

SUPPLEMENTARY DATA

Table S1. General characteristics of the study provenances. Description of provenances which form the provenance-progeny trial, including: geographical co-ordinates (latitude, longitude), elevation (m), percentage of serotiny (*S*; proportion of closed cones in relation to total cones of all trees that at least had one closed cone in total; mean \pm s.d.), total open cones (number of total open cones), total closed cones (number of total closed cones), mean height (cm), winter rainfall: December, January and February (Winter R; mm), spring rainfall: March, April and May (Spring R; mm), summer rainfall: June, July and August (Summer R; mm), fall rainfall: September, October and November (Fall R; mm), average annual temperature (AAT), mean temperature of the warmest month (MTWM), mean temperature of the coldest month (MTCM) and daily average of thermal oscillation in °C (DATO) by provenance.

| Code | Province | Provenance | Longitude | Latitude | Elevation | <i>S</i> | Total open cones | Total closed cones | Mean height |
|------|-------------|----------------------------|-----------|----------|-----------|-------------------|------------------|--------------------|-------------|
| 11 | Girona | Cabanellas | 2.78 | 42.25 | 232 | 24.59 \pm 32.49 | 311 | 73 | 473.08 |
| 21 | Tarragona | Tivissa | 0.76 | 41.06 | 336 | 47.87 \pm 38.19 | 174 | 136 | 461.60 |
| 31 | Barcelona | Sant Salvador de Guardiola | 1.76 | 41.67 | 377 | 39.11 \pm 32.47 | 348 | 178 | 468.52 |
| 51 | Zaragoza | Sierra de Luna | -0.96 | 42.23 | 664 | 75.31 \pm 28.95 | 203 | 410 | 419.13 |
| 61 | Zaragoza | Zuera | -0.92 | 41.92 | 576 | 69.87 \pm 29.88 | 263 | 453 | 403.23 |
| 62 | Zaragoza | Villanueva de Huerva | -1.05 | 41.35 | 619 | 44.67 \pm 36.76 | 409 | 249 | 431.68 |
| 71 | Teruel | Hijar | -0.42 | 41.10 | 489 | 39.14 \pm 30.82 | 379 | 263 | 426.72 |
| 72 | Teruel | Monroyo | 0.03 | 40.80 | 628 | 40.02 \pm 36.34 | 285 | 121 | 441.81 |
| 81 | Guadalajara | Valtrabado del Rio | -2.39 | 40.74 | 849 | 30.93 \pm 30.10 | 468 | 194 | 413.24 |
| 82 | Guadalajara | Valdeconcha | -2.87 | 40.45 | 758 | 41.85 \pm 33.21 | 393 | 189 | 398.93 |
| 92 | Valencia | Tuéjar | -1.16 | 39.82 | 729 | 67.79 \pm 31.74 | 298 | 571 | 453.69 |
| 101 | Alicante | Tibi | -0.65 | 38.52 | 976 | 80.10 \pm 24.13 | 152 | 471 | 447.91 |
| 102 | Castellon | Altura | -0.61 | 39.79 | 640 | 60.90 \pm 33.84 | 617 | 605 | 453.66 |
| 103 | Albacete | Villa de Ves | -1.25 | 39.18 | 864 | 68.17 \pm 30.43 | 281 | 737 | 468.19 |
| 111 | Castellon | Benicasim | 0.03 | 40.08 | 468 | 64.05 \pm 41.35 | 46 | 101 | 442.19 |
| 131 | Alicante | Villajoyosa | -0.30 | 38.50 | 126 | 57.64 \pm 37.62 | 239 | 317 | 416.00 |
| 141 | Murcia | Ricote | -1.43 | 38.14 | 688 | 84.36 \pm 20.38 | 201 | 775 | 439.07 |
| 144 | Albacete | Paterna | -2.28 | 38.63 | 1028 | 35.77 \pm 29.16 | 497 | 219 | 425.74 |
| 152 | Granada | Benamaurel | -2.74 | 37.70 | 908 | 72.66 \pm 22.63 | 280 | 602 | 453.74 |
| 153 | Almeria | Velez Blanco | -2.02 | 37.79 | 848 | 53.48 \pm 33.87 | 411 | 380 | 438.40 |

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|-----|----------|-----------------------|-------|-------|-----|---------------|-----|-----|--------|
| 154 | Jaen | Santiago de la Espada | -2.47 | 38.23 | 842 | 60.39 ± 29.42 | 601 | 645 | 465.79 |
| 155 | Jaen | Quesada | -3.15 | 37.74 | 673 | 87.07 ± 23.51 | 165 | 692 | 408.97 |
| 161 | Jaen | Cazorla | -2.79 | 38.11 | 636 | 71.65 ± 26.29 | 475 | 927 | 461.54 |
| 171 | Granada | Lentegi | -3.69 | 36.82 | 363 | 81.04 ± 24.94 | 177 | 448 | 433.40 |
| 172 | Malaga | Carratraca | -4.83 | 36.84 | 635 | 90.69 ± 16.87 | 119 | 786 | 376.75 |
| 173 | Malaga | Frigiliana | -3.92 | 36.82 | 595 | 85.92 ± 18.11 | 245 | 674 | 457.38 |
| 181 | Baleares | Escorca | 2.88 | 39.81 | 546 | 68.76 ± 22.99 | 290 | 499 | 469.84 |
| 182 | Baleares | Palma de Mallorca | 2.65 | 39.57 | 62 | 33.76 ± 38.97 | 252 | 127 | 408.17 |
| 183 | Baleares | Ses Salines | 3.13 | 39.36 | 19 | 47.32 ± 38.32 | 264 | 124 | 417.03 |

| Code | Province | Provenance | Winter R | Spring R | Summer R | Fall R | AAT | MTWM | MTCM | DATO |
|------|-------------|----------------------------|----------|----------|----------|--------|------|------|------|------|
| 11 | Girona | Cabanellas | 221 | 273 | 219 | 263 | 13.7 | 21.4 | 6.9 | 14.5 |
| 21 | Tarragona | Tivissa | 133 | 159 | 75 | 199 | 15.3 | 25.1 | 6.9 | 18.1 |
| 31 | Barcelona | Sant Salvador de Guardiola | 101 | 154 | 123 | 191 | 13.9 | 23.4 | 5.5 | 18.0 |
| 51 | Zaragoza | Sierra de Luna | 146 | 159 | 119 | 163 | 13.2 | 23.2 | 4.7 | 18.5 |
| 61 | Zaragoza | Zuera | 120 | 145 | 95 | 128 | 12.9 | 23.4 | 4.2 | 19.2 |
| 62 | Zaragoza | Villanueva de Huerva | 78 | 131 | 91 | 110 | 13.4 | 23.5 | 5.1 | 18.5 |
| 71 | Teruel | Hijar | 85 | 116 | 82 | 126 | 14.1 | 23.9 | 5.7 | 18.2 |
| 72 | Teruel | Monroyo | 106 | 167 | 112 | 163 | 13.6 | 22.9 | 6.0 | 16.9 |
| 81 | Guadalajara | Valtrabado del Rio | 185 | 219 | 111 | 186 | 11.4 | 21.3 | 3.8 | 17.5 |
| 82 | Guadalajara | Valdeconcha | 180 | 157 | 80 | 162 | 12.7 | 23.0 | 4.0 | 18.9 |
| 92 | Valencia | Tuéjar | 103 | 138 | 102 | 140 | 14.0 | 23.7 | 6.3 | 17.4 |
| 101 | Alicante | Tibi | 144 | 137 | 58 | 164 | 13.0 | 22.2 | 6.1 | 16.1 |
| 102 | Castellon | Altura | 132 | 138 | 77 | 203 | 14.1 | 22.7 | 7.5 | 15.2 |
| 103 | Albacete | Villa de Ves | 126 | 125 | 82 | 156 | 13.5 | 23.0 | 5.9 | 17.1 |
| 111 | Castellon | Benicasim | 110 | 120 | 77 | 220 | 15.4 | 23.3 | 9.2 | 14.1 |
| 131 | Alicante | Villajoyosa | 99 | 94 | 42 | 156 | 16.7 | 24.7 | 10.0 | 14.7 |
| 141 | Murcia | Ricote | 70 | 101 | 44 | 106 | 15.8 | 24.9 | 8.6 | 16.4 |
| 144 | Albacete | Paterna | 180 | 166 | 67 | 139 | 13.2 | 24.1 | 4.5 | 19.6 |
| 152 | Granada | Benamaurel | 134 | 109 | 44 | 107 | 14.3 | 24.1 | 6.5 | 17.6 |
| 153 | Almeria | Velez Blanco | 68 | 113 | 43 | 105 | 14.2 | 23.8 | 6.8 | 17.1 |
| 154 | Jaen | Santiago de la Espada | 201 | 190 | 71 | 152 | 14.1 | 24.9 | 6.1 | 18.8 |

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|-----|----------|-------------------|-----|-----|----|-----|------|------|------|------|
| 155 | Jaen | Quesada | 164 | 131 | 39 | 109 | 15.7 | 25.9 | 7.5 | 18.4 |
| 161 | Jaen | Cazorla | 366 | 284 | 60 | 201 | 14.4 | 25.0 | 6.0 | 19.0 |
| 171 | Granada | Lentegi | 298 | 163 | 31 | 223 | 15.9 | 22.9 | 10.3 | 12.6 |
| 172 | Malaga | Carratraca | 244 | 154 | 31 | 196 | 15.4 | 24.6 | 8.2 | 16.4 |
| 173 | Malaga | Frigiliana | 286 | 183 | 26 | 201 | 15.2 | 23.9 | 8.5 | 15.4 |
| 181 | Baleares | Escorca | - | - | - | - | - | - | - | - |
| 182 | Baleares | Palma de Mallorca | - | - | - | - | - | - | - | - |
| 183 | Baleares | Ses Salines | - | - | - | - | - | - | - | - |

Table S2. Overview of Q_{ST} estimates of various studies on pine species. Q_{ST} estimates for different traits provided by various pine species studies, including the present study.

| Family | Species | Q_{ST} | Trait | Reference |
|----------|--------------------------------------|----------|-------------------------------|---------------|
| Pinaceae | <i>Pinus contorta ssp. latifolia</i> | 0.006 | Branch angle | 1 |
| Pinaceae | <i>Pinus pinaster</i> | 0.010 | Wood density (max) | 2 |
| Pinaceae | <i>Pinus pinaster</i> | 0.020 | Wood density (mean) | 2 |
| Pinaceae | <i>Pinus pinaster</i> | 0.027 | Cavitation resistance | 3 |
| Pinaceae | <i>Pinus pinaster</i> | 0.030 | Wood density (min) | 2 |
| Pinaceae | <i>Pinus contorta ssp. latifolia</i> | 0.057 | Branch diameter | 1 |
| Pinaceae | <i>Pinus brutia</i> | 0.065 | Diameter | 4 |
| Pinaceae | <i>Pinus canariensis</i> | 0.077 | Height | 12 |
| Pinaceae | <i>Pinus brutia</i> | 0.095 | Height | 4 |
| Pinaceae | <i>Pinus albicaulis</i> | 0.110 | Late winter cold hardiness | 5 |
| Pinaceae | <i>Pinus brutia</i> | 0.119 | Diameter | 4 |
| Pinaceae | <i>Pinus halepensis</i> | 0.120 | Early reproductive allocation | 6 |
| Pinaceae | <i>Pinus halepensis</i> | 0.120 | Volume over bark | 6 |
| Pinaceae | <i>Pinus albicaulis</i> | 0.120 | Height | 5 |
| Pinaceae | <i>Pinus halepensis</i> | 0.120 | Height growth | 7 |
| Pinaceae | <i>Pinus contorta ssp. latifolia</i> | 0.133 | Specific gravity | 1 |
| Pinaceae | <i>Pinus pinaster</i> | 0.140 | Total above-ground biomass | 2 |
| Pinaceae | <i>Pinus contorta ssp. latifolia</i> | 0.161 | Branch length | 1 |
| Pinaceae | <i>Pinus contorta ssp. latifolia</i> | 0.166 | Stem diameter | 1 |
| Pinaceae | <i>Pinus brutia</i> | 0.170 | Height | 4 |
| Pinaceae | <i>Pinus brutia</i> | 0.182 | Height | 4 |
| Pinaceae | <i>Pinus pinaster</i> | 0.188 | Annual increase in height | 3 |
| Pinaceae | <i>Pinus contorta ssp. latifolia</i> | 0.195 | Stem height | 1 |
| Pinaceae | <i>Pinus pinaster</i> | 0.197 | Carbon isotope ratio | 3 |
| Pinaceae | <i>Pinus sylvestris</i> | 0.200 | Height growth | 8 |
| Pinaceae | <i>Pinus halepensis</i> | 0.210 | Early reproductive allocation | 6 |
| Pinaceae | <i>Pinus brutia</i> | 0.214 | Diameter | 4 |
| Pinaceae | <i>Pinus pinaster</i> | 0.220 | Total leaf area | 2 |
| Pinaceae | <i>Pinus canariensis</i> | 0.225 | Survival | 12 |
| Pinaceae | <i>Pinus albicaulis</i> | 0.250 | Survival | 5 |
| Pinaceae | <i>Pinus brutia</i> | 0.281 | Height | 4 |
| Pinaceae | <i>Pinus halepensis</i> | 0.290 | Volume over bark | 6 |
| Pinaceae | <i>Pinus halepensis</i> | 0.320 | Serotiny | Present study |
| Pinaceae | <i>Pinus sylvestris</i> | 0.364 | Budset | 9 |
| Pinaceae | <i>Pinus brutia</i> | 0.384 | Diameter | 4 |
| Pinaceae | <i>Pinus pinaster</i> | 0.470 | Collar diameter | 2 |
| Pinaceae | <i>Pinus pinaster</i> | 0.730 | Survival | 10 |
| Pinaceae | <i>Pinus sylvestris</i> | 0.770 | Timing of terminal budset | 11 |
| Pinaceae | <i>Pinus pinaster</i> | 0.790 | Total height | 10 |
| Pinaceae | <i>Pinus pinaster</i> | 0.970 | Stem form | 10 |

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