

Supplementary Table S1. Characteristics of rhizosphere samples analyzed, ontogenetic stage and sex of trees from which samples were collected and their geographical data. Each row corresponds to a single tree. For each tree, a spring rhizosphere sample ("+" in the "Spring Sample" column), an autumn sample ("+" in the "Autumn Sample" column), or both samples were collected.

| Sample name | Geographic region and habitat soil types | Sampling location | Spring sample | Autumn sample | Tree sex* |
|--------------------|---|--------------------------|----------------------|----------------------|------------------------------|
| cfo-14 | City of Moscow, Urbic Technosol | 55.826599, 37.493121 | + | - | Generative, Female |
| cfo-16 | City of Moscow, Urbic Technosol | 55.793023, 37.556559 | + | - | Generative, Female |
| cfo-27 | City of Moscow, Urbic Technosol | 55.836725, 37.552391 | + | - | Generative, Female |
| cfo-30 | City of Moscow, Urbic Technosol | 55.835864, 37.567393 | + | - | Generative, Generative, Male |
| cfo-33 | City of Moscow, Urbic Technosol | 55.836212, 37.566489 | + | - | Generative, Male |
| cfo-39 | City of Moscow, Urbic Technosol | 55.836578, 37.554478 | + | - | Generative, Female |
| cfo-41 | City of Moscow, Urbic Technosol | 55.667621, 37.59773 | + | - | Generative, Female |
| cfo-44 | City of Moscow, Urbic Technosol | 55.665872, 37.58988 | + | - | Generative, Male |
| cfo-45 | City of Moscow, Urbic Technosol | 55.665865, 37.589644 | + | - | Generative, Male |
| cfo-51 | City of Moscow, Urbic Technosol | 55.674999, 37.566241 | + | - | Generative, Female |
| cfo-54 | City of Moscow, Urbic Technosol | 55.674999, 37.566241 | + | - | Generative, Male |
| cfo-55 | City of Moscow, Urbic Technosol | 55.674999, 37.566241 | + | - | Generative, Female |
| cfo-76 | City of Obninsk, Urbic Technosol | 55.092946, 36.618006 | + | - | Generative, Male |
| cfo-79 | City of Obninsk, Urbic Technosol | 55.093126, 36.617936 | + | - | Generative, Female |
| cfo-80 | City of Obninsk, Urbic Technosol | 55.093165, 36.617957 | + | - | Generative, Female |
| cfo-86 | City of Obninsk, Urbic Technosol | 55.093294, 36.617994 | + | - | Generative, Female |
| cfo-89 | City of Obninsk, Urbic Technosol | 55.093348, 36.618076 | + | - | Generative, Female |
| cfo-93 | City of Obninsk, Urbic Technosol | 55.093393, 36.618043 | + | - | Generative, Female |
| cfo-94 | City of Obninsk, Urbic Technosol | 55.093426, 36.618069 | + | - | Generative, Female |
| cfo-100 | City of Obninsk, Urbic Technosol | 55.09408, 36.61837 | + | - | Generative, Female |

| | | | | | |
|---------|---|-------------------------|---|---|-----------------------|
| cfo-101 | City of Obninsk, Urbic Technosol | 55.094135, 36.618377 | + | - | Generative, Female |
| cfo-103 | City of Obninsk, Urbic Technosol | 55.094214, 36.618388 | + | - | Generative, Female |
| cfo-106 | City of Obninsk, Urbic Technosol | 55.093859, 36.619888 | + | - | Generative, Female |
| Pfo_1 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.352374, 44.059665 | + | + | Generative, Female |
| Pfo_2 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.352357, 44.059899 | - | + | Generative, Female |
| Pfo_3 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.352267, 44.059949 | + | + | Generative, Female |
| Pfo_4 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.352254, 44.060078 | + | + | Generative, Female |
| Pfo_5 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.352335, 44.060471 | - | + | Generative, Female |
| Pfo_6 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.350187, 44.057717 | + | + | Generative, Female |
| Pfo_7 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.350513, 44.055672 | + | + | Generative, Female |
| Pfo_8 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.350367, 44.056690 | + | + | Generative, Female |
| Pfo_9 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.349087, 44.059552 | + | + | Generative, Male |

| | | | | | |
|--------|---|-------------------------|---|---|-----------------------|
| Pfo 10 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.34895, 44.059657 | + | + | Generative, Female |
| Pfo 11 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.349175, 44.059504 | + | + | Generative, Female |
| Pfo 12 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.348399, 44.059859 | + | + | Generative, Female |
| Pfo 14 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.347917, 44.059613 | + | + | Generative, Female |
| Pfo 15 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.347924, 44.057064 | + | + | Generative, Male |
| Pfo 16 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.34864, 44.05762 | + | + | Generative, Male |
| Pfo 17 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.348846, 44.057411 | - | + | Generative, Male |
| Pfo 18 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.34865, 44.057088 | + | + | Generative, Male |
| Pfo 19 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.348595, 44.056844 | + | + | Generative, Male |
| Pfo 20 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.349736, 44.053389 | + | + | Generative, Male |
| Pfo 21 | Suburb of Nizhny Novgorod city, | 56.347224, 44.060078 | - | + | Generative, Female |

| | | | | | |
|--------|---|-------------------------|---|---|-----------------------|
| | floodplain of the Volga River, Fluvisol | | | | |
| Pfo 22 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.347372, 44.061504 | + | + | Generative, Male |
| Pfo 23 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.346653, 44.061317 | + | + | Generative, Male |
| Pfo 24 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.346479, 44.061316 | - | + | Generative, Female |
| Pfo 26 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.346533, 44.06196 | - | + | Generative, Female |
| Pfo 27 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.348623, 44.062902 | - | + | Generative, Female |
| Pfo 28 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.349537, 44.062455 | - | + | Generative, Male |
| Pfo 29 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.349836, 44.061572 | + | + | Generative, Male |
| Pfo 30 | Suburb of Nizhny Novgorod city, floodplain of the Volga River, Fluvisol | 56.350171, 44.059993 | + | + | Generative, Male |
| Skfo 1 | Podkumok River Valley, Fluvisol | 44.027603 43.067865 | + | - | Generative, Female |
| Skfo 2 | Podkumok River Valley, Fluvisol | 44.027049 43.06349 | + | - | Generative, Female |
| Skfo 3 | Podkumok River Valley, Fluvisol | 44.027473 43.06353 | + | - | Generative, Male |

| | | | | | |
|---------|---------------------------------|------------------------|---|---|------------------------|
| Skfo 4 | Podkumok River Valley, Fluvisol | 44.027473 43.06353 | + | + | Generative, intersex** |
| Skfo 5 | Podkumok River Valley, Fluvisol | 44.04294 42.932274 | - | + | Generative, Male |
| Skfo 6 | Podkumok River Valley, Fluvisol | 44.04294 42.932274 | + | - | Generative, Female |
| Skfo 7 | Podkumok River Valley, Fluvisol | 44.043669 42.933025 | + | + | Generative, Male |
| Skfo 8 | Podkumok River Valley, Fluvisol | 44.043904 42.933252 | + | + | Generative, Female |
| Skfo 9 | Podkumok River Valley, Fluvisol | 44.045263 42.935257 | + | + | Generative, Female |
| Skfo 10 | Podkumok River Valley, Fluvisol | 44.045182 42.938949 | + | + | Generative, Female |
| Skfo 11 | Podkumok River Valley, Fluvisol | 44.04521 42.939581 | + | + | Generative, Male |
| Skfo 12 | Podkumok River Valley, Fluvisol | 44.045228 42.939812 | + | + | Generative, Male |
| Skfo 13 | Podkumok River Valley, Fluvisol | 44.044609 42.942218 | + | - | Generative, Female |
| Skfo 14 | Podkumok River Valley, Fluvisol | 44.03778 42.943411 | + | + | Virginile, Not Defined |
| Skfo 15 | Podkumok River Valley, Fluvisol | 44.045557 42.944202 | + | + | Virginile, Not Defined |
| Skfo 16 | Podkumok River Valley, Fluvisol | 44.044412 42.946224 | + | + | Virginile, Not Defined |
| Skfo 17 | Podkumok River Valley, Fluvisol | 44.042521 42.963468 | + | + | Generative, Male |
| Skfo 18 | Podkumok River Valley, Fluvisol | 43.957302 42.768589 | + | + | Generative, Female |
| Skfo 19 | Podkumok River Valley, Fluvisol | 43.955697 42.766329 | + | + | Generative, Female |
| Skfo 20 | Podkumok River Valley, Fluvisol | 43.954759 42.765917 | + | + | Generative, Female |

| | | | | | |
|---------|--|------------------------|---|---|------------------------|
| Skfo_21 | Podkumok River Valley, Fluvisol | 43.954701 42.765658 | + | + | Generative, Female |
| Skfo_22 | Podkumok River Valley, Fluvisol | 43.954502 42.765205 | - | + | Virginile, Not Defined |
| Skfo_23 | Podkumok River Valley, Fluvisol | 43.954949 42.766178 | - | + | Generative, Female |
| Skfo_24 | Podkumok River Valley, Fluvisol | 43.959573 42.773464 | + | + | Generative, Female |
| Skfo_25 | Podkumok River Valley, Fluvisol | 43.959558 42.774582 | + | + | Virginile, Not Defined |
| Skfo_26 | Podkumok River Valley, Fluvisol | 43.963678 42.781233 | + | + | Generative, Female |
| Skfo_27 | Podkumok River Valley, Fluvisol | 43.967392 42.785425 | + | + | Generative, Female |
| Skfo_28 | Podkumok River Valley, Fluvisol | 43.971874 42.789184 | + | + | Generative, Female |
| Skfo_29 | Podkumok River Valley, Fluvisol | 43.972696 42.789123 | + | + | Generative, Female |
| Skfo_30 | Podkumok River Valley, Fluvisol | 43.973228 42.788866 | + | + | Generative, Male |
| Ufo_1 | Suburb of Uryupinsk city, Khopyor river valley, Fluvisol | 50.789744 41.988373 | + | + | Generative, Female |
| Ufo_2 | Suburb of Uryupinsk city, Khopyor river valley, Fluvisol | 50.787686 41.985166 | + | + | Virginile, Not Defined |
| Ufo_3 | Suburb of Uryupinsk city, Khopyor river valley, Fluvisol | 50.787714 41.984997 | - | + | Generative, Female |
| Ufo_4 | Suburb of Uryupinsk city, Khopyor river valley, Fluvisol | 50.790325 41.978117 | + | + | Virginile, Not Defined |
| Ufo_5 | Suburb of Uryupinsk city, Khopyor river valley, Fluvisol | 50.79067 41.977279 | + | + | Generative, Male |

| | | | | | |
|--------|--|------------------------|------------------|---|---------------------------|
| Ufo 6 | Suburb of Uryupinsk city, Khopyor river valley, Fluvisol | 50.791846 41.978294 | + | + | Virginile, Not Defined |
| Ufo 7 | Suburb of Uryupinsk city, Khopyor river valley, Fluvisol | 50.793013 41.979879 | - | + | Generative, Female |
| Ufo 8 | Suburb of Uryupinsk city, Khopyor river valley, Fluvisol | 50.793133 41.979933 | - | + | Generative, Male |
| Ufo 9 | Suburb of Uryupinsk city, Khopyor river valley, Fluvisol | 50.791472 41.984088 | - | + | Generative, Male |
| Ufo 10 | Suburb of Uryupinsk city, Khopyor river valley, Fluvisol | 50.813251 41.992686 | + | + | Generative, Female |
| Ufo 11 | Suburb of Uryupinsk city, Khopyor river valley, Fluvisol | 50.811365 41.987989 | + | + | Generative, Female |
| Ufo 12 | Suburb of Uryupinsk city, Khopyor river valley, Fluvisol | 50.811208 41.988316 | + (2 samples) | + | Virginile, Not Defined |
| Ufo 13 | Suburb of Uryupinsk city, Khopyor river valley, Fluvisol | 50.810635 41.980038 | + | + | Generative, Male |
| Ufo 14 | Suburb of Uryupinsk city, Khopyor river valley, Fluvisol | 50.810218 41.979661 | + | + | Generative, Female |
| Ufo 15 | Suburb of Uryupinsk city, Khopyor river valley, Fluvisol | 50.810313 41.975727 | + | + | Generative, Female |
| Ufo 16 | Suburb of Uryupinsk city, Khopyor river valley, Fluvisol | 50.784777 41.986269 | + | + | Generative, Male |
| Ufo 17 | Suburb of Uryupinsk city, Khopyor river valley, Fluvisol | 50.784834 41.986221 | + | + | Generative, Male |
| Ufo 18 | Suburb of Uryupinsk city, Khopyor river valley, Fluvisol | 50.782144 41.984908 | - | + | Virginile, Not Defined |

| | | | | | |
|--------|--|------------------------|---|---|------------------------|
| Ufo 19 | Suburb of Uryupinsk city, Khopyor river valley, Fluvisol | 50.785039 41.985022 | + | + | Generative, intersex** |
| Ufo 20 | Suburb of Uryupinsk city, Khopyor river valley, Fluvisol | 50.786221 41.986017 | + | + | Generative, Male |
| Ufo 21 | Suburb of Uryupinsk city, Khopyor river valley, Fluvisol | 50.787698 41.985552 | + | + | Generative, Female |

* Sex was determined by inspection of the tree when generative organs were present or by PCR to the ARR17 sex-specific gene.

** Visual inspection of the tree revealed both male generative organs and female generative structures at the same time.