



Ghent University Botanical Garden

The genus *Betula* L.

(Betulaceae)

**Vegetative key to the species
in Western European cultivation.**

Jan De Langhe

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This key is based on characteristics, visible during the longest possible period of the year. Species in general represented in collections are discussed.

List of taxa treated in this key see on page 7.

List of names referred to synonymy see on page 7.

To improve accuracy:

- **Do examine only the two mature leaves at the base of long shoot and/or the leaves of short shoots** unless otherwise mentioned. Depending the taxon, all other leaves can differ enormously in size and secondary vein number!!!
- Beware of hybridisation, especially with plants raised from seed gathered in collections.

Characteristics based on:

- JDL herbarium specimens.
- living specimens, in various arboreta, botanic gardens and collections, especially these from wild origin.
- literature:

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<http://www.plantentuin.ugent.be>

- 1 a Shrub **AND** lamina with ≤ 6 , secondary veins/side (rarely some laminas with up to 8 secondary veins/side), usually shallowly ribbed. 2
- b Tree or shrub, **IF** shrub, then lamina with ≥ 8 secondary veins/side, often strongly ribbed. 7
- 2 a Margin crenate. Lamina obovate, +/- rounded or kidney shaped, at least as wide as long, often wider than long. *B. nana* (Betula/Apterocaryon)
- b Margin not crenate, **OR** variably coarsely (serrate-) dentate to crenate. Lamina sometimes as wide as long but usually clearly longer than wide. 3
- 3 a Apex acute **AND** margin acutely dentate. 4
- b Apex obtuse to rounded **AND** margin +/- obtusely dentate (beware: juvenile or strong shoots can differ in +/- acutely dentate margin and +/- acute apex). 5
- 4 a Young shoot with brownish glands (especially on top of shoot, visible with LENS), often sticky to the touch. *B. occidentalis* (Betula/Betulae)
- b Young shoot densely hairy with short hairs **AND** poorly or not glandular, **OR IF** glandular then glands transparent or white (LENS). *B. pubescens* (Betula/Betulae)
- 5 a Lamina broad, sometimes almost as wide as long **AND** margin coarsely dentate or +/- crenate and coarsely dentate. *B. pumila* (Betula/Apterocaryon)
- b Lamina always clearly longer than wide. Margin more regularly and finely dentate. ... 6
- 6 a Lamina US dark green, ovate to rhombic. Primary teeth +/- broad at their base.
..... *B. ovalifolia* (Betula/Apterocaryon)
- Different:** hybrid between *B. ermanii* and *B. ovalifolia*, with intermediate characters: +/- deeply impressed secondary veins to 8/side, base cuneate, rounded to cordate, apex acute to obtuse. *B. apoiensis* (Betula)
- b Lamina US green, ovate to obovate. Primary teeth +/- narrow at their base.
..... *B. fruticosa* (Betula/Apterocaryon)
- 7 a Lamina at base remarkably cordate (>1 cm deep) **AND** primary teeth long excurrent (3-4 mm long) **AND** petiole 2-6 cm. *B. maximowicziana* (Acuminatae/Acuminatae)
- b Lamina at base rounded to cuneate or truncate **AND** primary teeth excurrent or not, **OR IF** lamina cordate then never >1 cm deep **AND** teeth never excurrent **NOR** petiole 2-6 cm long. 8
- 8 a Smell and/or taste of wintgreen oil obvious when damaging young shoot (this feature is even more perceptible after wetting damaged shoot). 9
- b No smell nor taste of wintgreen oil..... 17
- 9 a Petiole and lamina LS on secondary veins +/- felty hairy with short hairs (decreasing in autumn), primary teeth excurrent. Fruiting catkin long and pendulous.
..... *B. alnoides* (Acuminatae/Acuminatae)
- Lamina $\leq 2 \times$ longer than broad. Fruiting catkin solitary. *B. alnoides* subsp. *luminifera*
- Lamina $\geq 2 \times$ longer than broad. Fruiting catkin 2-5. *B. alnoides* subsp. *alnoides*
- b Petiole and lamina LS on secondary veins +/- silky to stiffly hairy with long hairs (decreasing in autumn), primary teeth not excurrent. Fruiting catkin short and erect.
..... 10

- 10 a Margin clearly coarsely to double-dentate: teeth +/- triangular, often ≥ 5 mm high and wide. Lamina LS +/- blue-green. *B. corylifolia* (Nipponobetula/Nipponobetula)
- b Margin different: teeth <5 mm high and wide. Lamina LS green. 11
- 11 a Secondary veins ≤ 6 /side. Apex obtuse. *B. lenta* f. *uber* (Asperae/Lentae)
- b Secondary veins ≥ 7 /side. Apex acute to acuminate. 12
- 12 a Multistemmed shrub/small tree. 1 year old long shoots mainly directed upwards, firm. *B. medwediewii* (Asperae/Lentae)
- b Tree. 1 year old long shoots variably directed, from +/- upwards to horizontal or pendent, thinner. 13
- 13 a Lamina ovate to broadly ovate, midvein length up to 8 cm, secondary veins usually ≤ 10 /side. Lamina base rounded to broadly cuneate. *B. globispica* (Asperae/Lentae)
- b Lamina ovate to oblong ovate, midvein length up to 12 cm (sometimes more), secondary veins usually 12-18/side. Lamina base +/- cordate to rounded, rarely +/- truncate to cuneate. 14
- 14 a Bark at least partly peeling off with little up curled strips. *B. alleghaniensis* (Asperae/Lentae)
- b Bark sombre, initially smooth or +/- granular, often vertically torn and bursting open in thick plates later. 15
- 15 a Margin finely serrate, mainly 3-5(-9) teeth between 2 secondary veins. *B. lenta* (Asperae/Lentae)
- b Margin coarsely serrate, mostly 1-3(-4) teeth between 2 secondary veins. 16
- 16 a Lamina US between secondary veins clearly bullate. Fruiting catkin 2-4 x 1,5 cm, bract to 8 mm long, central lobe obvious longer than lateral lobes. *B. grossa* (Asperae/Lentae)
- b Lamina US between secondary veins not so bullate. Fruiting catkin 2,5-6 x 1,2-2,5 cm, bract 8-13 mm long, central lobe 2 x longer than lateral lobes. *B. insignis* (Asperae/Lentae)
- 17 a Secondary veins mainly ≥ 10 /side AND bark peeling in long thin papery strips or ribbons/strings (or at least so detachable by hand). 18
- b Secondary veins <10/side, at least so partly on the short shoots, OR bark different (+/- rough, or tearing loose with curly flakes, or stiff/breakable strips). 24
- 18 a Lamina +/- triangular ovate, largest width clearly under the middle AND margin sharply (double-) serrate AND base truncate to weakly cordate. *B. ermanii* (Betula/Costatae)
- b Lamina ovate to oblong ovate or elliptic. IF lamina +/- triangular ovate then margin not sharply (double-) serrate. 19
- 19 a Bark with orange or pink-red to brownish colour. 20
- b Bark with whitish creamy to honey or grey colour. 21
- 20 a Lamina LS glossy. Bark with brown colour. *B. utilis* var. *utilis* (Betula/Betulae)
- b Lamina LS dull. Bark pink, coppery coloured to orange. *B. utilis* var. *albosinensis* (Betula/Betulae)

- 21 a Lamina at base +/- cuneate AND largest width +/- in the middle of lamina.
..... *B. utilis* var. *jacquemontii* hybrids (+ cultivars) (Betula/Betulae)
- b Lamina at base +/- truncate to rounded or weakly cordate, largest width sometimes in, but usually below the middle of lamina. 22
- 22 a Lamina broad: ovate to broadly ovate. Margin with broad and coarse primary teeth and coarse incisions. *B. utilis* var. *jacquemontii* (Betula/Betulae)
- b Lamina relatively narrow: ovate to oblong ovate. Margin with sharp primary teeth and fine acute incisions. 23
- 23 a Lamina ≥ 2 \times longer than wide. Secondary veins mainly strictly rectilinear.
..... *B. costata* (Betula/Costatae)
- b Lamina ≤ 2 \times longer than wide. Secondary veins slightly curved upwards.
..... *B. utilis* var. *utilis* (Betula/Betulae)
- 24 a Young shoot with short pubescence. One year old shoot often short pubescent.
..... *B. pubescens* (Betula/Betulae)
- Different: similar taxa with short and dense pubescence on shoot, glandular or not:
- Shoot densely glandular with whitish glands. Fruiting catkins pendulous, bract with central lobe not clearly enlarged. *B. microphylla* (Betula/Betulae)
 - Shoot not or sparsely glandular. Fruiting catkins +/- erect, bract prominent, with clearly enlarged central lobe. *B. raddeana* (Betula/Dahuricae)
- b Young shoot and annual shoot glabrous, +/- glandular to warty, OR IF hairy then with long hairs, pointing towards apex of lamina. 25
- 25 a Young shoot +/- sticky and brownish glandular (especially visible near the top with a LENS). Lamina with ≤ 6 pair of secondary veins. *B. occidentalis* (Betula/Betulae)
- b Young shoot not as sticky and brownish glandular. Lamina mostly with ≥ 6 pair of secondary veins. 26
- 26 a Bark at least partly peeling in several layers of large scales and/or stiff plates. Large specimens exhibit this mainly on the branches while the trunk itself becomes very roughly ridged. 27
- b Bark different: OR peeling with long papery thin strips, OR not peeling, OR roughly ridged. 28
- 27 a Pubescence of shoot, petiole, lamina LS woolly, +/- lasting, young shoot less obviously glandular. Lamina margin on short shoot double-serrate, 5-12 secondary veins/side. *B. nigra* (Betula/Dahuricae)
- b Pubescence less obvious, thin to fading, and young shoot obviously glandular. Lamina margin on short shoot +/- irregularly serrate, 5-8(-9) secondary veins/side.
..... *B. dahurica* (Betula/Dahuricae)
- 28 a Bark peeling in long papery thin ribbons/strings (or at least so detachable by hand).
..... 29
- b Bark not peeling, OR IF peeling then in little strips but no ribbons detachable by hand, AND with base of trunk very rough. 34

- 29 a Lamina US with secondary veins close together and clearly deeply impressed, **AND** lamina LS clearly ribbed, **AND** margin sharply (often double-) dentate.
..... *B. ermanii* (Betula/Costatae)
- Different:** hybrid between *B. ermanii* and *B. ovalifolia*, with intermediary characters: +/- deeply impressed secondary veins to 8/side, base cuneate, rounded to cordate, apex sharp to obtuse. *B. apoiensis* (Betula)
- b Lamina US with secondary veins distant and impressed or not, **AND/OR** lamina LS +/- flat, with secondary veins not quite perceptible, **AND/OR** margin bluntly to +/- crenately dentate. 30
- 30 a Lamina US glossy, secondary veins often impressed and lamina between the secondary veins +/- bullate, sometimes bulged. 31
- b Lamina US +/- dull, secondary veins not so impressed, lamina flat between the secondary veins, sometimes +/- wavy. 32
- 31 a Shoot and bud not or weakly glandular.
..... *B. utilis* var. *jacquemontii* (+ cultivars and hybrids) (Betula/Betulae)
- b Shoot clearly glandular, bud +/- resinous. *B. utilis* var. *occidentalis* (Betula/Betulae)
- 32 a Lamina variable: oblong ovate to ovate, or ovate to rhombic. Bark often heavily marked with striking lenticels (zebra-effect, especially on white specimens).
..... *B. papyrifera* (Betula/Betulae)
- Different:** Similar species, lamina more gradually tapering into slender point, always with cordate base. Bark pink to red-brown (not white nor dark brown). *B. cordifolia* (Betula/Betulae)
- b Lamina variable: triangular to broadly ovate, or broadly ovate to rhombic. Bark with less striking lenticels. 33
- 33 a Lamina US dark green with blue-green hue, LS contrasting paler grey- to blue-green and completely glabrous (margin ciliate!). Lamina base cuneate to truncate.
..... *B. pendula* subsp. *szechuanica* (Betula/Betulae)
- b Lamina US dark green, LS paler green, glabrous to variably hairy. Lamina base cuneate to weakly cordate. *B. pendula* subsp. *platyphylla* (Betula/Betulae)
- 34 a Lamina with ≤ 7 secondary veins/side. Bark white or partly white. 35
- b Lamina with ≥ 8 pair secondary veins/side. Bark dark, often with contrasting pale lenticels. 36
- 35 a Apex acuminate to long acuminate, gradually tapering from the middle of the lamina. Bark white, +/- peeling, at base dark and coarsely ridged with dark rhombic parts.
..... *B. pendula* subsp. *pendula* (Betula/Betulae)
- b Apex caudate. Lamina often remarkably abruptly narrowed almost from the middle towards the apex. Bark not peeling, white and speckled to orange brown.
..... *B. populifolia* (Betula/Betulae)
- 36 a Lamina with ≤ 12 secondary veins/side. 37
- b Lamina with ≥ 12 secondary veins/side, **OR** at least in part of the leaves. 40
- 37 a Lamina midvein length on mature short shoot mostly <4 cm, LS +/- glaucous **AND** secondary veins clearly deeply impressed (lamina is strikingly ribbed).
..... *B. bomiensis* (Asperae/Asperae)
- b Lamina midvein length on mature short shoot >4 cm, LS green, **AND/OR** secondary veins not impressed. 38

- 38 a Lamina midvein length average 6-9 cm, LS midvein and secondary veins with scattered tiny brown glands (aromatic at drying). *B. schmidtii* (Asperae/Asperae)
- b Lamina midvein length average ≤ 6 cm, LS not so glandular nor aromatic. 39
- 39 a Lamina rhombic to ovate, base cuneate to rounded. Margin often with ≥ 2 teeth between two secondary veins. *B. chinensis* (Asperae/Asperae)
- b Lamina ovate to oblong ovate, base rounded. Margin with ≤ 2 teeth between two secondary veins. *B. fargesii* (Asperae/Asperae)
- 40 a Shoot indumentum very densely honey coloured (later greyish and thinner), shoot colour is not visible. Lamina LS without glands. *B. calcicola* (Asperae/Asperae)
- b Shoot less hairy, or with looser pubescence, shoot colour is visible. 41
- 41 a Lamina on short shoot with strong texture AND $< 2,5$ cm width AND primary teeth clearly excurrent. *B. potaninii* (Asperae/Asperae)
- b Lamina on short shoot with thin texture, OR > 3 cm width AND/OR primary teeth not excurrent or only slightly so on part of the leaves. 42
- 42 a Lamina with > 16 secondary veins/side, OR at least in part of the leaves, LS eglandular. *B. chichibuensis* (Asperae/Asperae)
- b Lamina with < 16 secondary veins/side, LS +/- glandular. *B. delavayi* (Asperae/Asperae)

List of taxa treated in this identification key.

- B. alleghaniensis* (Asperae/Lentae)
B. alnoides (Acuminatae/Acuminatae)
B. alnoides subsp. *alnoides* (Acuminatae/Acuminatae)
B. alnoides subsp. *luminifera* (Acuminatae/Acuminatae)
B. apoensis (Betula)
B. bomiensis (Asperae/Aspera)
B. calcicola (Asperae/Asperae)
B. chichibuensis (Asperae/Asperae)
B. chinensis (Asperae/Asperae)
B. cordifolia (Betula/Betulae)
B. corylifolia (Nipponobetula/Nipponobetula)
B. costata (Betula/Costatae)
B. dahurica (Betula/Dahuricae)
B. delavayi (Asperae/Asperae)
B. ermanii (Betula/Costatae)
B. fargesii (Asperae/Asperae)
B. fruticosa (Betula/Apterocaryon)
B. globispica (Asperae/Lentae)
B. grossa (Asperae/Lentae)
B. insignis (Asperae/Lentae)
B. lenta (Asperae/Lentae)
B. lenta f. *uber* (Asperae/Lentae)
B. maximowicziana (Acuminatae/Acuminatae)
B. medwediewii (Asperae/Lentae)
B. microphylla (Betula/Betulae)
B. nana (Betula/Apterocaryon)
B. nigra (Betula/Dahuricae)
B. occidentalis (Betula/Betulae)
B. ovalifolia (Betula/Apterocaryon)
B. papyrifera (Betula/Betulae)
B. pendula subsp. *pendula* (Betula/Betulae)
B. pendula subsp. *platyphylla* (Betula/Betulae)
B. pendula subsp. *szechuanica* (Betula/Betulae)
B. populifolia (Betula/Betulae)
B. potaninii (Asperae/Asperae)
B. pubescens (Betula/Betulae)
B. pumila (Betula/Apterocaryon)
B. raddeana (Betula/Dahuricae)
B. schmidtii (Asperae/Asperae)
B. utilis var. *albosinensis* (Betula/Betulae)
B. utilis var. *jacquemontii* (Betula/Betulae)
B. utilis var. *occidentalis* (Betula/Betulae)
B. utilis var. *utilis* (Betula/Betulae)

List of taxa referred to close relative (~) or synonymy (=) in this identification key.

- Betula aetnensis* = *Betula pendula*
Betula austrosinensis = *Betula insignis*
Betula celtiberica ~ *Betula pubescens* (subsp. *celtiberica*)
Betula divaricata ~ *Betula ovalifolia*
Betula glandulifera ~ *Betula pumila* (western form)
Betula humilis = *Betula fruticosa*
Betula kirghisorum ~ *Betula pendula*
Betula litwinowii = *Betula pubescens* (McAllister and Ashburner pers. comm.)
Betula middendorffii ~ *Betula ovalifolia*
Betula oycowiensis ~ *Betula pendula*
Betula pamirica ~ *Betula pubescens*
Betula procurva = *Betula pubescens* (McAllister and Ashburner pers. comm.)
Betula saposhnikovii = *Betula pubescens* (McAllister and Ashburner pers. comm.)
Betula schugnanica ~ *Betula pubescens*
Betula tatewakiana ~ *Betula ovalifolia*

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	cm
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