136					
BR20	9 May 2020	138					
BS20	13 May 2020	142					
BT20	16 May 2020	142					
BU20	19 May 2020	143					
BV20	23 May 2020	144					

Table S3. Estimates associated with regressions of deacclimation rate in response to temperature and deacclimation in response to chill accumulation for each species.

Species	Temperature response (max k_{deacc})†				Chill response (Ψ_{deacc})‡			
	n (different temperature assays)	β_1	β_2	β_3	n (different chill assays)	d	b	c
Abies balsamea	14	0.0937	–0.00516	0.0001491	51	0.017	–4.38	55.0
Acer rubrum	14	0.1279	–0.00312	0.0001522	50	0.043	–11.20	70.1
Acer saccharum	1	0.0527	0.00000	0.0000000	51	0.134	–5.64	73.8
Cercis canadensis	14	0.0655	0.00115	–0.0000307	50	0.080	–6.62	62.5
Cornus florida	7	0.0087	0.00475	–0.0001156	49	0.103	–6.70	68.6
Cornus mas	14	–0.0485	0.01624	–0.0002497	50	0.048	–7.10	71.8
Fagus grandifolia	7	0.0569	–0.00293	0.0000759	50	0.105	–6.53	72.8
Forsythia 'Meadowlark'	14	–0.0314	0.04830	–0.0012354	50	0.029	–7.57	70.0
Kalmia latifolia	7	–0.0332	0.00326	0.0000000	50	0.037	–3.51	59.7
Larix kaempferi	14	0.0851	–0.00454	0.0001476	49	0.045	–4.65	63.9
Metasequoia glyptostroboides	1	0.0606	0.00000	0.0000000	50	0.118	–3.96	58.2
Picea abies	14	0.0658	–0.00414	0.0002155	51	0.006	–3.50	65.8
Prunus armeniaca	14	0.1144	0.02069	–0.0004248	50	0.027	–7.74	72.8
Prunus nigra	7	0.2602	–0.02510	0.0007594	49	0.039	–4.62	61.9
Rhododendron	4	0.1169	–0.00958	0.0002463	49	0.091	–3.05	51.9
				All Species	749	0.065	–4.98	66.0

†$\max k_{deacc_T} = \beta_1 \times T + \beta_2 \times T^2 + \beta_3 \times T^3$, where T is the temperature in °C.

‡$\Psi_{deacc} = d + {(1-d)}/{1 + e^{[b \times (\ln(chill) - \ln(c))]}}$, where *chill* is the accumulated chill in portions.

Table S4. Estimates, fitness statistics, and displays associated with linear regressions for each collection and species.

Species	Collection	n	α ± error		β ± error		r^2	*P*-value
Abies balsamea	AA20	45	-15.26	±1.07	0.00	±0.16	0.00	0.975
	AB20	50	-14.47	±1.15	-0.33	±0.18	0.07	0.071
	AC20	40	-15.10	±1.12	-0.15	±0.22	0.01	0.480
	AD20	41	-18.13	±0.98	0.08	±0.16	0.01	0.591
	AE20	51	-17.26	±0.71	-0.33	±0.07	0.30	<0.001
	AF20	61	-18.31	±0.60	-0.50	±0.11	0.26	<0.001
	AG20	56	-19.85	±0.52	-0.15	±0.03	0.26	<0.001
	AH20	41	-22.91	±0.45	0.04	±0.03	0.06	0.132
	AI20	45	-24.76	±0.35	0.01	±0.01	0.01	0.601
	AJ20	46	-25.85	±0.48	0.00	±0.02	0.00	0.942
	AK20	43	-25.83	±0.54	0.10	±0.03	0.26	<0.001
	AL20	35	-27.45	±0.76	0.13	±0.04	0.22	0.005
	AM20	33	-29.35	±0.59	0.40	±0.03	0.82	<0.001
	AN20	45	-27.44	±0.64	0.35	±0.04	0.69	<0.001
	AO20	41	-29.57	±0.84	0.65	±0.06	0.77	<0.001
	AP20	40	-27.72	±0.63	0.38	±0.05	0.58	<0.001
	AQ20	46	-27.93	±0.52	0.68	±0.05	0.83	<0.001
	AR20	47	-27.88	±0.60	0.57	±0.05	0.75	<0.001
	AS20	44	-29.99	±0.59	0.98	±0.05	0.90	<0.001
	AT20	48	-27.42	±0.46	0.71	±0.05	0.82	<0.001
	AU20	43	-26.51	±0.46	0.98	±0.06	0.85	<0.001
	AV20	26	-26.83	±0.46	0.92	±0.07	0.87	<0.001
	AW20	46	-26.78	±0.53	1.08	±0.08	0.80	<0.001
	AX20	42	-26.42	±0.59	1.18	±0.11	0.73	<0.001
	AY20	38	-25.84	±0.66	0.98	±0.12	0.66	<0.001
	AZ20	33	-25.77	±0.42	1.11	±0.08	0.86	<0.001
	BA20	45	-22.87	±0.39	0.97	±0.11	0.63	<0.001
	AA21	25	-14.47	±0.72	-0.26	±0.13	0.15	0.059
	AB21	38	-15.16	±0.87	-0.33	±0.11	0.20	0.006
	AC21	49	-20.89	±0.68	-0.08	±0.05	0.05	0.135
	AD21	55	-22.19	±0.46	-0.11	±0.03	0.18	0.001
	AE21	44	-23.23	±0.45	0.09	±0.03	0.22	0.001
	AF21	41	-24.73	±0.35	0.01	±0.03	0.01	0.638
	AG21	40	-23.69	±0.38	-0.06	±0.03	0.10	0.047
	AH21	49	-26.45	±0.33	0.11	±0.02	0.35	<0.001
	AI21	40	-23.40	±0.59	-0.12	±0.06	0.09	0.058
	AJ21	61	-25.62	±0.34	0.04	±0.02	0.10	0.013
	AK21	53	-26.76	±0.30	0.12	±0.01	0.56	<0.001

	AL21	59	-25.54	±0.30	0.08	±0.01	0.37	<0.001
	AM21	58	-27.08	±0.43	0.08	±0.02	0.16	0.002
	AN21	56	-29.59	±0.28	0.18	±0.02	0.68	<0.001
	AO21	47	-29.07	±0.52	0.40	±0.04	0.66	<0.001
	AP21	45	-29.74	±0.75	0.55	±0.06	0.70	<0.001
	AQ21	39	-27.83	±0.40	0.28	±0.03	0.63	<0.001
	AR21	45	-28.00	±0.51	0.54	±0.04	0.78	<0.001
	AS21	43	-27.18	±0.50	0.42	±0.04	0.72	<0.001
	AT21	43	-30.21	±0.32	0.77	±0.04	0.89	<0.001
	AU21	55	-27.27	±0.57	0.72	±0.06	0.74	<0.001
	AV21	45	-26.84	±0.54	0.69	±0.08	0.60	<0.001
	AW21	47	-27.98	±0.70	0.97	±0.14	0.50	<0.001
	AX21	48	-26.16	±0.56	1.24	±0.22	0.40	<0.001
Acer rubrum	AA20	26	-8.68	±1.18	0.02	±0.15	0.00	0.885
	AB20	27	-7.06	±0.77	-0.05	±0.12	0.01	0.716
	AC20	34	-9.16	±1.73	-0.01	±0.29	0.00	0.982
	AD20	29	-9.99	±1.29	0.10	±0.21	0.01	0.634
	AE20	35	-9.75	±1.02	-0.30	±0.12	0.16	0.017
	AF20	39	-18.84	±0.87	0.08	±0.11	0.02	0.455
	AG20	33	-20.25	±0.53	0.09	±0.04	0.16	0.019
	AH20	25	-21.82	±0.77	0.06	±0.05	0.06	0.237
	AI20	31	-21.58	±0.50	0.00	±0.02	0.00	0.883
	AJ20	37	-24.89	±0.89	0.12	±0.04	0.19	0.008
	AK20	44	-21.99	±0.59	-0.01	±0.03	0.00	0.686
	AL20	33	-25.09	±0.69	0.10	±0.04	0.19	0.012
	AM20	26	-24.06	±0.92	0.09	±0.06	0.09	0.144
	AN20	30	-23.74	±1.34	0.16	±0.07	0.15	0.036
	AO20	32	-26.51	±0.48	0.24	±0.04	0.58	<0.001
	AP20	34	-25.36	±1.06	0.28	±0.09	0.24	0.004
	AQ20	35	-25.94	±1.22	0.89	±0.14	0.55	<0.001
	AR20	42	-23.50	±0.94	0.38	±0.08	0.36	<0.001
	AS20	45	-23.62	±0.78	0.44	±0.07	0.46	<0.001
	AT20	36	-25.52	±0.91	0.84	±0.13	0.55	<0.001
	AU20	30	-23.01	±0.85	1.65	±0.41	0.37	<0.001
	AV20	47	-25.38	±0.57	2.54	±0.23	0.74	<0.001
	AW20	35	-24.62	±0.59	2.54	±0.31	0.67	<0.001
	AX20	40	-21.99	±0.83	2.48	±0.31	0.63	<0.001
	AY20	30	-20.41	±0.57	3.41	±0.44	0.68	<0.001
	AZ20	30	-19.37	±0.84	3.20	±0.65	0.46	<0.001
	AA21	12	-4.16	±1.19	-0.32	±0.17	0.25	0.097

	AB21	28	-2.99	±1.68	-0.65	±0.22	0.26	0.006
	AC21	47	-9.08	±0.95	-0.24	±0.08	0.17	0.004
	AD21	47	-17.08	±0.50	0.11	±0.03	0.19	0.002
	AE21	45	-19.04	±0.71	0.24	±0.04	0.46	<0.001
	AF21	50	-19.76	±0.64	0.18	±0.05	0.23	<0.001
	AG21	60	-20.13	±0.49	0.15	±0.02	0.43	<0.001
	AH21	57	-21.59	±0.52	0.15	±0.03	0.29	<0.001
	AI21	69	-21.36	±0.43	0.14	±0.02	0.49	<0.001
	AJ21	70	-22.60	±0.45	0.18	±0.02	0.53	<0.001
	AK21	79	-23.40	±0.49	0.15	±0.02	0.42	<0.001
	AL21	80	-23.83	±0.49	0.22	±0.02	0.54	<0.001
	AM21	70	-24.39	±0.44	0.19	±0.03	0.42	<0.001
	AN21	70	-24.71	±0.56	0.21	±0.04	0.32	<0.001
	AO21	50	-25.33	±0.67	0.25	±0.06	0.29	<0.001
	AP21	59	-26.40	±0.71	0.41	±0.05	0.52	<0.001
	AQ21	50	-24.78	±0.67	0.29	±0.05	0.39	<0.001
	AR21	69	-25.89	±0.68	0.30	±0.06	0.28	<0.001
	AS21	58	-25.94	±0.71	0.50	±0.09	0.34	<0.001
	AT21	50	-27.42	±0.72	0.76	±0.13	0.42	<0.001
	AU21	58	-28.03	±0.78	1.34	±0.11	0.74	<0.001
	AV21	80	-26.17	±0.63	1.59	±0.13	0.64	<0.001
	AW21	79	-26.23	±0.67	2.00	±0.15	0.69	<0.001
	AX21	50	-24.68	±0.70	2.25	±0.29	0.57	<0.001
Acer saccharum	AA20	24	-6.56	±0.34	0.11	±0.05	0.18	0.039
	AB20	24	-6.80	±0.41	0.20	±0.07	0.27	0.009
	AC20	20	-5.80	±0.39	0.05	±0.08	0.02	0.526
	AD20	21	-7.20	±0.97	0.16	±0.14	0.06	0.267
	AE20	24	-5.56	±1.99	-2.01	±0.39	0.55	<0.001
	AF20	19	-20.65	±1.44	0.32	±0.27	0.08	0.252
	AG20	27	-24.26	±0.73	0.21	±0.05	0.43	<0.001
	AH20	20	-21.10	±0.51	0.04	±0.03	0.12	0.133
	AI20	22	-26.19	±0.38	0.15	±0.02	0.84	<0.001
	AJ20	23	-26.43	±0.58	0.23	±0.03	0.76	<0.001
	AK20	25	-27.17	±0.84	0.22	±0.04	0.56	<0.001
	AL20	18	-28.16	±0.93	0.27	±0.05	0.64	<0.001
	AM20	21	-28.20	±0.71	0.26	±0.04	0.71	<0.001
	AN20	23	-29.14	±0.72	0.23	±0.04	0.62	<0.001
	AO20	28	-29.72	±0.66	0.30	±0.04	0.70	<0.001
	AP20	23	-30.28	±0.83	0.37	±0.07	0.56	<0.001
	AQ20	23	-31.49	±0.65	0.52	±0.06	0.78	<0.001

	AR20	27	-30.06	±1.31	0.42	±0.10	0.42	<0.001
	AS20	32	-29.77	±0.66	0.30	±0.06	0.46	<0.001
	AT20	28	-29.93	±0.70	0.24	±0.08	0.26	0.005
	AU20	32	-30.34	±0.69	0.42	±0.09	0.42	<0.001
	AV20	26	-31.23	±0.44	0.48	±0.04	0.83	<0.001
	AW20	35	-30.32	±0.59	0.50	±0.11	0.40	<0.001
	AX20	29	-31.69	±0.54	0.92	±0.10	0.77	<0.001
	AY20	23	-29.54	±0.49	1.24	±0.20	0.65	<0.001
	AZ20	37	-29.16	±0.70	1.08	±0.11	0.74	<0.001
	BA20	28	-27.07	±0.63	1.39	±0.20	0.64	<0.001
	AA21	19	-16.68	±1.01	-0.05	±0.14	0.01	0.714
	AB21	40	-19.42	±0.61	-0.05	±0.07	0.01	0.515
	AC21	30	-19.06	±0.88	0.29	±0.13	0.15	0.033
	AD21	59	-18.48	±0.47	0.20	±0.03	0.38	<0.001
	AE21	50	-19.50	±0.66	-0.03	±0.04	0.01	0.453
	AF21	48	-20.70	±0.51	0.14	±0.04	0.22	0.001
	AG21	50	-20.97	±0.58	0.21	±0.04	0.34	<0.001
	AH21	60	-22.11	±0.37	0.06	±0.02	0.12	0.006
	AI21	70	-24.79	±0.46	0.20	±0.02	0.64	<0.001
	AJ21	65	-24.40	±0.48	0.15	±0.03	0.35	<0.001
	AK21	70	-23.76	±0.58	0.13	±0.02	0.33	<0.001
	AL21	70	-26.05	±0.52	0.20	±0.02	0.52	<0.001
	AM21	60	-25.84	±0.50	0.23	±0.03	0.52	<0.001
	AN21	59	-24.77	±0.50	0.17	±0.03	0.34	<0.001
	AO21	50	-24.99	±0.48	0.21	±0.04	0.36	<0.001
	AP21	48	-26.16	±0.56	0.22	±0.04	0.38	<0.001
	AQ21	50	-26.23	±0.58	0.22	±0.05	0.31	<0.001
	AR21	49	-27.23	±0.51	0.29	±0.06	0.35	<0.001
	AS21	60	-28.39	±0.54	0.47	±0.05	0.61	<0.001
	AT21	60	-27.26	±0.53	0.35	±0.05	0.41	<0.001
	AU21	67	-28.61	±0.56	0.63	±0.06	0.65	<0.001
	AV21	59	-28.97	±0.50	0.86	±0.07	0.71	<0.001
	AW21	60	-27.24	±0.51	0.79	±0.10	0.50	<0.001
	AX21	50	-26.20	±0.48	0.79	±0.20	0.25	<0.001
Cercis canadensis	AA20	29	-7.88	±1.07	-0.15	±0.13	0.05	0.255
	AB20	38	-10.38	±0.88	0.24	±0.14	0.08	0.095
	AC20	29	-10.48	±0.87	0.30	±0.15	0.13	0.059
	AD20	30	-9.61	±0.71	0.00	±0.11	0.00	0.968
	AE20	35	-10.14	±0.68	0.02	±0.08	0.00	0.812
	AF20	43	-13.42	±0.67	0.16	±0.08	0.09	0.045

AG20	39	-13.66	±0.58	0.13	±0.04	0.26	0.001
AH20	33	-11.71	±0.44	0.05	±0.02	0.13	0.038
AI20	25	-12.98	±0.54	0.08	±0.02	0.39	0.001
AJ20	41	-14.49	±0.62	0.14	±0.03	0.29	<0.001
AK20	32	-15.26	±0.64	0.18	±0.03	0.57	<0.001
AL20	27	-15.36	±0.58	0.25	±0.03	0.68	<0.001
AM20	28	-16.03	±0.56	0.34	±0.03	0.83	<0.001
AN20	34	-16.05	±0.91	0.38	±0.05	0.66	<0.001
AO20	38	-17.04	±0.63	0.40	±0.04	0.74	<0.001
AP20	36	-17.65	±0.66	0.56	±0.06	0.73	<0.001
AQ20	40	-18.50	±0.57	0.67	±0.05	0.80	<0.001
AR20	30	-17.55	±0.62	0.49	±0.05	0.77	<0.001
AS20	20	-17.62	±0.95	1.09	±0.14	0.78	<0.001
AT20	26	-17.42	±0.77	0.95	±0.16	0.59	<0.001
AU20	19	-16.49	±0.78	1.25	±0.17	0.76	<0.001
AV20	40	-14.41	±0.68	1.53	±0.27	0.46	<0.001
AW20	38	-13.03	±0.53	1.92	±0.22	0.68	<0.001
AX20	44	-12.13	±0.55	1.52	±0.23	0.51	<0.001
AY20	41	-11.36	±0.42	1.39	±0.17	0.63	<0.001
AZ20	24	-9.39	±0.72	1.38	±0.55	0.22	0.021
BA20	27	-8.51	±0.56	1.47	±0.45	0.29	0.003
AA21	25	-6.71	±0.50	-0.02	±0.08	0.00	0.780
AB21	35	-6.84	±0.63	-0.19	±0.08	0.15	0.022
AC21	51	-8.89	±0.40	-0.05	±0.03	0.05	0.115
AD21	54	-10.14	±0.35	-0.01	±0.02	0.00	0.663
AE21	43	-11.35	±0.46	0.13	±0.03	0.36	<0.001
AF21	50	-13.54	±0.47	0.17	±0.04	0.33	<0.001
AG21	59	-12.57	±0.37	0.07	±0.02	0.20	<0.001
AH21	58	-13.71	±0.50	0.08	±0.03	0.14	0.004
AI21	70	-15.33	±0.39	0.12	±0.02	0.48	<0.001
AJ21	70	-14.17	±0.36	0.15	±0.02	0.53	<0.001
AK21	80	-16.55	±0.38	0.20	±0.02	0.53	<0.001
AL21	78	-15.78	±0.43	0.20	±0.02	0.55	<0.001
AM21	50	-17.19	±0.49	0.34	±0.04	0.60	<0.001
AN21	50	-16.12	±0.45	0.36	±0.03	0.71	<0.001
AO21	60	-18.15	±0.49	0.44	±0.04	0.72	<0.001
AP21	49	-17.64	±0.54	0.46	±0.06	0.55	<0.001
AQ21	70	-16.20	±0.42	0.39	±0.05	0.51	<0.001
AR21	79	-17.59	±0.36	0.49	±0.04	0.71	<0.001
AS21	70	-18.46	±0.55	0.70	±0.08	0.56	<0.001

	AT21	70	-17.35	±0.55	0.64	±0.08	0.50	<0.001
	AU21	70	-17.35	±0.53	1.01	±0.09	0.63	<0.001
	AV21	80	-17.16	±0.56	1.25	±0.12	0.58	<0.001
	AW21	70	-16.84	±0.57	1.71	±0.16	0.63	<0.001
Cornus florida	AA20	19	-6.54	±0.29	0.11	±0.04	0.32	0.011
	AB20	21	-6.31	±0.29	0.12	±0.05	0.21	0.038
	AC20	17	-5.92	±0.32	0.07	±0.05	0.09	0.234
	AD20	16	-5.45	±0.31	-0.02	±0.04	0.01	0.682
	AE20	30	-9.41	±1.20	-0.07	±0.10	0.02	0.442
	AF20	43	-8.73	±1.66	-0.80	±0.24	0.22	0.002
	AG20	52	-22.72	±0.62	0.35	±0.04	0.59	<0.001
	AH20	47	-23.21	±0.81	0.29	±0.05	0.45	<0.001
	AI20	42	-22.36	±0.96	0.14	±0.03	0.29	<0.001
	AJ20	48	-24.04	±0.51	0.19	±0.03	0.54	<0.001
	AK20	46	-24.86	±0.92	0.31	±0.04	0.55	<0.001
	AL20	36	-24.20	±0.77	0.13	±0.04	0.21	0.005
	AM20	36	-24.20	±0.32	0.15	±0.02	0.66	<0.001
	AN20	37	-24.72	±0.82	0.26	±0.06	0.39	<0.001
	AO20	44	-25.25	±0.72	0.22	±0.05	0.35	<0.001
	AP20	49	-23.98	±0.50	0.22	±0.04	0.34	<0.001
	AQ20	48	-25.03	±0.64	0.36	±0.06	0.44	<0.001
	AR20	42	-26.17	±0.86	0.82	±0.08	0.70	<0.001
	AS20	36	-27.43	±0.86	0.96	±0.10	0.75	<0.001
	AT20	49	-26.70	±0.95	0.96	±0.10	0.65	<0.001
	AU20	47	-23.25	±0.77	0.31	±0.11	0.14	0.010
	AW20	48	-25.17	±0.68	1.13	±0.10	0.72	<0.001
	AX20	54	-25.85	±0.69	1.27	±0.12	0.69	<0.001
	AY20	40	-23.11	±0.76	1.32	±0.14	0.70	<0.001
	AZ20	40	-23.27	±0.94	1.33	±0.19	0.55	<0.001
	AA21	10	-4.59	±0.73	0.01	±0.10	0.00	0.956
	AB21	34	-10.13	±0.89	0.25	±0.13	0.11	0.061
	AC21	49	-10.05	±0.76	-0.03	±0.07	0.00	0.630
	AD21	55	-15.88	±0.71	0.23	±0.05	0.25	<0.001
	AE21	50	-17.49	±0.90	0.09	±0.05	0.05	0.112
	AF21	49	-19.24	±0.81	0.05	±0.06	0.01	0.429
	AG21	56	-19.82	±0.78	0.14	±0.04	0.17	0.002
	AH21	50	-24.10	±0.54	0.28	±0.05	0.39	<0.001
	AI21	60	-24.45	±0.51	0.26	±0.03	0.59	<0.001
	AJ21	60	-24.37	±0.43	0.18	±0.03	0.42	<0.001
	AK21	60	-23.49	±0.52	0.13	±0.03	0.28	<0.001

	AL21	59	-23.23	±0.53	0.11	±0.03	0.18	0.001
	AM21	60	-23.93	±0.35	0.10	±0.02	0.30	<0.001
	AN21	60	-23.30	±0.38	0.06	±0.02	0.11	0.008
	AO21	50	-22.17	±0.54	-0.05	±0.05	0.02	0.315
	AP21	50	-24.74	±0.38	0.17	±0.03	0.44	<0.001
	AQ21	50	-23.68	±0.53	0.14	±0.04	0.17	0.003
	AR21	69	-23.79	±0.56	0.35	±0.05	0.43	<0.001
	AS21	49	-24.14	±0.63	0.29	±0.08	0.23	<0.001
	AT21	60	-24.25	±0.72	0.66	±0.07	0.58	<0.001
	AU21	59	-24.93	±0.67	0.59	±0.09	0.42	<0.001
	AV21	58	-24.18	±0.57	0.60	±0.08	0.47	<0.001
	AW21	60	-24.20	±0.57	0.40	±0.09	0.24	<0.001
	AX21	50	-24.64	±0.42	0.80	±0.17	0.30	<0.001
Cornus mas	AA20	20	-6.09	±0.39	0.11	±0.05	0.19	0.058
	AB20	19	-5.65	±0.25	0.04	±0.05	0.03	0.460
	AC20	11	-5.17	±0.36	0.08	±0.07	0.13	0.270
	AD20	14	-5.23	±0.26	0.07	±0.04	0.18	0.132
	AE20	22	-3.69	±0.67	-0.58	±0.05	0.86	<0.001
	AF20	57	-10.46	±0.93	-0.53	±0.09	0.37	<0.001
	AG20	59	-18.20	±0.52	0.07	±0.03	0.08	0.033
	AH20	49	-18.68	±0.45	0.06	±0.03	0.11	0.020
	AI20	48	-20.81	±0.69	0.18	±0.03	0.51	<0.001
	AJ20	50	-20.61	±0.68	0.19	±0.03	0.39	<0.001
	AK20	48	-21.57	±0.79	0.31	±0.04	0.58	<0.001
	AL20	40	-21.30	±0.94	0.39	±0.05	0.58	<0.001
	AM20	30	-20.67	±0.84	0.42	±0.08	0.48	<0.001
	AN20	40	-20.89	±0.96	0.53	±0.07	0.59	<0.001
	AO20	27	-23.02	±1.09	1.28	±0.15	0.73	<0.001
	AP20	36	-21.71	±1.16	1.00	±0.17	0.49	<0.001
	AQ20	39	-22.55	±0.94	1.41	±0.16	0.69	<0.001
	AR20	68	-20.97	±0.73	1.00	±0.15	0.41	<0.001
	AS20	39	-21.49	±1.01	1.76	±0.40	0.34	<0.001
	AT20	40	-20.76	±1.00	1.22	±0.26	0.37	<0.001
	AU20	40	-20.07	±0.66	1.22	±0.35	0.24	0.001
	AV20	38	-22.27	±0.90	3.56	±0.50	0.58	<0.001
	AW20	30	-22.09	±0.80	3.26	±0.62	0.49	<0.001
	AX20	39	-21.58	±0.99	4.03	±0.53	0.61	<0.001
	AY20	30	-22.22	±0.67	3.59	±0.52	0.63	<0.001
	AZ20	20	-20.19	±1.02	5.36	±1.44	0.43	0.002
	AA21	32	-8.30	±0.94	-0.54	±0.14	0.34	<0.001

	AB21	44	-13.07	±1.06	-0.24	±0.13	0.08	0.063
	AC21	60	-12.53	±0.80	-0.12	±0.07	0.05	0.083
	AD21	54	-12.92	±0.81	-0.17	±0.06	0.16	0.003
	AE21	45	-16.54	±0.70	0.04	±0.04	0.03	0.271
	AF21	47	-19.26	±0.70	0.10	±0.05	0.07	0.063
	AG21	60	-19.50	±0.51	0.12	±0.02	0.30	<0.001
	AH21	60	-19.08	±0.46	0.09	±0.03	0.18	0.001
	AI21	70	-19.52	±0.50	0.10	±0.03	0.14	0.001
	AJ21	69	-20.44	±0.47	0.12	±0.03	0.18	<0.001
	AK21	79	-20.39	±0.48	0.22	±0.03	0.45	<0.001
	AL21	80	-19.84	±0.54	0.18	±0.03	0.26	<0.001
	AM21	60	-20.33	±0.61	0.28	±0.05	0.32	<0.001
	AN21	49	-20.87	±0.58	0.31	±0.07	0.31	<0.001
	AO21	40	-20.92	±0.97	0.68	±0.13	0.41	<0.001
	AP21	69	-21.21	±0.75	0.63	±0.10	0.36	<0.001
	AQ21	78	-21.00	±0.59	0.73	±0.11	0.37	<0.001
	AR21	79	-20.12	±0.68	0.82	±0.15	0.28	<0.001
	AS21	60	-20.89	±0.75	1.12	±0.19	0.37	<0.001
	AT21	70	-21.80	±0.61	1.27	±0.17	0.45	<0.001
	AU21	49	-21.21	±0.62	1.08	±0.26	0.27	<0.001
	AV21	70	-20.55	±0.84	1.60	±0.23	0.41	<0.001
	AW21	49	-24.00	±0.76	2.65	±0.31	0.60	<0.001
	AX21	39	-22.07	±0.72	1.72	±0.38	0.35	<0.001
Fagus grandifolia	AA20	35	-7.30	±0.25	0.08	±0.03	0.14	0.026
	AB20	33	-8.18	±0.40	0.31	±0.07	0.42	<0.001
	AC20	31	-9.59	±0.68	0.44	±0.12	0.33	0.001
	AD20	32	-7.91	±0.36	0.10	±0.05	0.10	0.081
	AE20	33	-8.33	±0.36	-0.12	±0.04	0.26	0.002
	AF20	47	-10.53	±0.27	-0.05	±0.03	0.06	0.094
	AG20	31	-12.85	±0.32	0.05	±0.02	0.16	0.028
	AH20	23	-13.43	±0.43	-0.01	±0.03	0.01	0.727
	AI20	27	-13.83	±0.47	-0.01	±0.02	0.01	0.696
	AJ20	22	-14.62	±0.49	0.03	±0.03	0.05	0.335
	AK20	26	-14.66	±0.29	0.01	±0.01	0.04	0.355
	AL20	21	-14.81	±0.67	0.03	±0.04	0.04	0.374
	AM20	21	-18.71	±0.91	0.25	±0.05	0.54	<0.001
	AN20	25	-15.56	±0.72	0.02	±0.04	0.01	0.633
	AO20	28	-16.87	±0.74	0.18	±0.05	0.36	0.001
	AP20	29	-16.71	±0.43	0.14	±0.04	0.30	0.002
	AQ20	27	-16.02	±0.27	0.11	±0.02	0.46	<0.001

	AR20	32	-16.02	±0.43	0.08	±0.04	0.13	0.045
	AS20	38	-16.87	±0.51	0.18	±0.05	0.30	<0.001
	AT20	38	-18.19	±0.44	0.33	±0.05	0.58	<0.001
	AU20	49	-18.11	±0.64	0.42	±0.08	0.37	<0.001
	AV20	22	-17.23	±0.73	0.57	±0.29	0.16	0.063
	AW20	59	-18.01	±0.65	0.48	±0.06	0.52	<0.001
	AX20	31	-16.02	±0.57	0.23	±0.15	0.08	0.120
	AY20	34	-17.17	±0.52	0.80	±0.15	0.45	<0.001
	AZ20	35	-14.78	±0.43	0.46	±0.09	0.46	<0.001
	BA20	47	-13.40	±0.52	0.73	±0.16	0.33	<0.001
	AA21	32	-5.00	±0.67	-0.07	±0.10	0.02	0.482
	AB21	34	-8.08	±0.45	0.06	±0.06	0.03	0.322
	AC21	53	-9.87	±0.30	0.16	±0.03	0.40	<0.001
	AD21	57	-9.83	±0.29	0.00	±0.02	0.00	0.816
	AE21	50	-10.60	±0.51	-0.02	±0.03	0.01	0.534
	AF21	46	-11.71	±0.34	-0.03	±0.03	0.03	0.213
	AG21	44	-12.57	±0.36	-0.05	±0.03	0.09	0.054
	AH21	43	-14.03	±0.32	0.01	±0.03	0.00	0.659
	AI21	54	-14.43	±0.27	0.02	±0.02	0.02	0.272
	AJ21	61	-15.21	±0.41	0.07	±0.02	0.17	0.001
	AK21	56	-15.18	±0.36	0.02	±0.02	0.03	0.203
	AL21	60	-14.73	±0.40	0.01	±0.02	0.00	0.676
	AM21	51	-15.38	±0.31	0.04	±0.02	0.10	0.025
	AN21	46	-16.20	±0.39	0.06	±0.02	0.13	0.015
	AO21	38	-17.00	±0.51	0.08	±0.04	0.09	0.067
	AP21	42	-16.62	±0.42	0.21	±0.03	0.57	<0.001
	AQ21	40	-16.41	±0.46	0.17	±0.04	0.38	<0.001
	AR21	43	-18.32	±0.31	0.26	±0.02	0.74	<0.001
	AS21	55	-16.90	±0.51	0.23	±0.04	0.34	<0.001
	AT21	53	-17.08	±0.51	0.16	±0.05	0.16	0.003
	AU21	65	-17.48	±0.47	0.32	±0.05	0.42	<0.001
	AV21	52	-17.37	±0.49	0.26	±0.07	0.22	<0.001
	AW21	43	-16.78	±0.39	0.33	±0.08	0.27	<0.001
Forsythia ‘Meadowlark’	AA20	29	-7.14	±0.57	0.13	±0.08	0.09	0.107
	AB20	27	-6.06	±0.29	0.04	±0.05	0.03	0.381
	AC20	24	-6.06	±0.39	-0.02	±0.08	0.00	0.808
	AD20	23	-7.80	±0.85	0.16	±0.13	0.06	0.245
	AE20	25	-7.55	±0.93	-0.14	±0.10	0.09	0.157
	AF20	42	-15.69	±1.00	-0.26	±0.13	0.08	0.065
	AG20	51	-20.07	±0.51	0.01	±0.04	0.00	0.816

AH20	40	-20.82	±0.92	0.29	±0.05	0.43	<0.001
AI20	30	-23.28	±0.81	0.40	±0.04	0.80	<0.001
AJ20	38	-22.75	±0.53	0.18	±0.03	0.49	<0.001
AK20	28	-23.86	±0.73	0.49	±0.04	0.86	<0.001
AL20	26	-25.47	±1.28	0.66	±0.08	0.75	<0.001
AM20	21	-24.63	±1.48	0.75	±0.15	0.56	<0.001
AN20	26	-24.37	±1.42	0.83	±0.11	0.72	<0.001
AO20	22	-25.56	±1.39	1.41	±0.20	0.72	<0.001
AP20	18	-24.89	±1.37	1.83	±0.25	0.78	<0.001
AQ20	29	-25.13	±1.06	2.29	±0.19	0.85	<0.001
AR20	42	-24.92	±1.13	2.66	±0.31	0.64	<0.001
AS20	35	-24.71	±1.09	3.94	±0.44	0.71	<0.001
AT20	15	-22.93	±0.95	5.52	±0.43	0.93	<0.001
AU20	21	-23.66	±0.72	8.04	±0.63	0.90	<0.001
AV20	24	-24.83	±1.26	8.11	±0.97	0.76	<0.001
AW20	19	-22.60	±0.71	7.83	±0.58	0.92	<0.001
AX20	30	-19.81	±1.51	4.36	±0.86	0.48	<0.001
AY20	18	-20.92	±1.56	12.49	2.21	0.67	<0.001
AZ20	12	-15.10	±1.39	9.50	±1.96	0.70	0.001
AA21	30	-10.87	±1.82	-0.03	±0.28	0.00	0.920
AB21	44	-15.00	±0.96	-0.42	±0.12	0.21	0.002
AC21	42	-20.42	±0.81	0.75	±0.08	0.69	<0.001
AD21	43	-16.91	±0.68	0.04	±0.06	0.01	0.510
AE21	38	-20.66	±0.75	0.19	±0.05	0.29	<0.001
AF21	45	-19.85	±0.56	0.07	±0.04	0.05	0.126
AG21	35	-20.69	±1.31	0.42	±0.10	0.35	<0.001
AH21	40	-22.14	±1.02	0.48	±0.09	0.41	<0.001
AI21	56	-21.46	±0.50	0.17	±0.03	0.37	<0.001
AJ21	56	-20.59	±0.41	0.08	±0.03	0.15	0.004
AK21	64	-23.24	±0.65	0.33	±0.04	0.57	<0.001
AL21	76	-24.20	±0.54	0.35	±0.03	0.58	<0.001
AM21	50	-21.60	±0.50	0.15	±0.05	0.16	0.004
AN21	42	-22.75	±0.47	0.15	±0.05	0.15	0.010
AO21	41	-23.91	±1.21	0.72	±0.13	0.45	<0.001
AP21	79	-25.07	±0.66	0.48	±0.07	0.40	<0.001
AQ21	70	-26.66	±0.91	1.66	±0.14	0.68	<0.001
AR21	58	-26.04	±0.86	1.82	±0.18	0.64	<0.001
AS21	54	-26.91	±1.00	1.82	±0.23	0.54	<0.001
AT21	57	-25.77	±1.14	2.20	±0.27	0.55	<0.001
AU21	49	-25.71	±1.41	2.92	±0.46	0.46	<0.001

	AV21	46	-26.52	±1.02	3.61	±0.38	0.67	<0.001
	AW21	42	-28.62	±1.23	5.51	±0.49	0.76	<0.001
	AX21	40	-24.29	±1.22	3.57	±0.48	0.59	<0.001
Kalmia latifolia	AA20	22	-6.05	±0.35	0.01	±0.05	0.00	0.860
	AB20	14	-5.93	±0.35	-0.03	±0.06	0.02	0.607
	AC20	14	-6.04	±0.28	0.08	±0.05	0.19	0.115
	AD20	18	-6.70	±0.70	0.06	±0.11	0.02	0.594
	AE20	22	-4.07	±0.73	-0.64	±0.06	0.87	<0.001
	AF20	28	-5.31	±1.68	-0.76	±0.13	0.55	<0.001
	AG20	39	-15.68	±1.69	-0.19	±0.09	0.10	0.047
	AH20	49	-20.50	±0.50	0.07	±0.03	0.12	0.016
	AI20	49	-23.91	±0.49	0.05	±0.02	0.15	0.007
	AJ20	49	-24.41	±0.57	0.17	±0.03	0.42	<0.001
	AK20	48	-22.76	±0.68	0.11	±0.03	0.20	0.001
	AL20	37	-22.68	±0.93	0.28	±0.05	0.46	<0.001
	AM20	39	-23.35	±0.87	0.34	±0.05	0.54	<0.001
	AN20	38	-22.14	±0.93	0.21	±0.05	0.29	<0.001
	AO20	47	-24.71	±0.67	0.35	±0.04	0.58	<0.001
	AP20	44	-25.74	±0.98	0.54	±0.08	0.50	<0.001
	AQ20	44	-21.93	±0.97	0.43	±0.09	0.38	<0.001
	AR20	45	-22.36	±0.82	0.38	±0.07	0.41	<0.001
	AS20	50	-21.49	±0.89	0.29	±0.08	0.21	0.001
	AT20	48	-21.11	±1.01	0.49	±0.11	0.30	<0.001
	AU20	44	-22.63	±0.82	0.48	±0.11	0.31	<0.001
	AV20	30	-21.51	±0.97	0.37	±0.16	0.17	0.024
	AW20	64	-22.28	±0.66	0.54	±0.06	0.54	<0.001
	AX20	49	-23.09	±0.82	0.89	±0.12	0.55	<0.001
	AY20	29	-20.17	±1.06	0.93	±0.42	0.15	0.035
	AZ20	39	-21.25	±0.96	0.71	±0.20	0.26	0.001
	BA20	40	-18.95	±0.65	0.70	±0.20	0.24	0.001
	AA21	6	-3.74	±0.61	-0.08	±0.12	0.11	0.519
	AB21	15	-5.00	±0.35	0.02	±0.07	0.01	0.738
	AC21	20	-5.66	±0.69	-0.03	±0.09	0.01	0.738
	AD21	26	-3.54	±0.90	-0.53	±0.06	0.79	<0.001
	AE21	37	-7.67	±1.08	-0.33	±0.06	0.46	<0.001
	AF21	47	-13.04	±0.83	-0.17	±0.06	0.14	0.009
	AG21	39	-13.69	±0.97	-0.27	±0.07	0.30	<0.001
	AH21	47	-20.61	±0.94	0.28	±0.09	0.19	0.002
	AI21	50	-17.96	±0.75	0.00	±0.07	0.00	0.989
	AJ21	60	-20.06	±0.64	0.02	±0.04	0.00	0.625

	AK21	66	-21.77	±0.61	0.07	±0.02	0.12	0.004
	AL21	58	-22.30	±0.56	0.17	±0.03	0.37	<0.001
	AM21	52	-23.75	±0.69	0.11	±0.04	0.15	0.005
	AN21	58	-22.04	±0.74	0.04	±0.04	0.02	0.326
	AO21	50	-23.68	±0.75	0.11	±0.06	0.06	0.088
	AP21	49	-23.54	±0.75	0.15	±0.06	0.14	0.008
	AQ21	50	-23.47	±0.88	0.37	±0.07	0.37	<0.001
	AR21	59	-22.47	±0.73	0.14	±0.04	0.15	0.003
	AS21	49	-24.95	±0.77	0.56	±0.09	0.43	<0.001
	AT21	49	-23.90	±0.84	0.40	±0.11	0.23	0.001
	AU21	49	-23.98	±0.81	0.73	±0.13	0.39	<0.001
	AV21	59	-23.51	±0.73	0.56	±0.11	0.32	<0.001
	AW21	50	-23.14	±0.77	0.86	±0.16	0.39	<0.001
Larix kaempferi	AA20	34	-9.95	±0.98	0.00	±0.13	0.00	0.989
	AB20	30	-11.69	±1.30	0.05	±0.21	0.00	0.798
	AC20	28	-14.06	±1.68	0.29	±0.29	0.04	0.312
	AD20	26	-12.28	±1.30	-0.21	±0.18	0.05	0.252
	AE20	38	-15.39	±0.98	-0.20	±0.10	0.10	0.058
	AF20	43	-21.77	±0.74	0.17	±0.08	0.09	0.046
	AG20	39	-21.75	±0.44	-0.07	±0.03	0.13	0.025
	AH20	32	-22.48	±0.64	0.02	±0.04	0.01	0.588
	AI20	27	-23.97	±0.45	0.02	±0.02	0.05	0.246
	AJ20	29	-25.24	±0.45	0.09	±0.02	0.40	<0.001
	AK20	29	-24.19	±0.74	0.06	±0.04	0.09	0.108
	AL20	20	-26.38	±0.87	0.36	±0.06	0.70	<0.001
	AM20	23	-25.54	±0.50	0.23	±0.03	0.78	<0.001
	AN20	34	-26.62	±1.16	0.37	±0.06	0.54	<0.001
	AO20	27	-24.95	±1.35	0.45	±0.11	0.39	<0.001
	AP20	36	-23.21	±0.95	0.30	±0.08	0.29	0.001
	AQ20	40	-23.64	±0.79	0.53	±0.07	0.60	<0.001
	AR20	41	-22.70	±0.87	0.43	±0.07	0.47	<0.001
	AS20	43	-22.46	±0.91	0.46	±0.08	0.44	<0.001
	AT20	43	-22.03	±0.83	0.44	±0.09	0.37	<0.001
	AU20	34	-23.06	±0.97	0.81	±0.16	0.45	<0.001
	AV20	30	-24.41	±0.89	1.18	±0.25	0.45	<0.001
	AW20	39	-24.52	±0.78	1.09	±0.12	0.69	<0.001
	AX20	51	-23.57	±0.59	0.78	±0.09	0.61	<0.001
	AY20	34	-22.67	±0.63	1.11	±0.18	0.53	<0.001
	AZ20	40	-21.24	±0.54	0.78	±0.12	0.52	<0.001
	AA21	10	-4.37	±0.57	-0.06	±0.09	0.05	0.554

	AB21	22	-12.50	±1.66	-0.32	±0.21	0.11	0.137
	AC21	48	-17.68	±0.65	-0.01	±0.06	0.00	0.922
	AD21	47	-17.19	±0.68	-0.18	±0.05	0.25	<0.001
	AE21	41	-19.34	±0.71	0.00	±0.04	0.00	0.912
	AF21	44	-23.69	±0.64	0.17	±0.05	0.23	0.001
	AG21	50	-20.63	±0.53	0.03	±0.03	0.03	0.262
	AH21	41	-24.06	±0.49	0.12	±0.04	0.16	0.009
	AI21	62	-23.98	±0.25	0.07	±0.01	0.43	<0.001
	AJ21	57	-24.09	±0.25	0.07	±0.01	0.37	<0.001
	AK21	58	-24.07	±0.34	0.08	±0.01	0.41	<0.001
	AL21	55	-24.70	±0.40	0.09	±0.02	0.37	<0.001
	AM21	50	-24.80	±0.26	0.16	±0.02	0.69	<0.001
	AN21	49	-23.70	±0.29	0.03	±0.02	0.05	0.115
	AO21	43	-24.65	±0.43	0.08	±0.04	0.12	0.026
	AP21	40	-24.92	±0.64	0.29	±0.05	0.51	<0.001
	AQ21	46	-25.47	±0.59	0.29	±0.05	0.47	<0.001
	AR21	56	-26.20	±0.64	0.33	±0.05	0.42	<0.001
	AS21	58	-26.25	±0.54	0.47	±0.05	0.63	<0.001
	AT21	46	-29.05	±0.75	0.92	±0.10	0.67	<0.001
	AU21	56	-25.39	±0.61	0.53	±0.06	0.59	<0.001
	AV21	57	-25.37	±0.58	0.68	±0.08	0.55	<0.001
	AW21	55	-29.08	±0.62	1.61	±0.12	0.77	<0.001
Metasequoia glyptostroboides	AA20	34	-9.48	±0.72	0.05	±0.11	0.01	0.628
	AB20	30	-8.21	±1.10	-0.12	±0.19	0.01	0.552
	AC20	21	-9.71	±0.88	0.27	±0.16	0.13	0.111
	AD20	26	-9.21	±1.04	0.02	±0.16	0.00	0.897
	AE20	36	-12.31	±1.03	0.18	±0.13	0.06	0.165
	AF20	58	-15.47	±0.69	0.14	±0.08	0.06	0.073
	AG20	51	-19.70	±0.49	0.31	±0.03	0.65	<0.001
	AH20	36	-20.54	±0.45	0.17	±0.03	0.54	<0.001
	AI20	34	-21.22	±0.58	0.15	±0.02	0.56	<0.001
	AJ20	38	-22.38	±0.63	0.18	±0.03	0.48	<0.001
	AK20	31	-22.91	±0.90	0.44	±0.05	0.75	<0.001
	AL20	26	-20.94	±1.04	0.22	±0.06	0.34	0.002
	AM20	25	-24.02	±0.60	0.60	±0.05	0.88	<0.001
	AN20	31	-22.34	±1.12	0.50	±0.07	0.63	<0.001
	AO20	31	-23.53	±1.01	0.69	±0.07	0.76	<0.001
	AP20	32	-23.76	±1.02	0.83	±0.09	0.74	<0.001
	AQ20	35	-25.05	±0.80	0.88	±0.07	0.83	<0.001
	AR20	38	-24.03	±0.82	1.04	±0.07	0.85	<0.001

	AS20	37	-24.39	±0.65	1.16	±0.06	0.92	<0.001
	AT20	34	-23.72	±0.76	0.91	±0.08	0.80	<0.001
	AU20	47	-24.20	±0.73	1.27	±0.09	0.81	<0.001
	AV20	35	-22.58	±0.65	0.85	±0.07	0.81	<0.001
	AW20	47	-23.35	±0.62	1.11	±0.08	0.82	<0.001
	AX20	43	-23.00	±0.85	1.36	±0.13	0.71	<0.001
	AY20	37	-22.32	±0.47	1.31	±0.09	0.85	<0.001
	AZ20	42	-21.90	±0.73	1.40	±0.13	0.75	<0.001
	AA21	12	-4.23	±0.25	-0.08	±0.03	0.34	0.047
	AB21	16	-4.21	±0.54	0.00	±0.07	0.00	0.947
	AC21	36	-8.08	±1.04	0.10	±0.11	0.02	0.373
	AD21	46	-12.09	±0.82	0.15	±0.06	0.13	0.013
	AE21	43	-18.68	±0.69	0.37	±0.04	0.67	<0.001
	AF21	47	-20.60	±0.50	0.48	±0.04	0.78	<0.001
	AG21	52	-18.87	±0.55	0.16	±0.03	0.41	<0.001
	AH21	54	-20.63	±0.45	0.22	±0.03	0.58	<0.001
	AI21	63	-19.95	±0.38	0.16	±0.02	0.62	<0.001
	AJ21	63	-20.47	±0.43	0.19	±0.02	0.60	<0.001
	AK21	65	-19.97	±0.53	0.18	±0.02	0.55	<0.001
	AL21	61	-20.43	±0.76	0.22	±0.03	0.41	<0.001
	AM21	57	-21.33	±0.56	0.24	±0.03	0.50	<0.001
	AN21	56	-22.04	±0.69	0.27	±0.04	0.43	<0.001
	AO21	46	-22.65	±0.34	0.28	±0.03	0.69	<0.001
	AP21	46	-21.52	±0.30	0.21	±0.02	0.67	<0.001
	AQ21	44	-21.60	±0.86	0.52	±0.07	0.58	<0.001
	AR21	55	-23.22	±0.84	0.65	±0.07	0.64	<0.001
	AS21	52	-22.50	±0.60	0.66	±0.06	0.74	<0.001
	AT21	50	-21.83	±0.78	0.69	±0.07	0.64	<0.001
	AU21	59	-22.57	±0.49	0.77	±0.05	0.80	<0.001
	AV21	51	-22.26	±0.56	0.81	±0.08	0.68	<0.001
	AW21	51	-22.45	±0.52	0.70	±0.08	0.59	<0.001
	AX21	44	-21.14	±0.26	0.63	±0.11	0.44	<0.001
Picea abies	AA20	39	-15.98	±1.07	0.01	±0.15	0.00	0.935
	AB20	38	-14.32	±1.06	-0.14	±0.17	0.02	0.403
	AC20	36	-15.92	±1.24	-0.23	±0.22	0.03	0.297
	AD20	34	-15.77	±0.97	-0.24	±0.14	0.09	0.091
	AE20	40	-17.84	±0.65	-0.22	±0.08	0.17	0.008
	AF20	46	-18.85	±0.53	-0.22	±0.06	0.23	0.001
	AG20	35	-21.09	±0.61	-0.02	±0.04	0.01	0.600
	AH20	29	-20.59	±0.53	-0.05	±0.03	0.11	0.082

AI20	27	-23.07	±0.73	0.05	±0.03	0.11	0.089
AJ20	25	-21.19	±1.21	0.04	±0.06	0.02	0.481
AK20	29	-22.49	±0.76	0.18	±0.04	0.45	<0.001
AL20	21	-23.56	±0.74	0.13	±0.04	0.37	0.003
AM20	21	-25.54	±1.00	0.57	±0.06	0.83	<0.001
AN20	27	-23.09	±1.08	0.35	±0.06	0.58	<0.001
AO20	29	-25.37	±0.75	0.63	±0.05	0.86	<0.001
AP20	28	-23.47	±1.27	0.59	±0.11	0.54	<0.001
AQ20	29	-25.19	±0.91	0.83	±0.08	0.80	<0.001
AR20	30	-23.62	±0.65	0.65	±0.06	0.81	<0.001
AS20	38	-23.58	±1.02	0.60	±0.09	0.55	<0.001
AT20	35	-23.52	±0.57	0.63	±0.06	0.75	<0.001
AU20	35	-23.39	±0.72	0.70	±0.10	0.58	<0.001
AV20	30	-24.48	±0.54	0.99	±0.10	0.78	<0.001
AW20	31	-25.27	±0.49	0.72	±0.08	0.75	<0.001
AX20	35	-24.79	±0.35	1.36	±0.07	0.93	<0.001
AY20	22	-25.41	±0.63	2.44	±0.25	0.83	<0.001
AZ20	32	-23.09	±0.66	0.86	±0.14	0.55	<0.001
BA20	41	-23.73	±0.45	1.40	±0.14	0.72	<0.001
AA21	20	-18.46	±0.56	-0.06	±0.09	0.02	0.515
AB21	40	-17.39	±0.70	-0.37	±0.09	0.33	<0.001
AC21	48	-17.97	±0.60	-0.22	±0.06	0.26	<0.001
AD21	44	-19.96	±0.58	-0.16	±0.06	0.15	0.008
AE21	38	-19.50	±0.65	-0.06	±0.04	0.06	0.155
AF21	37	-21.24	±0.62	0.04	±0.04	0.02	0.435
AG21	36	-22.07	±0.43	0.06	±0.03	0.10	0.056
AH21	43	-21.17	±0.50	0.03	±0.03	0.04	0.211
AI21	31	-20.82	±0.54	-0.09	±0.05	0.10	0.091
AJ21	44	-21.25	±0.33	0.00	±0.02	0.00	0.822
AK21	47	-22.91	±0.34	0.06	±0.02	0.24	<0.001
AL21	56	-22.22	±0.61	0.17	±0.03	0.44	<0.001
AM21	40	-23.70	±0.84	0.22	±0.05	0.36	<0.001
AN21	50	-22.40	±0.82	0.18	±0.05	0.22	0.001
AO21	44	-22.61	±0.60	0.33	±0.05	0.52	<0.001
AP21	47	-23.80	±0.69	0.34	±0.05	0.50	<0.001
AQ21	42	-23.24	±0.90	0.48	±0.07	0.54	<0.001
AR21	37	-23.61	±0.79	0.50	±0.07	0.60	<0.001
AS21	45	-23.48	±0.94	0.63	±0.08	0.57	<0.001
AT21	48	-24.57	±0.62	0.77	±0.08	0.67	<0.001
AU21	47	-24.83	±0.99	0.74	±0.14	0.38	<0.001

	AV21	43	-25.50	±1.09	1.18	±0.16	0.57	<0.001
	AW21	46	-25.13	±0.68	1.19	±0.14	0.63	<0.001
	AX21	43	-24.26	±0.81	1.74	±0.32	0.43	<0.001
Prunus armeniaca	AA20	21	-5.54	±0.62	0.01	±0.09	0.00	0.951
	AB20	24	-4.87	±0.62	0.08	±0.10	0.03	0.410
	AC20	19	-4.62	±0.75	-0.01	±0.13	0.00	0.934
	AD20	28	-4.75	±0.88	-0.30	±0.13	0.18	0.025
	AE20	39	-6.75	±0.89	-0.27	±0.08	0.24	0.001
	AF20	60	-10.71	±0.69	-0.18	±0.07	0.09	0.021
	AG20	56	-15.18	±0.56	0.11	±0.04	0.14	0.004
	AH20	45	-16.13	±0.65	0.13	±0.04	0.22	0.001
	AI20	34	-17.22	±0.68	0.18	±0.03	0.47	<0.001
	AJ20	35	-19.09	±0.59	0.27	±0.04	0.61	<0.001
	AK20	25	-20.71	±0.75	0.45	±0.08	0.60	<0.001
	AL20	16	-21.12	±0.96	0.57	±0.08	0.78	<0.001
	AM20	20	-22.00	±0.94	0.54	±0.08	0.72	<0.001
	AN20	27	-22.17	±1.10	0.62	±0.10	0.63	<0.001
	AO20	27	-22.07	±0.49	0.65	±0.05	0.85	<0.001
	AP20	39	-21.71	±0.65	0.62	±0.07	0.68	<0.001
	AQ20	43	-21.08	±0.67	0.65	±0.06	0.73	<0.001
	AR20	27	-19.21	±0.97	1.14	±0.19	0.59	<0.001
	AS20	18	-20.84	±0.87	2.70	±0.31	0.83	<0.001
	AT20	17	-18.25	±0.77	3.61	±0.40	0.84	<0.001
	AU20	21	-18.84	±1.27	4.72	±0.91	0.59	<0.001
	AV20	20	-18.12	±1.07	5.80	±0.75	0.77	<0.001
	AW20	46	-12.81	±1.19	2.06	±0.49	0.29	<0.001
	AX20	28	-13.74	±1.09	4.41	±0.71	0.59	<0.001
	AY20	20	-14.89	±1.00	7.59	±1.25	0.67	<0.001
	AZ20	11	-15.60	±0.36	11.00	±0.85	0.95	<0.001
	AA21	10	-4.74	±0.54	0.11	±0.08	0.21	0.183
	AB21	24	-2.29	±1.18	-0.67	±0.14	0.49	<0.001
	AC21	37	-14.47	±1.14	0.28	±0.10	0.20	0.006
	AD21	43	-10.67	±1.15	0.11	±0.08	0.04	0.175
	AE21	39	-13.73	±0.89	0.15	±0.05	0.20	0.005
	AF21	38	-13.98	±0.77	0.18	±0.05	0.24	0.002
	AG21	55	-15.63	±0.52	0.12	±0.04	0.16	0.002
	AH21	50	-18.24	±0.67	0.27	±0.06	0.28	<0.001
	AI21	56	-17.90	±0.74	0.21	±0.07	0.15	0.003
	AJ21	69	-16.88	±0.50	0.31	±0.05	0.42	<0.001
	AK21	65	-20.61	±0.54	0.55	±0.05	0.69	<0.001

	AL21	82	-18.78	±0.43	0.23	±0.03	0.35	<0.001
	AM21	55	-21.00	±0.47	0.53	±0.04	0.73	<0.001
	AN21	56	-21.83	±0.65	0.59	±0.06	0.68	<0.001
	AO21	53	-21.78	±0.73	0.73	±0.06	0.74	<0.001
	AP21	89	-21.14	±0.51	0.67	±0.05	0.65	<0.001
	AQ21	89	-20.92	±0.44	0.72	±0.06	0.62	<0.001
	AR21	85	-20.35	±0.54	0.91	±0.08	0.62	<0.001
	AS21	65	-18.85	±0.83	1.21	±0.15	0.50	<0.001
	AT21	63	-18.52	±0.80	1.52	±0.18	0.54	<0.001
	AU21	56	-18.31	±1.05	2.49	±0.35	0.49	<0.001
	AV21	42	-18.69	±1.16	3.52	±0.47	0.58	<0.001
	AW21	48	-18.58	±1.07	3.65	±0.44	0.60	<0.001
	AX21	27	-18.16	±0.86	7.65	±0.69	0.83	<0.001
Prunus nigra	AA20	26	-5.23	±1.00	-0.08	±0.13	0.01	0.560
	AB20	22	-7.69	±0.92	0.49	±0.16	0.32	0.006
	AC20	18	-5.34	±0.44	0.18	±0.09	0.20	0.063
	AD20	14	-4.49	±0.68	0.02	±0.11	0.00	0.848
	AE20	15	-4.26	±0.30	0.05	±0.04	0.09	0.266
	AF20	21	-4.14	±0.22	0.07	±0.03	0.18	0.057
	AG20	11	-3.19	±0.20	-0.03	±0.02	0.23	0.135
	AH20	14	-6.64	2.17	-0.32	±0.10	0.46	0.008
	AI20	24	-15.69	±1.29	-0.08	±0.05	0.12	0.100
	AJ20	19	-20.83	±1.10	0.13	±0.06	0.26	0.025
	AK20	22	-25.19	±1.38	0.27	±0.06	0.47	<0.001
	AL20	15	-13.94	±1.15	0.27	±0.07	0.51	0.003
	AM20	13	-23.01	±1.25	0.33	±0.09	0.55	0.004
	AN20	31	-26.96	±1.00	0.44	±0.06	0.64	<0.001
	AO20	29	-28.51	±0.89	0.45	±0.05	0.72	<0.001
	AP20	29	-26.00	±0.87	0.39	±0.08	0.48	<0.001
	AQ20	27	-29.47	±0.72	0.78	±0.08	0.79	<0.001
	AR20	26	-26.35	±1.24	0.73	±0.10	0.71	<0.001
	AS20	33	-26.93	±1.07	1.11	±0.08	0.85	<0.001
	AT20	24	-27.43	±1.23	0.85	±0.12	0.70	<0.001
	AU20	23	-24.67	±1.01	0.81	±0.19	0.46	<0.001
	AV20	21	-23.81	±0.80	1.24	±0.31	0.46	0.001
	AW20	31	-22.55	±1.06	1.23	±0.21	0.54	<0.001
	AX20	26	-21.49	±0.69	1.92	±0.26	0.69	<0.001
	AY20	23	-20.41	±0.52	1.25	±0.21	0.62	<0.001
	AZ20	22	-14.98	±1.46	1.55	±0.46	0.36	0.003
	AA21	9	-3.90	±0.50	0.00	±0.07	0.00	0.958

	AB21	15	-3.61	±1.65	-0.26	±0.22	0.09	0.275
	AC21	18	-5.19	±0.64	0.10	±0.07	0.11	0.173
	AD21	19	-3.59	±0.92	-0.18	±0.07	0.30	0.016
	AE21	19	-6.01	±1.13	-0.54	±0.06	0.82	<0.001
	AF21	14	-2.12	2.91	-0.89	±0.19	0.65	0.001
	AG21	21	-9.61	±1.89	-0.43	±0.12	0.41	0.002
	AH21	20	-18.83	±1.18	-0.06	±0.10	0.02	0.580
	AI21	31	-19.46	±1.04	-0.05	±0.08	0.01	0.525
	AJ21	34	-18.73	±1.06	-0.12	±0.09	0.06	0.168
	AK21	57	-21.24	±0.65	0.07	±0.03	0.09	0.021
	AL21	48	-24.37	±0.73	0.24	±0.03	0.56	<0.001
	AM21	41	-22.60	±0.85	0.22	±0.05	0.35	<0.001
	AN21	46	-22.37	±0.79	0.19	±0.05	0.27	<0.001
	AO21	50	-24.93	±0.84	0.40	±0.06	0.46	<0.001
	AP21	49	-23.94	±0.89	0.34	±0.07	0.32	<0.001
	AQ21	45	-24.90	±0.94	0.56	±0.07	0.57	<0.001
	AR21	51	-26.85	±0.74	0.55	±0.06	0.66	<0.001
	AS21	51	-24.34	±0.96	0.53	±0.12	0.28	<0.001
	AT21	56	-26.48	±0.85	0.75	±0.12	0.41	<0.001
	AU21	44	-28.91	±1.04	1.35	±0.17	0.60	<0.001
	AV21	51	-24.66	±0.78	0.79	±0.13	0.44	<0.001
	AW21	69	-25.62	±0.67	1.84	±0.18	0.60	<0.001
Rhododendron calendulaceum	AB20	16	-9.27	±0.95	0.12	±0.14	0.05	0.428
	AC20	23	-8.43	±0.73	0.02	±0.14	0.00	0.863
	AD20	48	-14.43	±0.83	0.08	±0.12	0.01	0.525
	AE20	59	-15.01	±0.62	0.01	±0.06	0.00	0.857
	AF20	75	-17.47	±0.55	0.01	±0.06	0.00	0.933
	AG20	59	-17.76	±0.63	-0.02	±0.04	0.01	0.576
	AH20	39	-20.14	±0.74	0.10	±0.06	0.07	0.106
	AI20	30	-23.58	±0.43	0.12	±0.03	0.42	<0.001
	AJ20	40	-24.81	±0.42	0.11	±0.03	0.25	0.001
	AK20	40	-22.48	±0.55	0.10	±0.03	0.19	0.005
	AL20	38	-25.76	±0.55	0.27	±0.03	0.68	<0.001
	AM20	30	-26.86	±0.50	0.31	±0.05	0.59	<0.001
	AN20	48	-25.53	±0.60	0.20	±0.03	0.43	<0.001
	AO20	49	-28.53	±0.59	0.41	±0.04	0.71	<0.001
	AP20	39	-26.42	±0.52	0.35	±0.06	0.52	<0.001
	AQ20	48	-25.60	±0.46	0.25	±0.04	0.44	<0.001
	AR20	39	-24.63	±0.61	0.22	±0.07	0.19	0.005
	AS20	37	-26.19	±0.67	0.34	±0.08	0.35	<0.001

	AT20	49	-25.41	±0.53	0.22	±0.06	0.23	<0.001
	AU20	50	-26.41	±0.62	0.40	±0.09	0.31	<0.001
	AV20	40	-26.06	±0.45	0.36	±0.08	0.34	<0.001
	AW20	30	-26.91	±0.58	0.54	±0.07	0.66	<0.001
	AX20	50	-27.98	±0.39	0.51	±0.06	0.63	<0.001
	AY20	40	-27.18	±0.30	0.43	±0.06	0.62	<0.001
	AZ20	40	-25.69	±0.42	0.52	±0.09	0.48	<0.001
	AA21	35	-10.32	±0.58	-0.12	±0.09	0.05	0.189
	AB21	50	-10.66	±0.90	-0.07	±0.11	0.01	0.527
	AC21	50	-14.26	±0.98	-0.04	±0.12	0.00	0.744
	AD21	60	-18.08	±0.60	0.13	±0.04	0.14	0.003
	AE21	50	-16.92	±0.65	0.08	±0.04	0.08	0.047
	AF21	50	-18.60	±0.81	0.14	±0.06	0.11	0.020
	AG21	50	-19.10	±0.55	0.03	±0.04	0.01	0.476
	AH21	50	-22.62	±0.61	0.22	±0.06	0.24	<0.001
	AI21	50	-20.73	±0.63	0.01	±0.06	0.00	0.830
	AJ21	60	-21.31	±0.51	0.04	±0.03	0.03	0.201
	AK21	59	-21.79	±0.44	0.07	±0.02	0.13	0.004
	AL21	60	-21.44	±0.47	0.06	±0.03	0.08	0.033
	AM21	59	-23.39	±0.49	0.18	±0.03	0.39	<0.001
	AN21	60	-23.22	±0.50	0.13	±0.03	0.23	<0.001
	AO21	49	-24.82	±0.72	0.22	±0.06	0.22	0.001
	AP21	49	-25.11	±0.57	0.25	±0.04	0.41	<0.001
	AQ21	47	-24.21	±0.62	0.27	±0.05	0.40	<0.001
	AR21	50	-25.54	±0.72	0.33	±0.06	0.38	<0.001
	AS21	49	-25.23	±0.58	0.30	±0.07	0.30	<0.001
	AT21	50	-26.61	±0.63	0.40	±0.08	0.33	<0.001
	AU21	50	-26.85	±0.65	0.55	±0.11	0.36	<0.001
	AV21	50	-27.00	±0.71	0.53	±0.14	0.24	<0.001
	AW21	50	-28.13	±0.61	0.60	±0.12	0.33	<0.001
	AX21	50	-27.12	±0.76	0.36	±0.31	0.03	0.248

Table S5. Estimates, fitness statistics, and displays associated with linear regressions for each temperature and species.

Species	Chill	T (ºC)	n	α ± error		β ± error		r^2	*P*-value
Abies balsamea	54	2	26	-28.22	±0.34	0.09	±0.01	0.66	<0.001
		4	34	-25.34	±1.44	0.42	±0.06	0.63	<0.001
		7	34	-25.50	±2.32	0.27	±0.12	0.14	0.027
		11	33	-23.75	±2.72	0.51	±0.19	0.19	0.010
		15	38	-24.39	±2.32	0.71	±0.19	0.29	0.001
		22	45	-28.00	±0.51	0.54	±0.04	0.78	<0.001
		30	31	-25.81	±0.69	1.15	±0.15	0.66	<0.001
	82	2	39	-27.93	±0.41	0.04	±0.02	0.09	0.070
		4	38	-26.99	±0.25	0.02	±0.01	0.04	0.252
		7	49	-27.08	±0.30	0.01	±0.02	0.00	0.765
		11	48	-27.52	±0.60	0.19	±0.03	0.43	<0.001
		15	46	-27.65	±0.69	0.68	±0.08	0.64	<0.001
		22	52	-26.10	±0.63	0.75	±0.08	0.64	<0.001
		30	65	-28.12	±0.53	1.49	±0.13	0.67	<0.001
Acer rubrum	54	2	30	-25.86	±0.67	-0.02	±0.03	0.01	0.539
		4	40	-26.89	±0.70	0.04	±0.03	0.07	0.090
		7	50	-25.90	±0.87	0.04	±0.03	0.03	0.226
		11	60	-25.36	±0.85	0.10	±0.04	0.11	0.009
		15	50	-26.44	±0.95	0.27	±0.04	0.48	<0.001
		22	70	-25.56	±0.71	0.28	±0.06	0.23	<0.001
		30	70	-25.27	±0.56	0.56	±0.07	0.50	<0.001
	82	2	70	-25.36	±0.70	0.19	±0.03	0.34	<0.001
		4	78	-24.50	±0.46	0.19	±0.02	0.50	<0.001
		7	100	-24.58	±0.59	0.40	±0.03	0.59	<0.001
		11	88	-24.67	±0.44	0.72	±0.05	0.72	<0.001
		15	88	-24.00	±0.59	1.09	±0.09	0.63	<0.001
		22	90	-23.54	±0.61	1.48	±0.11	0.67	<0.001
		30	58	-23.05	±0.95	2.95	±0.31	0.62	<0.001
Cercis canadensis	54	2	30	-16.41	±0.61	-0.02	±0.02	0.02	0.430
		4	40	-15.74	±0.42	-0.02	±0.02	0.05	0.150
		7	47	-18.25	±0.75	0.15	±0.03	0.43	<0.001
		11	59	-17.11	±0.84	0.14	±0.04	0.21	<0.001
		15	40	-16.45	±0.53	0.24	±0.03	0.58	<0.001
		22	79	-17.59	±0.36	0.49	±0.04	0.71	<0.001
		30	89	-15.17	±0.26	0.50	±0.04	0.70	<0.001

	82	2	66	-15.43	±0.46	0.13	±0.02	0.40	<0.001
		4	63	-13.99	±0.32	0.14	±0.01	0.60	<0.001
		7	72	-14.72	±0.33	0.26	±0.02	0.71	<0.001
		11	60	-14.29	±0.37	0.43	±0.04	0.67	<0.001
		15	80	-14.74	±0.34	0.59	±0.05	0.67	<0.001
		22	66	-14.30	±0.42	0.88	±0.07	0.69	<0.001
		30	55	-14.32	±0.57	1.25	±0.15	0.55	<0.001
Cornus florida	54	2	30	-23.69	±0.49	0.01	±0.02	0.02	0.457
		4	30	-23.68	±0.49	0.03	±0.02	0.07	0.148
		7	50	-24.34	±0.41	-0.01	±0.01	0.00	0.636
		11	60	-23.06	±0.69	-0.01	±0.03	0.00	0.596
		15	50	-23.80	±0.61	0.10	±0.03	0.23	<0.001
		22	70	-23.87	±0.63	0.37	±0.05	0.41	<0.001
		30	60	-23.33	±0.61	0.42	±0.07	0.38	<0.001
Cornus mas	54	2	40	-20.88	±0.84	0.05	±0.04	0.05	0.172
		4	40	-20.90	±0.62	0.03	±0.03	0.03	0.310
		7	70	-21.10	±0.61	0.06	±0.02	0.08	0.019
		11	70	-21.19	±0.70	0.23	±0.04	0.33	<0.001
		15	90	-20.75	±0.77	0.23	±0.08	0.09	0.004
		22	80	-20.30	±0.72	0.91	±0.16	0.30	<0.001
		30	80	-20.09	±0.68	1.14	±0.13	0.50	<0.001
	82	2	50	-21.27	±0.52	0.12	±0.03	0.30	<0.001
		4	90	-21.37	±0.64	0.12	±0.03	0.17	<0.001
		7	110	-21.19	±0.47	0.22	±0.03	0.33	<0.001
		11	80	-19.73	±0.63	0.30	±0.10	0.10	0.004
		15	90	-18.40	±0.91	0.69	±0.16	0.17	<0.001
		22	48	-19.70	±0.91	1.81	±0.26	0.52	<0.001
		30	39	-18.94	±1.11	2.98	±0.60	0.40	<0.001
Fagus grandifolia	54	2	25	-18.53	±0.43	0.06	±0.02	0.42	<0.001
		4	28	-18.59	±0.32	0.07	±0.01	0.55	<0.001
		7	30	-18.62	±0.32	0.12	±0.01	0.71	<0.001
		11	35	-17.57	±0.79	0.14	±0.04	0.26	0.002
		15	44	-17.54	±0.36	0.06	±0.02	0.28	<0.001
		22	43	-18.32	±0.31	0.26	±0.02	0.74	<0.001
		30	46	-17.46	±0.37	0.45	±0.04	0.74	<0.001
Forsythia 'Meadowlark'	54	2	34	-22.94	±0.68	0.02	±0.03	0.02	0.435
		4	43	-23.11	±0.52	0.07	±0.02	0.21	0.002

		7	55	-24.52	±1.20	0.29	±0.06	0.32	<0.001
		11	56	-23.15	±1.70	0.66	±0.13	0.33	<0.001
		15	60	-23.57	±1.19	0.90	±0.14	0.42	<0.001
		22	65	-23.82	±1.18	1.43	±0.25	0.34	<0.001
		30	81	-22.59	±1.19	1.33	±0.21	0.34	<0.001
	82	2	92	-21.42	±1.18	0.20	±0.05	0.15	<0.001
		4	121	-20.46	±0.76	0.21	±0.04	0.20	<0.001
		7	75	-22.80	±1.24	1.26	±0.18	0.41	<0.001
		11	56	-23.57	±1.13	2.20	±0.27	0.56	<0.001
		15	31	-23.61	±1.28	4.06	±0.72	0.52	<0.001
		22	27	-20.69	±2.00	6.58	±1.48	0.44	<0.001
		30	28	-20.10	±1.76	6.35	±1.09	0.57	<0.001
Kalmia latifolia	54	2	29	-22.71	±1.07	-0.03	±0.04	0.02	0.506
		4	30	-22.00	±0.86	-0.06	±0.03	0.10	0.089
		7	49	-23.49	±0.84	-0.02	±0.03	0.02	0.394
		11	35	-23.10	±1.00	0.02	±0.05	0.01	0.635
		15	50	-23.83	±0.90	0.17	±0.04	0.30	<0.001
		22	59	-22.47	±0.73	0.14	±0.04	0.15	0.003
		30	51	-22.62	±0.78	0.31	±0.09	0.18	0.002
Larix kaempferi	54	2	25	-27.94	±0.59	0.10	±0.02	0.46	<0.001
		4	29	-27.46	±0.48	0.09	±0.02	0.46	<0.001
		7	44	-26.65	±0.47	0.02	±0.02	0.05	0.134
		11	33	-26.70	±0.36	0.06	±0.02	0.28	0.002
		15	48	-27.62	±0.47	0.18	±0.02	0.64	<0.001
		22	56	-26.20	±0.64	0.33	±0.05	0.42	<0.001
		30	49	-26.76	±0.51	0.85	±0.07	0.78	<0.001
	82	2	50	-25.32	±0.63	0.12	±0.03	0.29	<0.001
		4	65	-25.33	±0.45	0.16	±0.02	0.48	<0.001
		7	58	-25.34	±0.48	0.26	±0.03	0.63	<0.001
		11	67	-24.19	±0.44	0.37	±0.03	0.64	<0.001
		15	46	-23.40	±0.62	0.50	±0.12	0.30	<0.001
		22	59	-23.76	±0.56	0.64	±0.11	0.36	<0.001
		30	48	-23.99	±0.56	0.97	±0.14	0.50	<0.001
Picea abies	54	2	24	-25.16	±0.54	0.08	±0.02	0.46	<0.001
		4	20	-25.39	±1.33	0.21	±0.05	0.47	0.001
		7	30	-24.09	±0.97	0.07	±0.04	0.08	0.122
		11	42	-23.29	±1.19	0.14	±0.06	0.14	0.014

		15	41	-25.41	±0.79	0.43	±0.05	0.68	<0.001
		22	39	-23.60	±1.02	0.50	±0.09	0.48	<0.001
		30	37	-23.05	±0.66	1.24	±0.11	0.80	<0.001
	82	2	59	-22.89	±0.69	-0.01	±0.03	0.00	0.635
		4	56	-21.52	±1.37	0.09	±0.06	0.04	0.139
		7	68	-22.91	±0.81	0.10	±0.04	0.09	0.013
		11	72	-23.12	±0.73	0.23	±0.04	0.34	<0.001
		15	68	-23.30	±0.60	0.38	±0.04	0.57	<0.001
		22	42	-23.98	±0.58	0.77	±0.08	0.68	<0.001
		30	40	-25.62	±0.86	2.13	±0.29	0.59	<0.001
Prunus armeniaca	54	2	37	-21.31	±0.41	0.07	±0.02	0.24	0.002
		4	50	-20.99	±0.39	0.13	±0.02	0.60	<0.001
		7	60	-20.15	±0.95	0.23	±0.05	0.30	<0.001
		11	68	-20.40	±0.72	1.09	±0.10	0.62	<0.001
		15	40	-18.18	±1.26	0.55	±0.09	0.50	<0.001
		22	87	-20.23	±0.59	0.93	±0.09	0.58	<0.001
		30	73	-17.76	±0.95	1.11	±0.17	0.39	<0.001
	82	2	61	-17.73	±0.40	0.10	±0.02	0.25	<0.001
		4	96	-14.32	±0.86	0.10	±0.06	0.02	0.132
		7	68	-16.09	±1.12	1.19	±0.20	0.35	<0.001
		11	39	-16.30	±1.05	1.90	±0.32	0.49	<0.001
		15	29	-15.89	±1.17	5.49	±0.90	0.58	<0.001
		22	25	-14.82	±1.20	5.19	±0.90	0.59	<0.001
		30	24	-18.03	±0.79	7.40	±0.70	0.83	<0.001
Prunus nigra	54	2	23	-29.57	±1.09	0.13	±0.04	0.34	0.003
		4	23	-27.74	±1.35	0.10	±0.01	0.16	0.061
		7	43	-27.75	±1.11	0.22	±0.06	0.47	<0.001
		11	60	-27.93	±0.82	0.23	±0.12	0.48	<0.001
		15	49	-22.82	±1.60	0.16	±0.19	0.10	0.025
		22	74	-22.69	±1.22	0.36	±0.19	0.14	0.001
		30	48	-25.90	±1.31	1.29	±0.04	0.58	<0.001
Rhododendron calendulaceum	54	11	40	-24.26	±1.36	0.29	±0.15	0.34	<0.001
		15	50	-24.88	±0.89	0.17	±0.02	0.30	<0.001
		22	50	-25.54	±0.72	0.33	±0.01	0.38	<0.001
		30	69	-24.59	±0.66	0.82	±0.02	0.59	<0.001