Supporting information

Appendix S1. Information on the plant material

Appendix S2. Information on the hydraulic vulnerability curves

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Appendix S5. Loss of hydraulic conductivity and relative water loss assessed with different methods

Appendix S6. Loss of hydraulic conductivity and relative water loss in different months
**Appendix S1**: Information on the origin of the plant material, on the number of tree individuals, the sample number as well as the dataset number (i.e. single hydraulic measurements). The numbers in brackets give information on the sample numbers measured with the bench top dehydration method.

| Species            | Origin                           | Lat. N         | Long. E.          | Altitude [m] | Tree age | Trees n | Organ      | Samples n | Datasets n |
|--------------------|----------------------------------|----------------|------------------|--------------|----------|---------|------------|-----------|------------|
| *Picea abies*      | Botanical garden, Vienna, Austria | 48°14′12″     | 16°20′15″        | 233          | 4        | 8       | trunk sapling | 8         | 54         |
| *Picea abies*      | Botanical garden, Vienna, Austria | 48°14′12″     | 16°20′15″        | 233          | 20       | 5       | branch      | 6         | 46         |
| *Picea abies*      | Sande, Southern Norway           | 59°34′50″     | 10°16′29″        | 105          | 40       | 6       | trunk wood  | 18        | 44         |
| *Larix decidua*    | Botanical garden, Vienna, Austria | 48°14′12″     | 16°20′15″        | 233          | 20       | 2       | branch      | 8         | 52         |
| *Acer campestre*   | Botanical garden, Vienna, Austria | 48°14′12″     | 16°20′15″        | 233          | 3-5      | 13 (7)  | trunk sapling | 16 (10)  | 59         |
| *Fagus sylvatica*  | Botanical garden, Vienna, Austria | 48°14′12″     | 16°20′15″        | 233          | 3-6      | 37 (31) | trunk sapling | 88 (82)  | 112        |
| *Populus x canescens* | River “Wien”, Vienna, Austria     | 48°12′30″     | 16°13′34″        | 224          | 3-4      | 18      | trunk sapling | 27        | 101        |
| *Populus tremula*  | River “Wien”, Vienna, Austria    | 48°12′30″     | 16°13′34″        | 224          | 30       | 17 (13) | branch      | 45 (41)   | 65         |
| *Sorbus torminalis*| Botanical garden, Vienna, Austria | 48°14′12″     | 16°20′15″        | 233          | 60       | 1       | branch      | 8         | 47         |
Appendix S2: Information on the hydraulic vulnerability curves of seven different woody species fitted by an exponential sigmoidal equation (percent loss of conductivity = 100/(1 + exp(a*(pressure-b)))) (Pammenter and VanderWilligen 1998). The parameter “a” corresponds to the slope of the linear part of the regression and “b” is the $P_{50}$, i.e. the pressure that is necessary to result in 50% conductivity loss. $P_{88}$ is the pressure that would result in 88% conductivity loss. Results for $a$ and $P_{50}$ are given with ± standard error and the 95% confidence interval (CI 95%) is given in brackets. Information on the sample- and dataset numbers is given in Table S1.

| Species              | $a$      | $P_{50}$            | $r^2$ | $P$     |
|----------------------|----------|---------------------|-------|---------|
|                      | [MPa]    |                     |       |         |
| Picea abies sapling  | 0.74 ± 0.05 | -6.31 ± 0.08 (-6.46 -6.15) | 0.93  | < 0.0001 |
| Picea abies branch   | 1.62 ± 0.15 | -4.63 ± 0.06 (-4.74 -4.51) | 0.95  | < 0.0001 |
| Picea abies trunk wood | 2.86 ± 0.27 | -2.21 ± 0.03 (-2.27 -2.15) | 0.94  | < 0.0001 |
| Larix decidua branch | 1.11 ± 0.06 | -4.45 ± 0.05 (-4.55 -4.34) | 0.97  | < 0.0001 |
| Acer campestre sapling | 0.82 ± 0.81 | -4.17 ± 0.11 (-4.44 -3.98) | 0.90  | < 0.0001 |
| Fagus sylvatica sapling | 0.92 ± 0.06 | -1.90 ± 0.05 (-2.00 -1.80) | 0.83  | < 0.0001 |
| Populus x canescens sapling | 2.01 ± 0.11 | -3.17 ± 0.03 (-3.22 -3.11) | 0.94  | < 0.0001 |
| Populus tremula branch | 1.34 ± 0.13 | -2.27 ± 0.07 (-2.41 -2.13) | 0.82  | < 0.0001 |
| Sorbus torminalis branch | 1.02 ± 0.08 | -2.88 ± 0.07 (-3.02 -2.73) | 0.93  | < 0.0001 |
Appendix S3: Parameters for linear ($b_0$, $b_1$), quadratic ($b_0$, $b_1$, $b_2$) or cubic ($b_0$, $b_1$, $b_2$, $b_3$) equations for the relationship between percent loss of conductivity (PLC, independent variable) and the relative water loss (RWL, dependent variable) ($P < 0.0001$), the calculated RWL resulting in 50% (RWL at $P_{50}$) and 88% (RWL at $P_{88}$) of conductivity loss and their 95% confidence intervals (CI 95%) and 95% individual prediction intervals (PI 95%) for seven different temperate woody species and different age classes. Mean values are given with their standard error.

| Species and organ       | $b_0$  | $b_1$  | $b_2$ | $b_3$ | $r^2$ | $P$    | RWL at $P_{50}$ (CI 95%, PI 95%) | RWL at $P_{88}$ (CI 95%, PI 95%) |
|-------------------------|--------|--------|-------|-------|-------|-------|----------------------------------|----------------------------------|
| Picea abies sapling     | 0.9642 | 0.4001 |       |       | 0.94  | < 0.0001| 20.97 (19.98 21.96, 15.41 26.54) | 36.17 (34.26 38.09, 30.37 41.97) |
| Picea abies branch      | 1.7912 | 0.3703 | -0.00147 | 3.028E-5 | 0.98  | < 0.0001| 20.41 (19.60 21.21, 15.07 25.74) | 43.60 (42.30 44.89, 38.31 48.88) |
| Picea abies trunk wood  | -0.7449 | 0.5076 |       |       | 0.96  | < 0.0001| 24.64 (23.55 25.72, 17.40 31.87) | 43.93 (42.27 45.59, 36.58 51.27) |
| Larix decidua branch    | 1.3540 | 0.0617 | 0.00426 |       | 0.98  | < 0.0001| 15.09 (14.46 15.71, 10.61 19.57) | 39.77 (38.75 40.79, 35.28 44.26) |
| Acer campestre sapling  | 0.2635 | 0.3866 |       |       | 0.89  | < 0.0001| 19.59 (18.27 20.91, 10.34 28.84) | 34.28 (32.16 36.40, 24.89 43.68) |
| Fagus sylvatica sapling | -0.6300 | 0.2139 |       |       | 0.85  | < 0.0001| 10.07 (9.65 10.48, 5.59 14.54)  | 18.19 (17.43 18.96, 13.68 22.71) |
| Populus x canescens sapling | 0.1207 | 0.3731 | -0.00470 | 3.482E-5 | 0.94  | < 0.0001| 11.38 (10.95 11.81, 7.48 15.29) | 20.29 (19.55 21.04, 16.45 24.14) |
| Populus tremula branch  | -2.1077 | 0.4203 |       |       | 0.90  | < 0.0001| 18.90 (17.81 20.00, 10.11 27.70) | 34.87 (33.01 36.74, 25.95 43.80) |
| Sorbus torminalis branch | 1.3535 | 0.2462 |       |       | 0.91  | < 0.0001| 13.66 (12.91 14.41, 8.62 18.71)  | 23.02 (21.75-24.29, 17.87-28.17) |
Appendix S4: Relationship between pressure application (air injection method) or water potential (bench top dehydration method) and the relative water loss (RWL, independent variable) for the prediction of $P_{50}$. Equation parameters for the pooled dataset are given either for linear ($b_0, b_1$), quadratic ($b_0, b_1, b_2$) or cubic ($b_0, b_1, b_2, b_3$) equations for branches, saplings or trunk wood of seven different temperate woody species. The predicted values of $P_{50}$ and $P_{88}$ are given with their 95% confidence intervals (95% CI) and 95% prediction intervals (95% PI). The point measurements for the equations are shown in Fig. 1, the RWL at 50% or 88% of conductivity in Table 1.

| Species/organ                  | $b_0$    | $b_1$    | $b_2$    | $b_3$    | $r^2$ | $P$    | $P_{50}$ pred. (95% CI, 95% PI) [MPa] | $P_{88}$ pred. (95% CI, 95% PI) [MPa] |
|--------------------------------|----------|----------|----------|----------|-------|--------|--------------------------------------|--------------------------------------|
| Picea abies sapling            | -0.4061  | -0.6779  | 0.0266   | -0.0004  | 0.95  | < 0.0001| -6.43 (-6.63 -6.22, -7.61 -5.24)    | -8.15 (-8.54 -7.76, -9.54 -6.76)    |
| Picea abies branch             | -1.2307  | -0.2109  | 0.0021   |          | 0.87  | < 0.0001| -4.65 (-4.89 -4.40, -6.35 -2.95)    | -6.39 (-6.83 -5.98, -8.09 -4.70)    |
| Picea abies trunk wood         | -0.9150  | -0.0505  | 0.0021   |          | 0.83  | < 0.0001| -2.16 (-2.29 -2.03, -3.02 -1.30)    | -3.13 (-3.33 -2.94, -4.00 -2.26)    |
| Larix decidua branch          | -1.0639  | -0.2530  | 0.0021   |          | 0.91  | < 0.0001| -4.24 (-4.45 -4.04, -5.74 -2.74)    | -6.68 (-7.05 -6.31, -8.19 -5.17)    |
| Acer campestre sapling         | -1.5801  | -0.1308  | 0.0021   |          | 0.78  | < 0.0001| -4.14 (-4.42 -3.86, -5.99 -2.30)    | -6.06 (-6.48 -5.65, -7.93 -4.20)    |
| Fagus sylvatica sapling        | -0.2166  | -0.1424  | -0.0025  |          | 0.84  | < 0.0001| -1.90 (-1.99 -1.81, -2.88 -0.92)    | -3.62 (-3.78 -3.46, -4.61 -2.63)    |
| Populus x canescens sapling    | -0.2088  | -0.4928  | 0.0247   | -0.0004  | 0.92  | < 0.0001| -3.28 (-3.37 -3.19, -4.14 -2.43)    | -3.81 (-3.97 -3.65, -4.68 -2.95)    |
| Populus tremula branch         | -0.6723  | -0.0874  |          |          | 0.76  | < 0.0001| -2.32 (-2.49 -2.15, -3.68 -0.96)    | -3.72 (-4.00 -3.44, -5.10 -2.34)    |
| Sorbus torminalis branch       | -0.1901  | -0.1892  |          |          | 0.91  | < 0.0001| -2.78 (-2.92 -2.63, -3.77 -1.78)    | -4.54 (-4.79 -4.30, -5.55 -3.53)    |
Appendix S5: Relationship between loss of hydraulic conductivity and relative water loss assessed with the bench top dehydration method and the air injection method for *Acer campestre* saplings (A), *Fagus sylvatica* saplings (B) and *Populus tremula* branches (C). The linear equations pooled for different hydraulic methods have overlapping 95% confidence intervals (95% CI).
Appendix S6: Relationship between loss of hydraulic conductivity and relative water loss in different months (June, July and August) for Larix decidua branches (A) and Fagus sylvatica saplings (B). The quadratic (A) and linear (B) equations pooled for different months have overlapping 95% confidence intervals (95% CI).