

## Supplemental materials

**Table S1** Summary of 12 family profiles evaluated in this study. Climatic conditions at each provenance are the averages for 30 years. ITMP: average temperature, SR: solar radiation, PCP: precipitation.

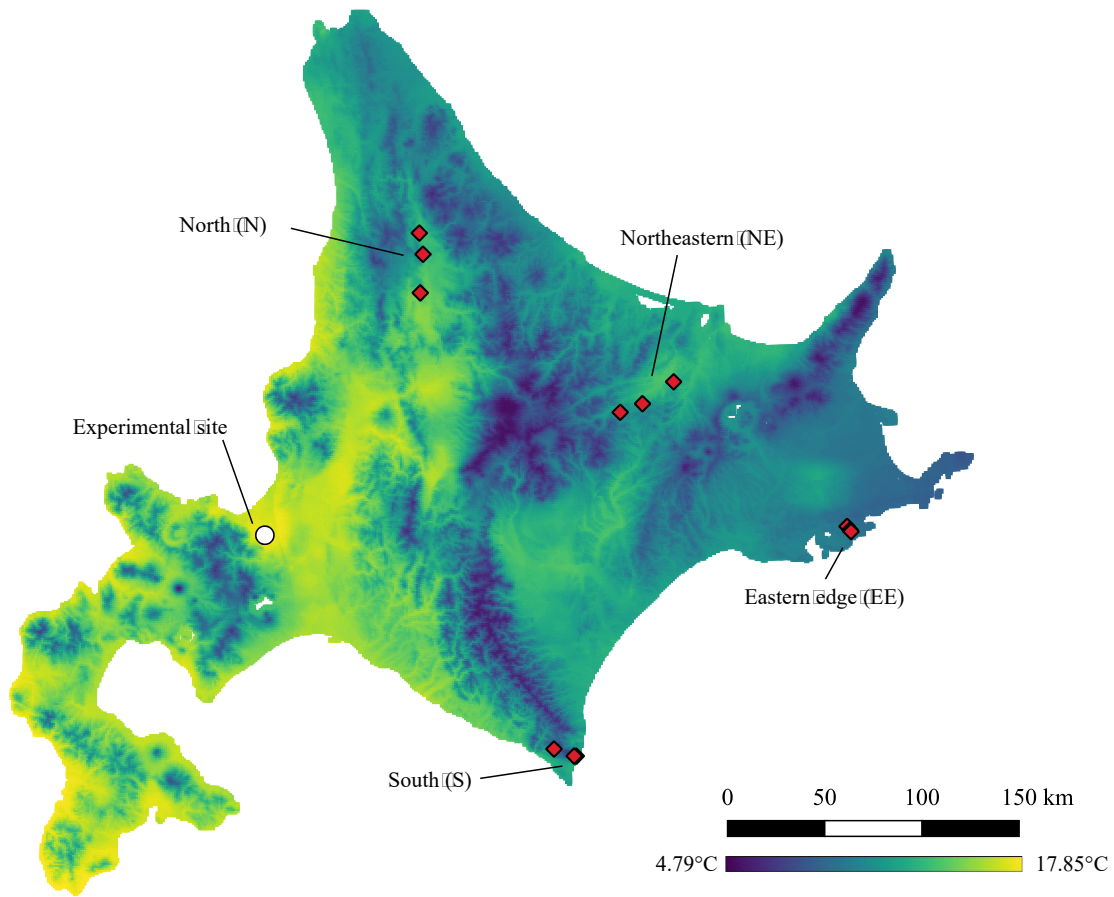
Family	Region	Lat	Lon	Climatic conditions at provenances		
				TMP (°C)	SR (MJ m <sup>-2</sup> year <sup>-1</sup> )	APCP (mm year <sup>-1</sup> )
Nayoro11		44.376	142.337	4.1	11.6	1191.8
Nayoro3	North (N)	44.197	142.319	5.4	11.6	1157.0
Bifuka2		44.474	142.313	5.2	11.3	1164.9
Urakawa7		42.046	143.288	6.8	12.0	1825.3
Urakawa6	South (S)	42.047	143.274	6.2	12.2	1908.3
Urakawa104		42.080	143.149	5.9	12.0	1984.4
Kitami107		43.674	143.738	4.5	12.4	741.8
Kitami106	Northeastern (NE)	43.636	143.594	4.2	12.4	844.9
Kitami6		43.773	143.940	5.2	12.4	720.3
Akkeshi114		43.082	145.017	5.5	12.1	1136.9
Akkeshi117	Eastern Edge (EE)	43.065	145.036	5.8	12.1	1130.9
Akkeshi110		43.058	145.041	5.9	12.1	1125.0

**Table S2** Summary of initial ID for each meteorological factor (left), and an example of an abbreviation (right) denoting the monthly meteorological factors.

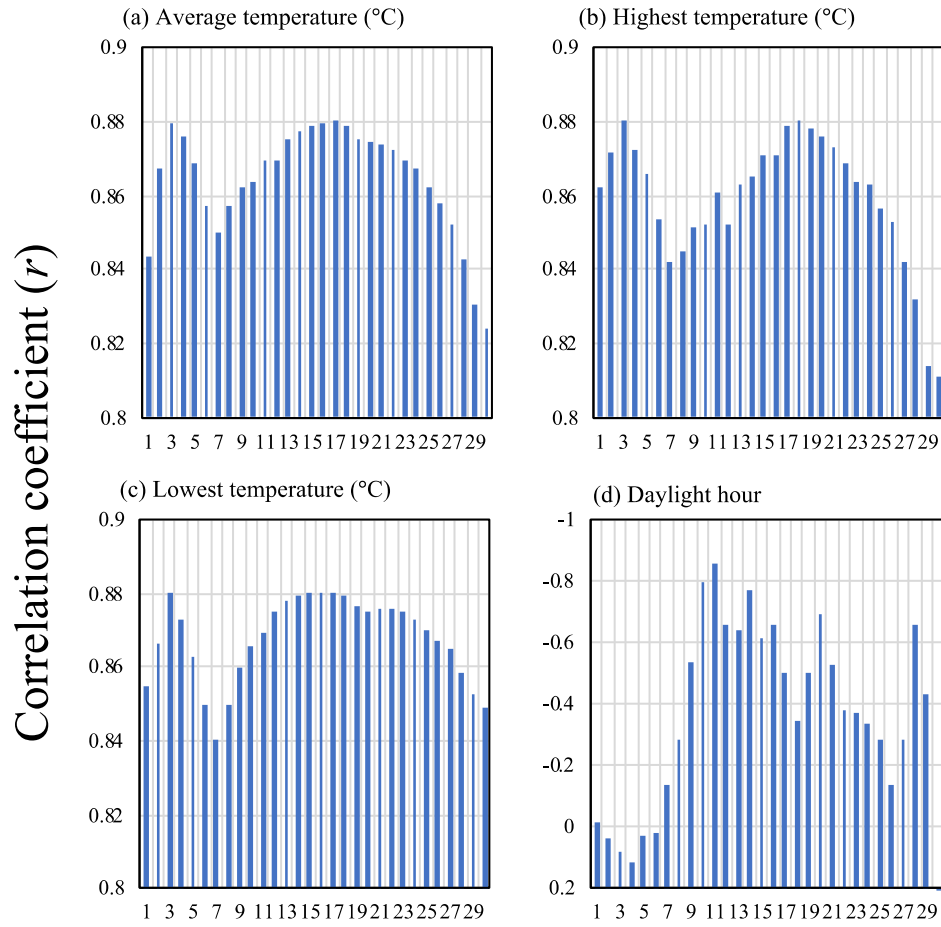
Initial ID	Meteorological factor	Abbreviation	Month
HT	Highest temperature (°C)	HT_1	January
		HT_2	February
LT	Lowest temperature (°C)	HT_3	March
		HT_4	April
AT	Average temperature (°C)	HT_5	May
		HT_6	June
PRP	Precipitation monthly totals (mm)	HT_7	July
SN	Snowfall monthly maximum (cm)	HT_8	August
		HT_9	September
DLH	Daylight hour (hour)	HT_10	October
SR	Monthly average of daily total solar radiation (MJ m <sup>-2</sup> )	HT_11	November
		HT_12	December

**Table S3** Summary of results in repeated measures ANOVA for the effects of measurement month (month) and provenance region (region) on the variation of  $F_v/F_m$ .

	Degree of freedom	Residual freedom	F value	p value
Month (M)	2	88	254.12	<0.001
Region (R)	3	44	1.54	0.22
M × R	6	88	1.26	0.28



**Fig. S1** Map of the lowest July temperatures (°C) averaged over the past 30 years, an experimental site (white circle), and mother trees of four seed provenances (red square). Details on geographic values are summarized in Supplemental Table 1.



**Fig. S2** Summary of correlation coefficients estimated by Pearson's correlation analysis between the growth environmental factors averaged by different number of days from 1 day to 1 month (i.e., 30 day) and seasonal variations of  $F_v/F_m$ .