



Ghent University Botanical Garden

Alnus Mill.

(Betulaceae-Betuloideae)

**VEGETATIVE KEY TO SPECIES
CULTIVATED IN WESTERN EUROPE**

Jan De Langhe

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Vegetative identification key.

Introduction:

This key is based on vegetative characteristics, and therefore also of use when flowers and fruits are absent.

- Use a 10x hand lens to check leaf margin incisions and venation pattern in general.
- Look at the entire plant.
- Beware of hybridisation, especially with plants raised from seed other than wild origin.

Abbreviations used in this key:

- **L/W** = length/width
- **LS** = lower surface
- **US** = upper surface

Taxa treated in this key: → p7.

Taxa referred to synonymy in this key: → p7.

Remarks: → p7.

References:

- JDL herbarium and [illustrations](#)
- living specimens, in various arboreta, botanic gardens and collections
- literature:

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KEY TO GROUPS

- 01 a Largest buds slender-pointed and (sub-)sessile AND covered with glabrous scales of unequal size (10× LENS). **Group A**
- b Largest buds blunt to shortly pointed, OR stipitate, OR pubescent, OR covered with scales of +/- equal size. 02
- 02 a Lamina secondary veins predominantly 10-15/side. 03
- b Lamina secondary veins predominantly 5-10/side. 04
- 03 a Lamina apex predominantly obtuse to acute or abruptly acute. **Group B** →p.3
- b Lamina apex predominantly acute to acuminate or caudate. **Group C** →p.3
- 04 a Lamina apex (at least in part of the foliage) +/- emarginate, OR margin halfway lobulate with lobes predominantly dentate on both sides (10× LENS). **Group D** →p.4
- b Lamina apex obtuse to acuminate AND margin serrulate to dentate, OR IF slightly lobulate then with lobes dentate on proximal side only. **Group E** →p.5

GROUP A

Largest buds slender-pointed and (sub-)sessile
AND covered with glabrous scales of unequal size (10× LENS).

- 01 a Lamina margin in apical half with (0-)1-2 secondary teeth between the primary teeth (10× LENS). 02
- b Lamina margin in apical half with 4-6 secondary teeth between the primary teeth. 04
- 02 a Lamina narrowly ovate, secondary veins 18-26/side. **A. pendula**
- b Lamina ovate to broadly ovate, secondary veins 12-18/side. 03
- 03 a Shoot pubescent (10× LENS). **A. firma**
- b Shoot glabrous. **A. sieboldiana**
- 04 a Lamina midvein length predominantly 10-17 cm AND base cuneate to obliquely cordate. **A. aff. maximowiczii** (Ulleungdo)
- b Lamina midvein length predominantly <12 cm. 05
- 05 a Lamina base predominantly cordate. **A. maximowiczii**
- b Lamina base cuneate, or rounded to (sub)cordate. **A. alnobetula**
- Lamina apex obtuse or obtuse to (sub-)acute.
- Lamina ovate to elliptic. **A. alnobetula** subsp. **crispa**
- Lamina broadly ovate or suborbicular. **A. alnobetula** subsp. **suaveolens**
- Lamina apex acute to acuminate.
- Secondary veins 4-8/side. **A. alnobetula** subsp. **alnobetula**
- Secondary veins 7-10/side.
- Base cuneate or cuneate to rounded. **A. alnobetula** subsp. **fruticosa**
- Base rounded to cordate.
- Margin irregularly coarsely dentate. **A. alnobetula** subsp. **sinuata**
- Margin rather regularly finely dentate. **A. manschurica**

GROUP B
Lamina secondary veins predominantly 10-15/side.
Lamina apex predominantly obtuse to acute or abruptly acute.

- 01 a Lamina margin (finely) dentate to lobulate, LS vein pattern craspedodromous - with secondary veins predominantly ending in teeth (10× LENS). 02
- b Lamina finely serrate, LS vein pattern semicraspedodromous - with secondary veins predominantly anastomosing before margin. 04
- 02 a Lamina margin predominantly densely and finely regularly dentate (rarely sub-lobulate).
..... **A. rhombifolia**
- b Lamina margin predominantly lobulate. 03
- 03 a Lamina margin +/- revolute (10× LENS). **A. rubra**
- b Lamina margin flat. **A. incana** subsp. **tenuifolia**
- 04 a Lamina LS venation glabrous to glabrescent with whitish hairs (10× LENS).
..... **A. cremastogyne**
- b Lamina LS venation +/- densely yellowish/rusty pubescent. 05
- 05 a Lamina L/W predominantly $\geq 2/1$ **A. ferdinandi-coburgii**
- b Lamina L/W predominantly $< 2/1$ **A. lanata**

GROUP C
Lamina secondary veins predominantly 10-15/side.
Lamina predominantly acute to acuminate or caudate.

- 01 a Lamina margin predominantly lobulate. 02
- b Lamina margin not lobulate. 04
- 02 a Primary teeth predominantly with proximal teeth only. **A. acuminata**
- Petiole and lamina LS glabrous. **A. acuminata** subsp. **glabrata**
- Petiole and/or lamina LS pubescent.
- Lamina margin rather regularly finely serrate. **A. acuminata** subsp. **acuminata**
- Lamina margin predominantly double serrate. **A. acuminata** subsp. **arguta**
- b Primary teeth dentate on both sides. 03
- 03 a Lamina margin +/- revolute (10× LENS). **A. rubra**
- b Lamina margin not revolute. **A. incana**
- Lamina margin predominantly coarsely dentate (only vigorous shoots +/- lobulate). **A. incana** subsp. **rugosa**
- Lamina margin predominantly lobulate.
- Lamina LS and petiole (densely) pubescent, base cuneate to (sub-)rounded. **A. incana** subsp. **incana**
- Lamina LS and petiole glabrous, base rounded or truncate to subcordate. **A. incana** subsp. **tenuifolia**
- 04 a Lamina base cordate, sometimes truncate to cordate. **A. subcordata**
- b Lamina base cuneate to rounded. 05

- 05 a Lamina margin predominantly shallowly distantly serrate to almost entire (10× LENS). 06
 b Lamina margin predominantly finely serrate to dentate (rarely +/- lobulate). 07
- 06 a Lamina LS secondary veins anastomosing before margin (10× LENS). *A. nepalensis*
 b Lamina LS secondary veins ending in tiny marginal teeth. *A. nitida*
- 07 a Lamina LS with regular dense (sub)parallel tertiary vein pattern (10× LENS). *A. acuminata*
 - Petiole and lamina LS glabrous. *A. acuminata* subsp. *glabrata*
 - Petiole and/or lamina LS pubescent.
 - Lamina margin rather regularly finely serrate. *A. acuminata* subsp. *acuminata*
 - Lamina margin predominantly double serrate. *A. acuminata* subsp. *arguta*
 b Lamina LS with rather irregular tertiary vein pattern. 08
- 08 a Lamina midvein length 12-30 cm and width 5-10 cm. *A. xspaethii*
 b Lamina midvein length 10-16 cm and width 3-7 cm. 09
- 09 a Lamina base rounded to broadly cuneate, US glabrous (10× LENS). *A. trabeculosa*
 b Lamina base cuneate, US pubescent. *A. xmayrii*

GROUP D

Lamina secondary veins predominantly 5-10/side.
 Lamina apex (at least in part of the foliage) +/- emarginate, OR margin halfway lobulate with lobes predominantly dentate on both sides (10× LENS).

- 01 a Apex emarginate. 02
 b Apex obtuse to acute (rarely acute to acuminate). 05
- 02 a Lamina LS vein axils glabrous, surface +/- greyish glaucous green. *A. matsumurae*
 b Lamina LS vein axils pubescent, surface (pale) green. 03
- 03 a Lamina irregularly lobulate to dentate. Stipules caducous. *A. glutinosa*
 - Lamina (broadly) obovate to (sub-)orbicular. Shoot, petiole and lamina LS glabrous with exception of vein axils.
 - Lamina LS vein axils conspicuously pubescent. *A. glutinosa* subsp. *barbata*
 - Lamina LS vein axils +/- slightly pubescent. *A. glutinosa* subsp. *glutinosa*
 - Lamina elliptic and/or apex obtuse to acute at least in part of the foliage.
 - Shoot, petiole and lamina LS rather glabrous. *A. glutinosa* subsp. *betuloides*
 - Shoot, petiole and lamina LS +/- pubescent. *A. xpubescens*
 b Lamina margin irregularly denticulate. Stipules long persistent. 04
- 04 a Lamina broadly obovate to orbicular obovate, surfaces very glossy. *A. fauriei*
 b Lamina broadly obovate, surfaces rather dull. *A. serrulatoides*
- 05 a Lamina margin revolute (10× LENS). *A. rubra*
 b Lamina margin flat. 06

- 06 a Lamina broadly ovate to orbicular, L/W often +/- 1/1. 07
 b Lamina (broadly) ovate to (broadly) elliptic, L clearly >W. 08
- 07 a Lamina midvein length predominantly ≤7cm, lobes acute. **A. inokumae**
 b Lamina midvein length predominantly >7 cm, lobes obtuse to acute. **A. hirsuta**
 - Shoot and lamina LS glabrous or pubescence restricted to venation. **A. hirsuta** subsp. **sibirica**
 - Shoot and lamina LS pubescent. **A. hirsuta** subsp. **hirsuta**
- 08 a Lamina (slightly) lobulate in part of the foliage, or finely regularly dentate. **A. rhombifolia**
 b Lamina predominantly lobulate, or coarsely (double) dentate in part. 09
- 09 a Shoot and lamina LS +/- pubescent, not glossy and sticky. **A. incana**
 - Lamina margin coarsely double serrate, only +/- lobulate on part of (vigorous) shoots. **A. incana** subsp. **rugosa**
 - Lamina distinctly lobulate. **A. incana** subsp. **incana**
 b Shoot and lamina LS glabrous, often glossy and sticky. 10
- 10 a Lamina marginal lobes 8-10/side. **A. incana** subsp. **tenuifolia**
 b Lamina marginal lobes 5-7/side. 11
- 11 a Lamina LS secondary vein axils glabrous (10× LENS). **A. glutinosa** subsp. **betuloides**
 b Lamina LS (at least in part of the foliage), with secondary vein axils pubescent. **A. orientalis**

GROUP E
 Lamina secondary veins predominantly 5-10/side.
 Lamina apex obtuse to acuminate **AND** margin serrulate to dentate,
OR IF slightly lobulate then with lobes dentate on proximal side only (10× LENS).

- 01 a Lamina base cordate (sometimes truncate to cordate). 02
 b Lamina base cuneate to rounded. 03
- 02 a Lamina ovate to heart-shaped, midvein length predominantly ≤10 cm. **A. cordata**
 b Lamina (broadly) ovate oblong, midvein length predominantly ≥10 cm. **A. subcordata**
- 03 a Lamina LS vein pattern semicraspedodromous - with secondary veins predominantly anastomosing before margin (10× LENS). **A. formosana**
 b Lamina LS vein pattern craspedodromous - with secondary veins predominantly ending in teeth. 04
- 04 a Lamina margin regularly densely serrulate to denticulate **AND** apical half with 3-5 secondary teeth between 2 primary teeth. 05
 b Lamina margin +/- coarsely dentate, **OR** +/- distantly serrate to denticulate **AND** apical half with 0-1(-2) secondary teeth between 2 primary teeth. 07
- 05 a Lamina predominantly ovate to elliptic. **A. rhombifolia**
 b Lamina predominantly elliptic to obovate. 06

06 a	Stipules long persistent.	A. serrulatoides
b	Stipules caducous.	A. serrulata
07 a	Lamina LS vein axils pubescent (10× LENS).	08
b	Lamina LS vein axils glabrous.	11
08 a	Shoot, petiole and lamina LS venation pubescent (10× LENS).	A. xmayrii
b	Shoot, petiole and lamina LS venation glabrous to initially slightly pubescent.	09
09 a	Lamina LS secondary veins often with tiny adpressed delta-shaped membranous domatia (10× LENS).	A. japonica
b	Lamina LS secondary veins without membranous domatia.	10
10 a	Lamina margin denticulate.	A. nitida
b	Lamina margin (at least in part of the foliage) coarsely dentate to lobulate.	A. orientalis
11 a	Lamina margin serrulate dentate to lobulate.	12
b	Lamina margin +/- distantly serrate to denticulate.	13
12 a	Lamina apex obtuse to acute, margin serrulate dentate.	A. maritima
b	Lamina apex acute to acuminate, margin dentate to lobulate.	A. jorullensis
13 a	Lamina LS secondary veins often with tiny adpressed delta-shaped membranous domatia - 10× LENS (fruiting aments few, 1-5).	A. japonica
b	Lamina LS secondary veins without membranous domatia (fruiting aments numerous, 5-13).	A. henryi

Taxa treated in this key.

- A. acuminata*
- subsp. *acuminata*
- subsp. *arguta*
- subsp. *glabrata*
- A. alnobetula*
- subsp. *alnobetula*
- subsp. *crispa*
- subsp. *fruticosa*
- subsp. *sinuata*
- subsp. *suaveolens*
- A. cordata*
- A. cremastogyne*
- A. fauriei*
- A. ferdinandi-coburgii*
- A. firma*
- A. formosana*
- A. glutinosa*
- subsp. *barbata*
- subsp. *betuloides*
- subsp. *glutinosa*
- A. henryi*
- A. hirsuta*
- subsp. *hirsuta*
- subsp. *sibirica*
- A. incana*
- subsp. *incana*
- subsp. *rugosa*
- subsp. *tenuifolia*
- A. inokumae*
- A. japonica*
- A. jorullensis*
- A. lanata*
- A. mandschurica*
- A. maritima*
- A. matsumurae*
- A. maximowiczii*
- A. aff. maximowiczii* (Ulleungdo)
- A. xmayrii* (*A. hirsuta* × *A. japonica*)
- A. nepalensis*
- A. nitida*
- A. orientalis*
- A. xpeculiaris* (*A. firma* × *A. pendula*)
- A. pendula*
- A. xpubescens* (*A. glutinosa* × *A. incana*)
- A. rhombifolia*
- A. rubra*
- A. serrulata*
- A. serrulatoides*
- A. sieboldiana*
- A. xspaeithii* (*A. japonica* × *A. subcordata*)
- A. subcordata*
- A. trabeculosa*

Taxa referred to synonymy in this key.

- A. firma* var. *multinervis* = *A. pendula*
- A. firma* var. *pendula* = *A. pendula*
- A. firma* var. *sieboldiana* = *A. sieboldiana*
- A. fruticosa* = *A. alnobetula* subsp. *fruticosa*
- A. hirsuta* var. *microphylla* = *A. inokumae*
- A. kamschatica* = *A. alnobetula* subsp. *sinuata*
- A. multinervis* = *A. pendula*
- A. rugosa* = *A. incana* subsp. *rugosa*
- A. sitchensis* = *A. alnobetula* subsp. *sinuata*
- A. tenuifolia* = *A. incana* subsp. *tenuifolia*
- A. viridis* = *A. alnobetula*
- A. viridis* subsp. *crispa* = *A. alnobetula* subsp. *crispa*
- A. viridis* subsp. *fruticosa* = *A. alnobetula* subsp. *fruticosa*
- A. viridis* subsp. *sinuata* = *A. alnobetula* subsp. *sinuata*
- A. viridis* subsp. *suaveolens* = *A. alnobetula* subsp. *suaveolens*

Remarks.

Several plants in collections under the name *Alnus jorullensis*, with numerous secondary veins usually belong to *A. acuminata*.

