Ulmaceae

_Hemiptelea_ Planch.
_Planera_ J.F.Gmel.
_Ulmus_ L.
_Zelkova_ Spach

VEGETATIVE KEY TO SPECIES IN EUROPEAN CULTIVATION

Jan De Langhe

(2 September 2013 - 7 April 2016)
Vegetative identification key.

**Introduction:**

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

- Use a 10× hand lens to evaluate leaf margin and pubescence in general.
- Look at the entire plant. 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 5.

**Names referred to synonymy:** see page 5.

**References:**

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

  Krüssmann, G. - (1977-1978) - Ulmaceae in Handbuch der Laubgehölze, 3 vol.

**Acknowledgments:**

I am particularly grateful to Wolfgang Bopp, Koen Camelbeke, Dan Crowley, Hans Heybroek, Tom Hudson, David Jewell, Owen Johnson, Tony Kirkham, Dan Luscombe, Ronnie Nijboer, Joke Ossaer, Paul Reader and Bruno Van Puijenbroek for extra help with constructive comments and specimens.

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http://www.plantentuin.ugent.be

http://www.arboretumwespelaar.be/EN
KEY TO GENERA

01 a Short shoots partly developed into thorns up to 10 cm long.  
genus Hemiptelea ................................................................................. H. davidii  
b Short shoots never thorny. ............................................................. 02

02 a Lamina predominantly ovate AND LS secondary veins predominantly strongly forking before reaching margin (to the naked eye). genus Planera ......................................................... P. aquatica  
b Lamina elliptic to obovate or ovate to elliptic AND LS secondary veins not or partially strongly forking before reaching margin (to the naked eye). ........................................ 03

03 a Lamina LS margin at mid-leaf predominantly without teeth between secondary veins (10× LENS). ........................................................ ........................................................... genus Zelkova  
b Lamina LS margin at mid-leaf with 0-1 or 1-several teeth between secondary veins and stronger forks (10× LENS). ........................................................ ........................................................... genus Ulmus: see page 3

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genus Zelkova

01 a Lamina of well developed leaves on vegetative shoots with 9-15 teeth/side. .................. 02  
b Lamina of well developed leaves on vegetative shoots with 3-8 teeth/side. .................. 04

02 a Lamina apex subacute to acute. ................................................................. Z. carpinifolia  
b Lamina apex acute to acuminate or almost caudate. ................................................................. 03

03 a Petiole and lamina LS clearly pubescent at least on midvein and secondary veins (10× LENS). ............................................................................................................................... Z. schneideriana  
b Petiole and lamina LS predominantly glabrous, except vein axils (10× LENS). ... Z. serrata

04 a Petiole short: 2-4 mm. .................................................................................. 05  
b Petiole long: 5-10 mm. .................................................................................. 06

05 a Lamina margin predominantly with 3-4(-5) veins ending in teeth/side. ............ Z. abelicea  
b Lamina margin predominantly with 4-6(-7) veins ending in teeth/side. ............ Z. sicula

06 a Lamina margin serrate-dentate, teeth curved forward. ......................................... Z. sinica  
b Lamina margin coarsely dentate, teeth triangular with apex +/- straight. . Z. ×verschaffeltii
KEY TO GROUPS

Lamina secondary veins predominantly 11-16(-more)/side (exclude veins ending in apex, avoid strong growth). .......................................................... Group 1

Lamina secondary veins predominantly 6-12/side (exclude veins ending in apex, avoid strong growth). .......................................................... Group 2: see page 4

GROUP 1
Lamina secondary veins predominantly 11-16(-more)/side.

01 a Lamina apex acute. .......................................................................................................................................................... 02

    b Lamina apex acute to acuminate or caudate. ..................................................................................................................... 03

02 a Lamina apex acute to (sub-)obtuse, LS margin at mid-leaf serrate to weakly biserrate = predominantly with 0-1 rather blunt tooth between secondary veins and stronger forks (10× LENS). .............................................................. *U. parvifolia*

    b Lamina apex acute, LS margin at mid-leaf clearly biserrate = predominantly with 2-3(-more) acute teeth between secondary veins and stronger forks (10× LENS). ...... *U. villosa*

03 a Lamina LS predominantly without large secondary vein forks. ................................................................. 04

    b Lamina LS predominantly with several large secondary vein forks. ........................................................... 05

04 a Lamina US rough to the touch, LS longer side base with 1-2 extra secondary veins.
.................................................................................................................................................................................. *U. americana*

    b Lamina US rather soft to the touch, LS longer side base with 3-4 extra secondary veins.
.................................................................................................................................................................................. *U. laevis*

05 a Petiole predominantly short: 2-4 mm AND base often clearly asymmetrical with longer side often overlapping/concealing petiole. .......................................................... 06

    b Petiole predominantly (much) longer, OR base different. ................................................................. 07

06 a Lamina apical half often with 1-3 caudate lobes/side. ................................................................. *U. laciniata*

    b Lamina apical half predominantly without caudate lobes. ................................................................. *U. glabra*

07 a Lamina US pubescent with long hairs (10× LENS). ................................................................. *U. chenmouei*

    b Lamina US glabrous (10× LENS). ......................................................................................................................... 08

08 a Petiole rather short 3-6 mm AND apex caudate. ................................................................. *U. uyematsui*

    b Petiole rather long: 6-12 mm, apex acute to acuminate. ................................................................. 09
09 a Lamina LS margin at mid-leaf predominantly with 2-3(-4) secondary teeth between secondary veins and stronger forks (10× LENS). ................................................................. 10

b Lamina primary teeth at mid-leaf predominantly without or with 1-2 secondary teeth between secondary veins and stronger forks (10× LENS). ................................................................. 11

10 a Shoot rather thick, Ø ≥2 mm. Lamina L/W <2/1. .................................................. U. wallichiana

b Shoot rather thin, Ø ≤1,5 mm. Lamina L/W >2/1. .................................................. U. minor

11 a Lamina midvein length 4-12 cm, ovate to obovate. ........................................... U. davidiana

b Lamina midvein length 8-15 cm, oblong ovate to oblong obovate. ........ U. castaneifolia

<table>
<thead>
<tr>
<th>GROUP 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamina secondary veins predominantly 6-12/side.</td>
</tr>
</tbody>
</table>

01 a Lamina midvein length predominantly 3-8 cm, base slightly asymmetrical AND petiole ≤3 mm. ............................................................................................................ 02

b Lamina midvein length predominantly 8-18 cm, OR petiole 3-12 mm, OR lamina base clearly asymmetrical. ................................................................. 03

02 a Lamina apex predominantly rounded to obtuse, rarely acute. .................... U. crassifolia

b Lamina apex acute to slightly acuminate. .................................................. U. alata

03 a Lamina midvein length often 10-18 cm AND petiole 2-4 mm AND base often clearly asymmetrical with longer side often overlapping/concealing petiole. ......................... 04

b Lamina midvein length predominantly 4-10 cm, OR petiole 3-12 mm, OR lamina base different. ............................................................................................. 06

04 a Lamina apical half often with 1-3 caudate lobes/side. ............................ U. laciniata

b Lamina apical half predominantly without caudate lobes. .......................... 05

05 a Lamina margin fimbriate (10× LENS!!). ......................................................... U. elliptica

b Lamina margin not fimbriate (10× LENS!!). .................................................. U. glabra

06 a Lamina LS margin at mid-leaf serrate to weakly biserrate = predominantly with 0-1 tooth between 2 secondary veins and stronger forks (10× LENS). .................................................. 07

b Lamina LS margin at mid-leaf clearly biserrate = predominantly with 1-2(-more) teeth between secondary veins and stronger forks (10× LENS). .................................................. 10

07 a Lamina obovate to broadly obovate or orbicular. ....................................... 08

b Lamina ovate to elliptic or elliptic to obovate. ............................................. 09

08 a Bark fissured. Lamina broadly obovate to orbicular. ............................... U. macrocarpa

b Bark flaky. Lamina obovate. .......................................................................... U. lamellosa

09 a Lamina apex acute to acuminate, LS large secondary vein forks 0-3/side. .... U. pumila

b Lamina apex obtuse to acute, LS large secondary vein forks 3-5(-more)/side. U. parvifolia
10 a Lamina margin fimbriate (10× LENS!!!). ................................................................. 11

b Lamina margin not fimbriate (10× LENS!!!). ............................................................... 12

11 a Lamina LS margin at mid-leaf with 1-2 teeth between 2 secondary veins and stronger forks (10× LENS). ................................................................. U. canescens

b Lamina LS margin at mid-leaf with 2-3(-4) teeth between 2 secondary veins and stronger forks (10× LENS). ................................................................. U. rubra

12 a Present year shoot glabrous or glabrescent (10× LENS). ........................................... U. minor

b Present year shoot pubescent (10× LENS). ..................................................................... 13

13 a Lamina ovate to suborbicular, apex acute. ................................................................. U. minor

b Lamina ovate to obovate, apex acuminate. ................................................................. U. davidiana

Taxa treated in this identification key:

<table>
<thead>
<tr>
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<th>Synonym</th>
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<tr>
<td>Hemiptelea davidii</td>
<td>Ulmus minor</td>
</tr>
<tr>
<td>Planera aquatica</td>
<td>Ulmus parvifolia</td>
</tr>
<tr>
<td>Ulmus alata</td>
<td>Ulmus pumila</td>
</tr>
<tr>
<td>Ulmus americana</td>
<td>Ulmus rubra</td>
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<tr>
<td>Ulmus canescens</td>
<td>Ulmus villosa</td>
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<td>Ulmus castaneifolia</td>
<td>Ulmus wallachiana</td>
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<td>Ulmus chenouei</td>
<td>Zelkova abelicea</td>
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<tr>
<td>Ulmus crassifolia</td>
<td>Zelkova carpinifolia</td>
</tr>
<tr>
<td>Ulmus davidiana</td>
<td>Zelkova schneideriana</td>
</tr>
<tr>
<td>Ulmus elliptica</td>
<td>Zelkova serrata</td>
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<td>Ulmus glabra</td>
<td>Zelkova sicula</td>
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<tr>
<td>Ulmus lacinata</td>
<td>Zelkova sinica</td>
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<tr>
<td>Ulmus laevis</td>
<td>Zelkova × verschaffeltii (Z.carpinifolia × Z.serrata)</td>
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<tr>
<td>Ulmus lamellosa</td>
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<tr>
<td>Ulmus macrocarpa</td>
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Names referred to synonymy:

<table>
<thead>
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<th>Taxon</th>
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<tbody>
<tr>
<td>Ulmus celtidea = U. laevis</td>
<td>Ulmus multinervis = U. castaneifolia</td>
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<tr>
<td>Ulmus campestris = U. minor</td>
<td>Ulmus plotii = U. minor</td>
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<tr>
<td>Ulmus carpinifolia = U. minor</td>
<td>Ulmus procera = U. minor</td>
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<td>Ulmus densa = U. minor</td>
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