



Ghent University Botanical Garden

Betula L. (Betulaceae)

VEGETATIVE KEY TO SPECIES
CULTIVATED IN WESTERN EUROPE

Jan De Langhe

(10 September 2008 - 12 January 2012)

Vegetative key.

This key is based on vegetative characteristics visible during the longest period of the year.

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

List of names referred to synonymy: see 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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Ashburner, K.B. & Walters, S.M. - (1989) - *Betula* in The European Garden Flora VOL. 2, p. 49-55.
Bean, W.J. - (1981) - *Betula* in Trees and Shrubs hardy in the British Isles I, p. 414-434.
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Ohba, H. - (2006) - *Betula* in Flora of Japan VOL. 2, p. 31-37.
Ohwi. - (1965) - *Betula* in Flora of Japan, p. 372-374.
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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)
- 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 wintergreen oil obvious when damaging young shoot (this feature is even more perceptible after wetting damaged shoot). 9
- b No smell nor taste of wintergreen 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)
- 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)
- 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)
- 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/Aspera)
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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