



Ghent University Botanical Garden

*Alnus* Mill.

(Betulaceae-Betuloideae)

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

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

## 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. *betulooides*  
- 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. pendula*  
*A. xpubescens* (*A. glutinosa* × *A. incana*)  
*A. rhombifolia*  
*A. rubra*  
*A. serrulata*  
*A. serrulatooides*  
*A. sieboldiana*  
*A. xspaethii* (*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*.

