Supplementary Material - Species differences in cue responses in woody plants of North America

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October 10, 2023

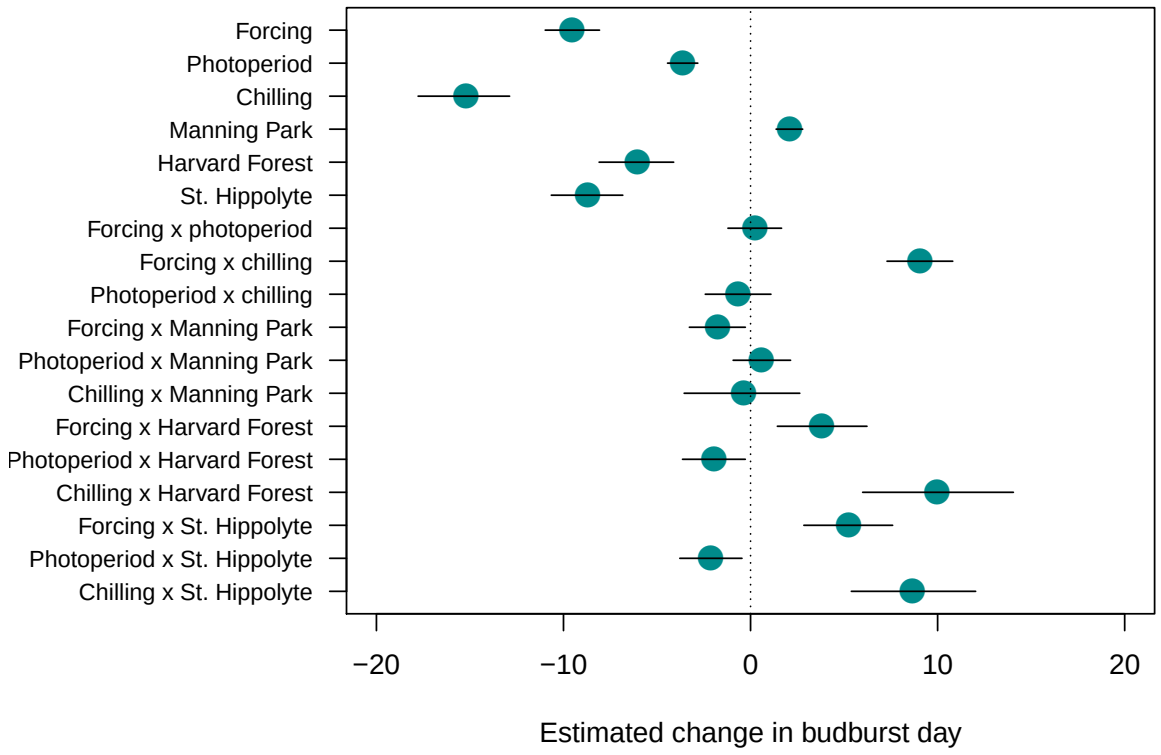

Figure S1: Estimated mean responses in budburst date of first bud to varying forcing, chilling, and photoperiod cues for 47 deciduous woody species across North America. Points represent mean posterior estimate, while bars depict the 95% uncertainty interval. Negative responses represent advances budburst, while positive values represent delaying effects.

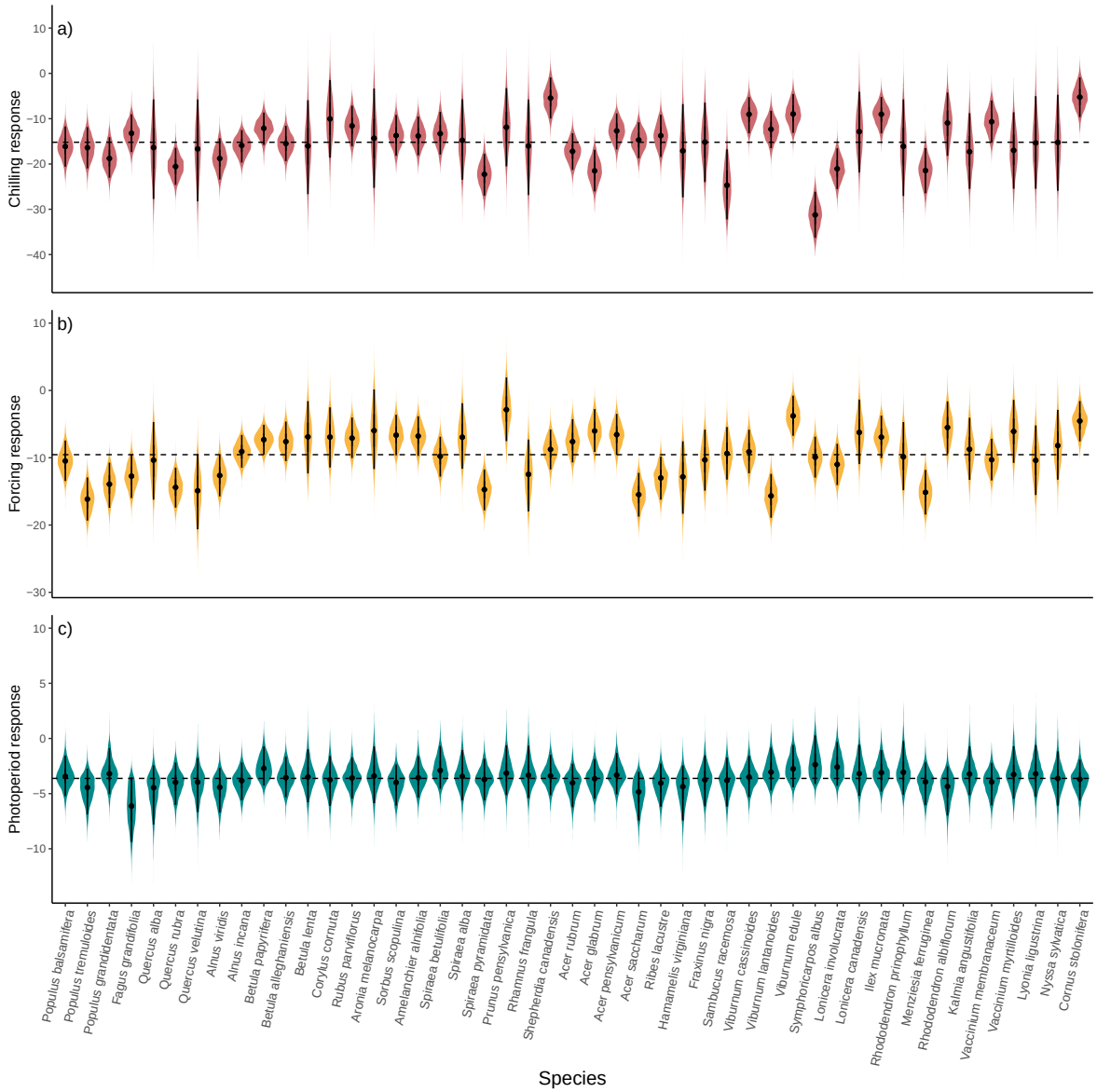

Figure S2: Species differences in cue estimate posterior distributions, comparing species differences across chilling (a), forcing (b), and photoperiod (c) cues. Species are ordered according to their phylogenetic relatedness. The median cue response is illustrated by the black circle, while the 90% quantile interval is illustrated by the black line. The coloured distribution depicts the shape of the posterior density for all samples of a given species. Species are ordered alphabetically, with differing y-axes to best depict species differences.

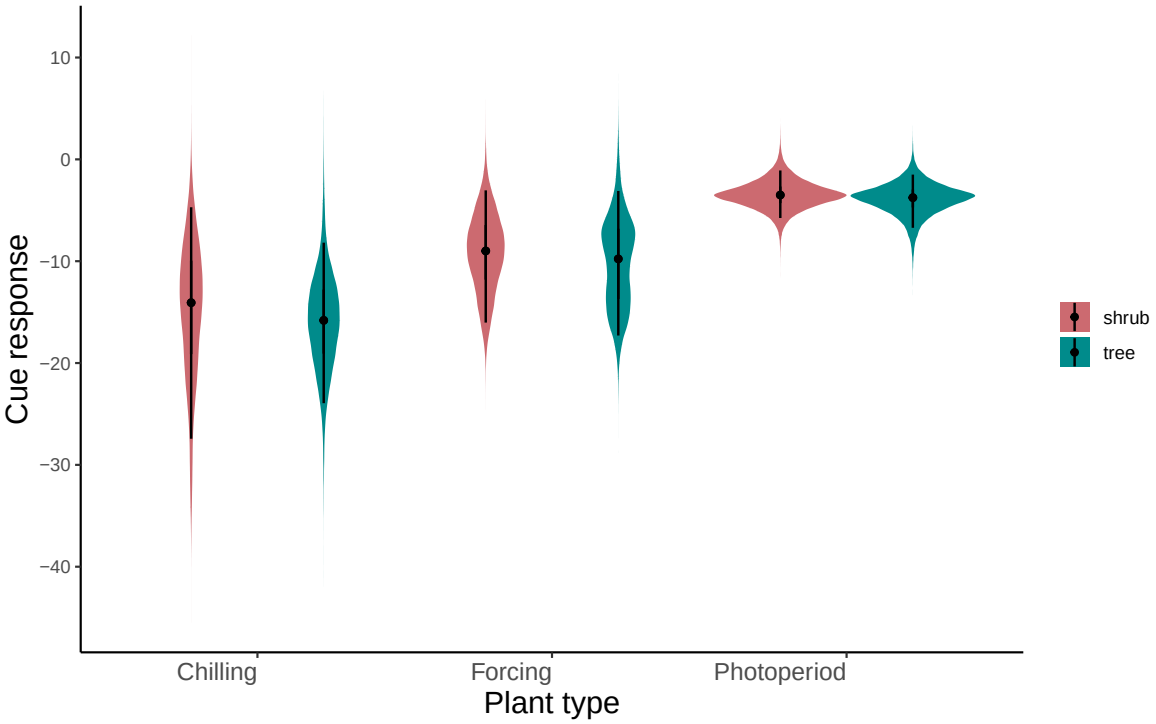

Figure S3: Comparisons of posterior distributions for cues estimates between shrub and tree species. Black circles represent the median cue response, while the thinner black line the 90% quantile interval. The coloured distribution is the the posterior density of the posteriors of the cue responses for all species within a given architectural type. The y-axis spans the entire range of the data.

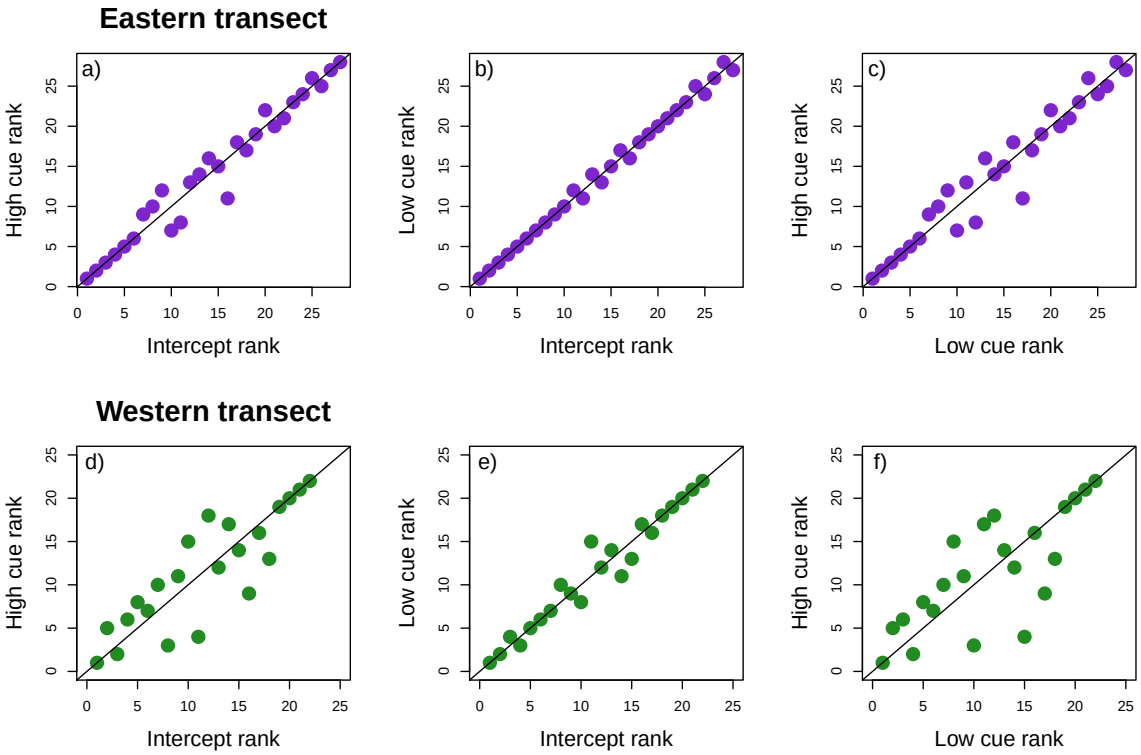

Figure S4: Estimated changes in species ranked budburst order, compared between species level effects (species intercept) and under high cue conditions (a and d), species level effects and under low cue condition (b and e), and ranked order under low and high cue conditions (c and f) for our eastern (a-c) and western species (d-f).

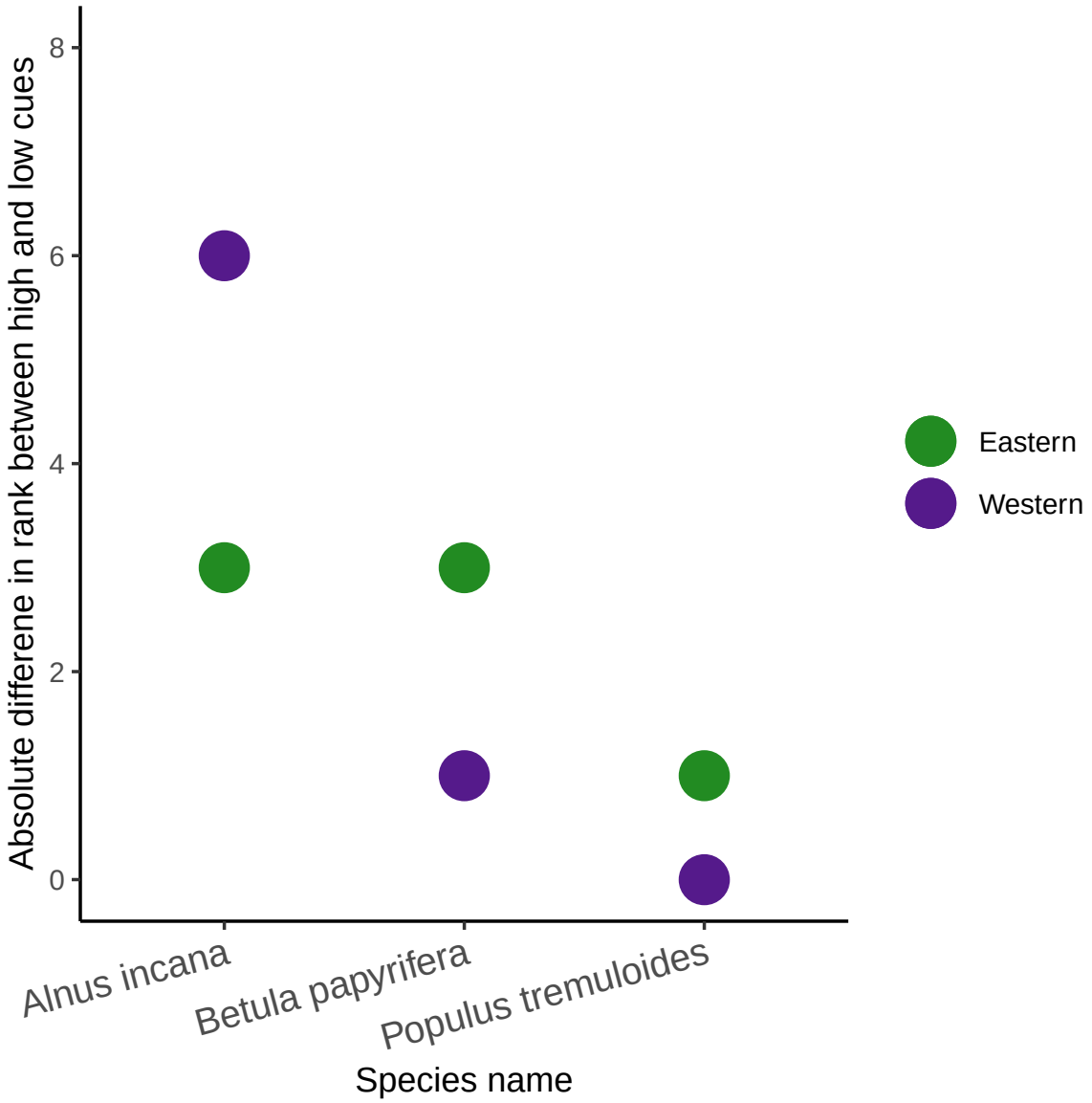

Figure S5: The difference in budburst ranking between high and low cues for the three species that occurr in both the eastern (shown in green) and western transect (shown in purple).

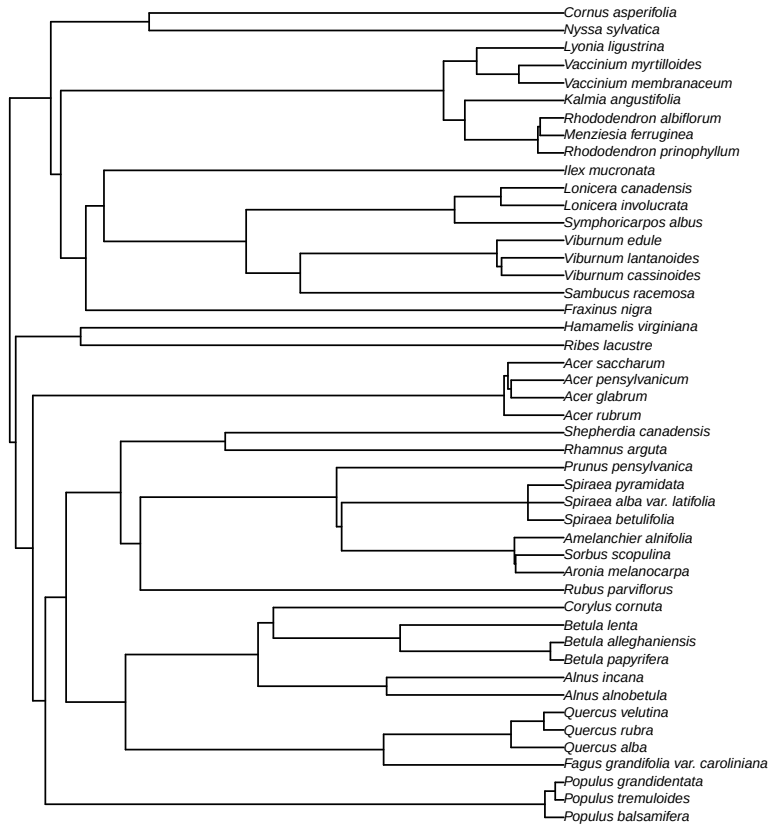

Figure S6: Species differences were accounted for by including phylogenetic effects on the species intercept. The phylogeny was obtained by pruning the existing tree for flowering plants developed by Smith and Brown (2018)

Table S1: Mean budburst dates across all treatments from raw data for 47 species at our two western sites, E.C. Manning Park (MP) and Smithers B.C.(SM) Canada, and our two eastern sites, Harvard Forest (HF) USA and St. Hippolyte (SH) Canada.

Species	Harvard Forest	St. Hippoltye	Manning Park	Smithers
Acer glabrum			36.00	39.00
Acer pensylvanicum	16.00	18.00		
Acer rubrum	22.00	25.00		
Acer saccharum	45.00	36.00		
Alnus incana			28.00	30.00
Alnus incana	33.00	25.00		
Alnus viridis			44.00	43.00
Amelanchier alnifolia			19.00	18.00
Aronia melanocarpa	14.00			
Betula alleghaniensis	20.00	21.00		
Betula lenta	30.00			
Betula papyrifera				31.00
Betula papyrifera	17.00	18.00		
Corylus cornuta	25.00	19.00		
Cornus stolonifera			15.00	17.00
Fagus grandifolia	42.00	43.00		
Fraxinus nigra	38.00	38.00		
Hamamelis virginiana	44.00			
Ilex mucronata	16.00	15.00		
Kalmia angustifolia	30.00	32.00		
Lonicera canadensis	17.00	16.00		
Lonicera involucrata			22.00	20.00
Lyonia ligustrina	31.00			
Menziesia ferruginea			43.00	46.00
Nyssa sylvatica	32.00			
Populus balsamifera			30.00	31.00
Populus grandidentata	33.00	31.00		
Populus tremuloides			46.00	35.00
Prunus pensylvanica	18.00	16.00		
Quercus alba	45.00			
Quercus rubra	36.00	34.00		
Quercus velutina	52.00			
Rhamnus frangula	32.00			
Rhododendron albiflorum			19.00	
Rhododendron prinophyllum	29.00			
Ribes lacustre			29.00	23.00
Rubus parviflorus			28.00	30.00
Sambucus racemosa			33.00	
Shepherdia canadensis			25.00	24.00
Sorbus scopulina			21.00	19.00
Spiraea alba	18.00	20.00		
Spiraea betulifolia			24.00	18.00
Spiraea pyramidata			26.00	22.00
Symphoricarpos albus			27.00	32.00
Vaccinium membranaceum			22.00	23.00
Vaccinium myrtilloides	13.00	17.00		
Viburnum cassinoides	15.00	18.00		
Viburnum edule			19.00	8.00
Viburnum lantanoides	31.00	28.00		

Table S2: Chill units from our two western sites, E.C. Manning Park (MP) and Smithers B.C.(SM) Canada, and our two eastern sites, Harvard Forest (HF) USA and St. Hippolyte(SH) Canada.

Population	Chilling.treatment	Chilling.Hours	Utah.Model	Chill.Portions
Harvard forest	Field chilling	892	814.50	56.62
Harvard forest	Field chilling + 30 d at 4 degree C	2140	2062.50	94.06
St. Hippoltye	Field chilling	682	599.50	44.63
St. Hippoltye	Field chilling + 30 d at 4 degree C	1930	1847.50	82.06
Smithers	Field chilling + 30 d at 4 degree C	1317	1368.00	54.95
Smithers	Field chilling + 70 d at 4 degree C	1965	2016.00	74.67
Manning Park	Field chilling + 30 d at 4 degree C	1213	1377.00	55.09
Manning Park	Field chilling + 70 d at 4 degree C	1861	2025.00	75.33

Table S3: Proportion of samples per species for which budburst was observed.

Species name	Proportion budburst	Plant type
Acer glabrum	0.83	tree
Alnus incana	1.00	shrub
Alnus viridis	0.92	shrub
Amelanchier alnifolia	0.99	shrub
Betula papyrifera	1.00	tree
Cornus stolonifera	0.99	shrub
Lonicera involucrata	0.87	shrub
Menziesia ferruginea	0.80	shrub
Populus balsamifera	0.98	tree
Populus tremuloides	0.90	tree
Rhododendron albiflorum	1.00	shrub
Ribes lacustre	0.82	shrub
Rubus parviflorus	0.94	shrub
Sambucus racemosa	0.95	shrub
Shepherdia canadensis	1.00	shrub
Sorbus scopulina	0.99	shrub
Spiraea betulifolia	0.94	shrub
Spiraea pyramidata	0.92	shrub
Symphoricarpos albus	0.84	shrub
Vaccinium membranaceum	0.90	shrub
Viburnum edule	1.00	shrub