



Ghent University Botanical Garden

Ilex L. (Aquifoliaceae)

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

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Vegetative 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 evaluate leaf margin and pubescence in general.
- Look at the entire plant and especially the most healthy shoots.
Young specimens, shade and strong shoots give an atypical view.
- Beware of hybridisation, especially with plants raised from seed other than wild origin.

Taxa treated in this key: see page 8.

Taxa referred to synonymy: see page 8.

Questionable/frequently misapplied names: see page 8.

References:

- JDL herbarium
- living specimens, in various arboreta, botanic gardens and collections
- literature:

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

<http://www.arboretumwespelaar.be/EN>

KEY TO GROUPS

- 01 a Foliage deciduous: **GROUP A: see page 2**
- b Foliage evergreen: **02**
- 02 a Lamina apex AND/OR margin predominantly spinose or mucronate dentate **GROUP B.** **03**
- b Lamina apex and margin entire, OR dentate, but not spinose nor mucronate **GROUP C.** **04**
- 03 a Lamina L/W predominantly 2/1-4/1. **Group B1: see page 3**
- b Lamina L/W +/- 2/1 or ≤2/1. **Group B2: see page 4**
- 04 a Lamina apex acute to acuminate or caudate. **Group C1: see page 5**
- b Lamina apex obtuse or obtuse to acute. **Group C2: see page 6**

Taxa not readily catalogued in one group are keyed out in both groups of the couplet.

GROUP A: Foliage deciduous.

- 01 a Lamina LS tertiary veins and their reticulation obscure or only developed in (small) part of the surface (10× LENS). **02**
- b Lamina LS tertiary veins and their reticulation fully developed over the whole surface (10× LENS). **05**
- 02 a Lamina US pubescent with hairs (or remnants) scattered over surface (10× LENS). **03**
- b Lamina US glabrous or if pubescent then with hairs near midvein only (10× LENS). **04**
- 03 a Lamina LS and petiole glabrous. ***I. asprella***
- b Lamina LS and petiole pubescent. ***I. cuthbertii***
- 04 a Lamina midvein length often 5-10 cm. ***I. decidua***
- b Lamina midvein length <5 cm. ***I. curtisii***
- 05 a Lamina LS glabrous (10× LENS). **06**
- b Lamina LS predominantly pubescent (10× LENS). **11**
- 06 a Lamina US pubescent with hairs (or remnants) scattered over surface (10× LENS).
..... ***I. phyllobolos***
- b Lamina US glabrous or if pubescent then with hairs near midvein only (10× LENS). **07**
- 07 a Lamina margin entire or with a few tiny teeth near apex (10× LENS). ***I. mucronata***
- b Lamina margin dentate or denticulate (10× LENS). **08**
- 08 a Lamina elliptic to obovate, base predominantly cuneate. ***I. laevigata***
- b Lamina predominantly ovate, base predominantly rounded to broadly cuneate. **09**

- 09 a Lamina midvein length 5-7 cm, margin clearly dentate. *I. macropoda*
 b Lamina midvein length often 7-12 cm, margin finely denticulate (10× LENS). 10
- 10 a Lamina margin with teeth spreading (10× LENS). *I. macrocarpa*
 b Lamina margin with teeth strictly pointed forward (10× LENS). *I. kusanoi*
- 11 a Lamina ovate, largest width clearly below the middle. *I. geniculata*
 b Lamina predominantly elliptic or variable from ovate and elliptic to obovate. 12
- 12 a Lamina apex obtuse to acute. 13
 b Lamina apex acute to acuminate. 14
- 13 a Lamina LS pubescence scattered along the midvein and secondary veins (10× LENS).
 *I. phyllobolos*
 b Lamina LS densely pubescent (10× LENS). *I. amelanchier*
- 14 a Petiole ≤10 mm. *I. serrata*
 b Petiole 8-15 mm. 15
- 15 a Petiole glabrous (10× LENS). *I. collina*
 b Petiole pubescent (10× LENS). 16
- 16 a Lamina apex predominantly flat, margin dentate to doubly dentate with 2-3(-more)
 teeth/cm (10× LENS). *I. verticillata*
 b Lamina apex often induplicate, margin remotely dentate with 1-2 teeth/cm (10× LENS).
 *I. longipes*

GROUP B: Foliage evergreen.

Lamina apex AND/OR margin predominantly spinose or mucronate dentate.

Group B1: Lamina L/W predominantly 2/1-4/1.

- 01 a Lamina width predominantly >5 cm. 02
 b Lamina width predominantly <5 cm. 03
- 02 a Bud and shoot green. Lamina margin with 20-30 teeth/side. *I. latifolia*
 b Bud reddish brown, shoot soon greyish. Lamina margin with <20 teeth/side. *I. kingiana*
- 03 a Lamina apex predominantly induplicate. 04
 b Lamina apex flat. 05
- 04 a Dentate lamina margin with (few) teeth only above apical half. *I. cassine*
 b Dentate lamina margin with teeth also beyond apical half. *I. rubra*

- 05 a Petiole <2 mm. *I. georgei*
- b Petiole 4-10(-more) mm. 06
- 06 a Lamina margin predominantly dentate at least in apical half, with tiny teeth/spines all strictly pointed forward. 07
- b Lamina margin variably entire (adult stage) to spinose dentate with teeth spreading or spreading to pointed forward. 08
- 07 a Angle secondary vein/midvein $\geq 45^\circ$, petiole purple. *I. hookeri* Hort.
- b Angle secondary vein/midvein $\leq 45^\circ$, petiole green. *I. fargesii*
- Lamina L/W 3/1-8/1, secondary veins 6-8(-more)/side. *I. fargesii* subsp. *fargesii*
- Lamina L/W 2/1-3/1, secondary veins ≤ 6 /side. *I. fargesii* subsp. *fargesii* var. *brevifolia*
- 08 a Lamina always dentate with predominantly 2-5 teeth/side. 09
- b Lamina variable entire (adult stage, sometimes only a few shoots present) or dentate with 5-12 (-more) teeth/side. 10
- 09 a Lamina margins dentate with large teeth 2-7 mm (spine included). *I. colchica*
- b Lamina margin dentate with tiny teeth 2-3 mm (spine included). *I. ciliospinosa*
- 10 a Lamina rigid and thick, US dull green, petiole ≤ 7 mm. *I. dipyrena*
- b Lamina supple leathery, US glossy green, petiole 7-12 mm. *I. corallina*

Group B2: Lamina L/W +/- 2/1 or $\leq 2/1$.

- 01 a Lamina margin at least in part of the foliage entire, OR with tiny teeth separated by small narrow sinuses. 02
- b All lamina margins with large teeth separated by large sinuses. 05
- 02 a Lamina midvein length <4 cm. *I. dimorphophylla*
- b Lamina midvein length 4-12(-more) cm. 03
- 03 a Lamina US glossy green. *I. aquifolium*
- b Lamina US dull green. 04
- 04 a Lamina margin partly entire or dentate with teeth directed forward to sideward. ... *I. opaca*
- b Lamina margin entire or dentate with teeth +/- appressed to directed forward. ... *I. perado*
- Lamina +/- orbicular to broadly ovate or broadly elliptic. Midvein length predominantly 3-6 cm. *I. perado* subsp. *azorica*
- Lamina ovate to elliptic or oblong. Midvein length 6-18 cm.
- Lamina midvein length and width predominantly $\leq 10 \times 6$ cm. *I. perado* subsp. *perado*
- Lamina midvein length and width predominantly $\geq 10 \times 6$ cm. *I. perado* subsp. *platyphylla*

05 a	Lamina apical 1/5-1/2 part entire.	06
b	Lamina apical 1/8-1/5 part entire.	07
06 a	Lamina angular (broadly) ovate, margin with 2-6 teeth/side.	<i>I. bioritsensis</i>
b	Lamina pentagonal, margin with 2(-3) teeth/side.	<i>I. pernyi</i>
07 a	Lamina rectangular.	08
b	Lamina ovate to elliptic or obovate.	09
08 a	Lamina midvein length <4 cm, margin dentate with 4-6 teeth/side.	<i>I. dimorphophylla</i>
b	Lamina midvein length 4-10 cm, margin dentate with 2(-4) teeth/side.	<i>I. cornuta</i>
09 a	Lamina US dull green.	<i>I. opaca</i>
b	Lamina US glossy green.	10
10 a	Lamina secondary veins 6-8/side.	<i>I. aquifolium</i>
b	Lamina secondary veins predominantly 3-5(-6)/side.	11
11 a	Lamina margin flat to slightly undulate, regularly dentate with 3 mm teeth directed forward.	<i>I. colchica</i>
b	Lamina margin undulate, coarsely +/- irregularly dentate with 3-7 mm teeth directed sideward, sometimes deflected.	<i>I. spinigera</i>

GROUP C: Foliage evergreen.

Lamina apex and margin entire, OR dentate, but not spinose nor mucronate.

Group C1: Lamina apex acute to acuminate or caudate.

01 a	Lamina margin entire.	02
b	Lamina margin serrate.	06
02 a	Lamina US midvein clearly raised.	03
b	Lamina US midvein impressed.	04
03 a	Lamina midvein length 5-15 cm, secondary veins 10-16/side.	<i>I. linii</i>
b	Lamina midvein length <5 cm, secondary veins ≤6/side.	<i>I. hayatana</i>
04 a	Lamina apex variable: acute to acuminate.	<i>I. mitis</i>
b	Lamina apex acuminate to caudate.	05
05 a	Lamina flat, base cuneate.	<i>I. rotunda</i>
b	Lamina undulate, base rounded.	<i>I. pedunculosa</i>

06 a	Lamina apex predominantly abruptly narrowly caudate, acumen L/W 2/1-3/1.	07
b	Lamina apex acute to acuminate or gradually caudate, acumen L/W \leq 2/1.	08
07 a	Current year shoot US and petioles purplish brown.	<i>I. brachyphylla</i>
b	Current year shoot US and petioles green.	<i>I. ficoidea</i>
08 a	Lamina width predominantly >5 cm.	<i>I. latifolia</i>
b	Lamina width predominantly <5 cm.	09
09 a	Lamina margin entire to serrate in apical 2/3.	10
b	Lamina margin serrate or crenate from apex to near base.	11
10 a	Lamina margin entire or with a few serrations in apical half.	<i>I. mitis</i>
b	Lamina margin serrate in apical 2/3.	<i>I. fargesii</i>
11 a	Lamina margin finely serrate with 20-40 teeth/side.	<i>I. melanotricha</i>
b	Lamina margin rather distantly serrate, predominantly with <20 teeth/side.	12
12 a	Current year shoot US green to purplish brown.	<i>I. corallina</i>
b	Current year shoot US green to brown.	13
13 a	Current year shoot soon brown/woody. Angle secondary vein/midvein 45°.	<i>I. purpurea</i>
b	Current year shoot green. Angle secondary vein/midvein >50°.	<i>I. cyrta</i>

Group C2: Lamina apex obtuse to acute.
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01 a	Lamina margin predominantly with \leq 6 teeth/side in apical half, <u>OR</u> entire at least in part of the leaves (10 \times LENS!).	02
b	Lamina margin predominantly serrate to crenate from apex to near base (10 \times LENS!). .	08
02 a	Petiole predominantly 7-12(-20) mm.	03
b	Petiole predominantly \leq 6 mm.	05
03 a	Current year shoot not grooved. Lamina margin flat.	<i>I. integra</i>
b	Current year shoot longitudinally grooved. Lamina margin recurved.	04
04 a	Lamina LS: angle secondary vein/midvein <45°.	<i>I. leucoclada</i>
b	Lamina LS: angle secondary vein/midvein >50°.	<i>I. canariensis</i>
05 a	Lamina US midvein pubescent (10 \times LENS).	<i>I. sugerokii</i>
b	Lamina US midvein glabrous (10 \times LENS).	06
06 a	Lamina apex obtuse to rounded.	<i>I. crenata</i>
b	Lamina apex acute.	07

07 a	Lamina margin dentate with teeth acumen shortly triangular (10× LENS).	<i>I. glabra</i>	
	b Lamina margin dentate with teeth acumen clearly elongated (10× LENS).	<i>I. coriacea</i>	
08 a	Lamina LS secondary veins ≥8/side (10× LENS).		09
	b Lamina LS secondary veins <8/side (10× LENS).		10
09 a	Lamina obovate, apex rounded or obtuse.	<i>I. paraguariensis</i>	
	b Lamina elliptic, apex acute.	<i>I. tolucana</i>	
10 a	Lamina LS secondary veins clearly visible (10× LENS).		11
	b Lamina LS secondary veins obscure (10× LENS).		14
11 a	Present year shoot warty to corky (10× LENS).	<i>I. nothofagifolia</i>	
	b Present year shoot different (10× LENS).		12
12 a	Lamina US rugose (10× LENS).	<i>I. rugosa</i>	
	b Lamina US smooth (10× LENS).		13
13 a	Lamina LS glabrous (10× LENS).	<i>I. vomitoria</i>	
	b Lamina LS pubescent at least on midvein (10× LENS).	<i>I. discolor</i>	
14 a	Lamina LS scattered punctate or gland dotted (10× LENS).		15
	b Lamina LS not punctate nor gland dotted (10× LENS).		16
15 a	Lamina margin predominantly dentate with 2-5(-10) teeth/side (10× LENS).	<i>I. crenata</i>	
	b Lamina margin often dentate with 10-20 teeth/side (10× LENS).	<i>I. triflora</i> var. <i>kanehirae</i>	
16 a	Current year shoot grey-brown/woody, densely hairy with long hairs (10× LENS).	<i>I. yunnanensis</i>	
	b Current year shoot green, minutely pubescent (10× LENS).	<i>I. shennongjiaensis</i>	

Taxa treated in this identification key.

In order to prevent disorder in the key, hybrids are strictly excluded due to their often extreme variability.

<i>I. amelanchier</i>	<i>I. laevigata</i>
<i>I. aquifolium</i>	<i>I. latifolia</i>
<i>I. asprella</i>	<i>I. leucoclada</i>
<i>I. bioritsensis</i>	<i>I. linii</i>
<i>I. brachyphylla</i>	<i>I. longipes</i>
<i>I. canariensis</i>	<i>I. macrocarpa</i>
<i>I. cassine</i>	<i>I. macropoda</i>
<i>I. ciliospinosa</i>	<i>I. melanotricha</i>
<i>I. colchica</i>	<i>I. mitis</i>
<i>I. collina</i>	<i>I. mucronata</i>
<i>I. corallina</i>	<i>I. nothofagifolia</i>
<i>I. coriacea</i>	<i>I. opaca</i>
<i>I. cornuta</i>	<i>I. paraguariensis</i>
<i>I. crenata</i>	<i>I. perado</i>
<i>I. curtisii</i>	- var. <i>azorica</i>
<i>I. cuthbertii</i>	- var. <i>perado</i>
<i>I. cyrtura</i>	- var. <i>platyphylla</i>
<i>I. decidua</i>	<i>I. pedunculosa</i>
<i>I. dimorphophylla</i>	<i>I. pernyi</i>
<i>I. dipyrena</i>	<i>I. phyllobolos</i>
<i>I. discolor</i>	<i>I. purpurea</i>
<i>I. fargesii</i>	<i>I. rotunda</i>
- subsp. <i>fargesii</i> var. <i>brevifolia</i>	<i>I. rubra</i>
- subsp. <i>fargesii</i> var. <i>fargesii</i>	<i>I. rugosa</i>
<i>I. ficoidea</i>	<i>I. serrata</i>
<i>I. geniculata</i>	<i>I. shennongjiaensis</i>
<i>I. georgei</i>	<i>I. spinigera</i>
<i>I. glabra</i>	<i>I. sugerokii</i>
<i>I. hayatana</i>	<i>I. toluca</i>
<i>I. hookeri</i> Hort.	<i>I. triflora</i> var. <i>kanehirae</i>
<i>I. integra</i>	<i>I. verticillata</i>
<i>I. kingiana</i>	<i>I. vomitoria</i>
<i>I. kusanoi</i>	<i>I. yunnanensis</i>

Taxa referred to synonymy in this identification key.

I. centrochinensis = *I. corallina*
I. pernyi var. *veitchii* = *I. bioritsensis*

Questionable/frequently misapplied names.

Plants in collections under the name *Ilex buergeri* and *I. triflora* with caudate leaf apex and glabrous shoots are *I. ficoidea*. Plants in collections under the name *I. hookeri* are at least in part *I. dipyrena* and *I. kingiana*. But several plants under the name *I. hookeri* and *I. insignis* with elongated leaves (longer and with more veins than *I. dipyrena*, and narrower than *I. kingiana*), with tiny spinulose teeth pointed forward are maybe something else and temporarily named here *I. hookeri* HORT.

