

# The elms of Co Cork- a survey of species, varieties and forms

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## Abstract

In a survey of the elms in County Cork, Ireland, some 50 single trees, groups of trees and populations were examined. Four main taxa were recognised, these being wych elm, Cornish elm, Coritanian elm and Dutch elm plus a number of ambiguous hybrids. While a large overall number of elms were found, the number of mature or even ancient elms is relatively small. Still, there are sufficient numbers of elms in the county to base a future elm protection programme on.

## Keywords

*Ulmus*, wych elm, field elm, hybrid elm, Dutch elm disease.

## Introduction

Elm taxonomy is known to be notoriously difficult. For the British Isles there are many different concepts, varying between just two elm species and more than one hundred so-called microspecies (Richens 1983, Armstrong 1992, Armstrong and Sell 1996).

The main reason for the difficulty with elm taxonomy lies in the fact that the variability within the genus is extreme. This is especially true for the group of elms we know under the name field elm. As a result, there is no generally accepted system for classification of the elms of the world. Some British researchers claim to host up to eight elm species in their country (Melville 1975, Clapham et al. 1987, Stace 1997).

The approach taken here follows the lines being drawn by Richard H. Richens (1983) who followed a fairly simple strategy. He assumed that there are just two species of elms present in the British Isles, the native wych elm, *Ulmus glabra* and the introduced field elm, *U. minor*. According to Richens the latter has a number of varieties, five in total, and both species hybridise to form the hybrid elm, *U. x hollandica*. Up to this point this is a practical concept. Unfortunately, for taxonomists, every individual within the *U. minor* – *U. x hollandica* – *U. glabra* group is able to hybridise again with every other member of the group, which results in a great range of morphological forms.

Based on studies on biochemical and genetic variation, modern researchers propose that wych and field elm are not two separate species at all (Machon et al 1995, 1997, Goodall-Copestake et al 2005). Evidence from several studies showed a continuity in variation for the respective features investigated. Consequently, these two forms, wych elm, *U. glabra* and field elm, *U. minor* may be considered as being at the extreme and opposite ends of a very variable single species – probably to be called *Ulmus campestris* L. We are not able to find the discontinuity of characters

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that would sufficiently define a species (Mackenthun 2003, Goodall-Copestake et al. 2005).

This study undertakes the task to shed some light onto the various forms of elms that may be found in Co Cork. Not every finding may be in line with current taxonomic knowledge but the study aims to give an idea of the scope of elms in the area. Considering the complicated taxonomy of elms one might expect an impenetrable jumble of elm populations in Co Cork. This is not so. The clearer forms can be defined and those individuals that bridge the gaps between one form and the other can be identified.

### **Materials and methods**

As already pointed out the overall objective of this study was not to produce a map of elm distribution in Co Cork. Rather, it seeks to give an impression of the range of species, varieties and forms of elms in the County.

Therefore, it was not necessary to scan the whole area but to go to places where the occurrence of elms was most likely: Natural and semi-natural woodlands, the wider river valleys (Rivers Bandon, Blackwater and Lee), the coastline, cemeteries and the gardens of stately homes. Furthermore, the knowledge of local people was utilised, for example employees of the Heritage department of Cork County Council. And while travelling through the County every elm of at least some importance was noted.

The identification of elms is based on two key sets of data.

First, pictures were taken of all trees under investigation in late spring 2006. They document their growth habit and their silhouette. Many British researchers base their system of elm species and varieties on the overall shape of the tree, especially its crown (e.g. Jobling and Mitchell 1974). In Co Cork, however, we find that many elms are not solitary, mature, well-shaped individuals but very often grow in hedgerows, in little woods where their growth may be suppressed by other trees. So, while the silhouette of a single tree is of good diagnostic value, it may not be clearly visible in every case. In some cases – like the majestic Castletownbere elm – it was used to identify a tree.

Second, during the following summer, leaf samples were collected from every elm that had been visited before. An additional excursion to the Gearagh was made by Chris Eiscle in June 2007 to count elms and to collect leaf samples as described below. There is now a collection of leaf samples of nearly 50 trees which form the base for elm identification in this study.

Other characters which may provide useful hints to the designation of an elm are the flowers and fruits, for example. Characters of the bark are of good diagnostic value as long as trees of the same girth are compared. The bark varies a lot during the lifetime of a tree and only with luck a pair with similar dimensions may be found to allow for proper description and identification.

One particular character is indeed very helpful for the identification of elms: corky ridges on young twigs – so called ‘winged twigs’. This is a clear hint towards field elm. But missing ridges may not lead to the conclusion that the tree in question is not a field elm.

Leaf characters were the main tools used for the identification of the elms in this study. When comparing elms, only mature leaves from the mature tree crown should be used. Leaves from shoots, suckers, from young individuals or from stumps are of little diagnostic value. It is best practice to use only the second leaf of a short shoot from the mature tree crown. Very often, however, these leaves are not available and the researcher has to work with what is at hand. For this study fairly uniform leaf samples which showed consistent characters were collected so that comparisons between elm populations could be made more feasible.

Elm leaves generally share a set characters as follows:

- they are simple (as opposed to compound leaves) and they are not lobed (like maple);
- the leaf margin is serrate (as opposed to entire), each larger tooth has 1 to 3 smaller teeth – so the margin is in fact doubly serrate;
- the lowest part of the lamina where the leaf margins join the petiole is usually asymmetric.

But the specific formation of leaf characters may disclose fine distinctions:

- the leaves can have many different overall forms from nearly round to very narrow;
- the leaves can be large (8 to 14 cm long), intermediate (6 to 10 cm) or small (4 to 6 cm);
- the leaf lamina can be wide (5 to 8 cm across) or narrow (2 to 3 cm);
- the tips of the teeth of the serrate leaf margins may be acuminate (Figure 1 (a)) or blunt (Figure 1 (b)).

The asymmetry of the leaf may express itself in different ways:

- both leaf margins join the petiole at the same point but the larger half of the lamina forms a lobe covering a part of the petiole (Figure 1 (c));
- both leaf margins join the petiole at the same point and the two halves of the lamina are just of different size (Figure 1 (d));
- both leaf margins join the petiole at different points but the distance between these two points is relatively short (Figure 1 (e));
- both leaf margins join the petiole at different points and the distance between these two points is relatively long (Figure 1 (f));
- the petiole and the midrib of the leaf is not straight but bent, leading to an extreme asymmetry in the lower part of the leaf (Figure 1 (g)).

This set of characters should be sufficient to identify the elms of Co Cork. But, as was said before, a wide range of intermediate forms occur.

## Results

### *Species, varieties, cultivars and types of elms*

In the course of the study four more or less distinct taxa were found: *Ulmus glabra* (wych elm), *U. minor* var. *cornubiensis* (Cornish elm), *U. minor* var. *coritana* (Coritanian elm) and *U. x hollandica* (Dutch elm). All four taxa display various forms of variability in leaf characters so that the overall number of discernible entities is 13. The taxonomical status of each of these entities needs to be discussed.

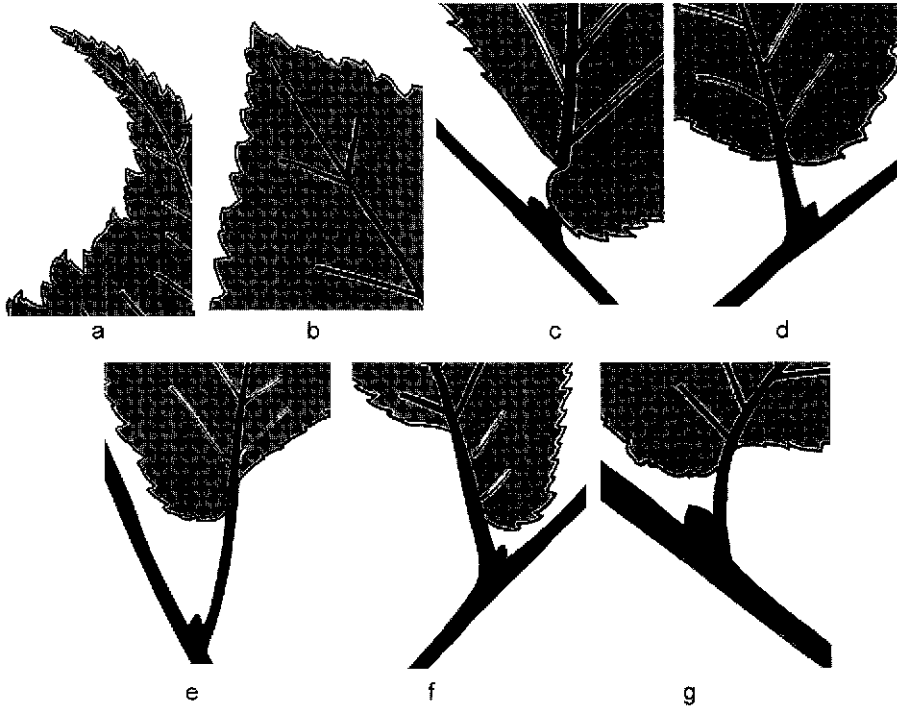


Figure 1: Leaf characteristics of elm species - (a): acuminate teeth at the leaf margin, (b): blunt teeth at the leaf margin, (c): lobe covering the petiole, (d) leaf margins join the petiole at the same point, (e) leaf margins join the petiole at different points (short distance between points), (f) leaf margins join the petiole at different points (long distance between points), (g) bent petiole and midrib.

### *Ulmus glabra* (wych elm)

The leaves of *U. glabra* are large, 8 to 14 cm long, 5 to 8 cm wide (the product of length x width being > 28), their form is ovate, the widest part of the leaf is shifted towards the tip, the upper surface of the leaf is very rough, the leaf margin is sharply serrate, some leaves tend to have multiple leaf tips, the vein-pits are densely pubescent, the lowest part of the lamina is normally nearly symmetrical – but very asymmetrical variants occur – the larger half forms a lobe covering the petiole.

The typical form with a fairly symmetrical base of the leaf-blade occurs at relatively few locations (Figure 2): Ahakista (mid-town), Ballineen (western part of town), Ballyally (coastguard station), Baltimore (Glebe Garden), Glengarriff (near Lady Bantry Bridge), Macroom (Crow Wood – three examples, each with a girth of around 100 cm at breast height, were found here).

An atypical form with a distinct asymmetrical lower part of the leaf-blade was found at Baltimore (Glebe Garden) and Letter Lower (Figure 3). Multiple tips of the leaf may or may not occur in both forms.

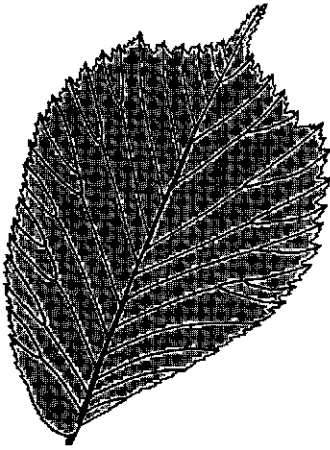


Figure 2: Leaf form of wych elm – typical form, approximately half natural size.

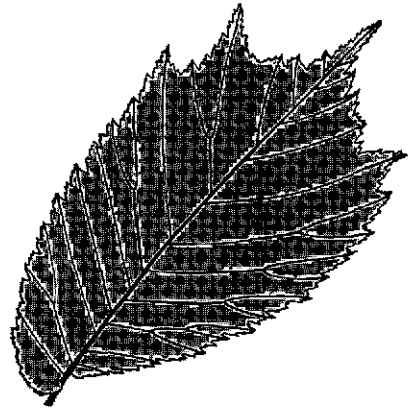


Figure 3: Leaf form of wych elm – atypical form, approximately half natural size.

#### *Ulmus minor* (field elm)

Traditionally, this elm species is sub-divided into five different varieties, one of them is found in Co Cork. Additionally, a second form of *U. minor* seems to be present.

#### *Ulmus minor* var. *cornubiensis* (Cornish elm)

The leaves are small, 4 to 6 cm long, 2 to 3 cm wide (the product of length x width being < 28), the leaves are ovate to rhombic, the lower part of the leaf-blade is rather symmetrical – variants with a very asymmetrical lower part of the leaf-blade occur, both leaf-margins join the petiole at the same point, the upper leaf surface is normally smooth, the leaf-margins are pointedly serrate.

The typical form with a rather symmetric leaf and a smooth upper leaf surface (Figure 4) was found at the following locations: Ahakista (western part of village), Ahakista (near the coast), Ardnagashel (eastern part of village), Bandon River (near Gurteen crossing), Bantry (near the road to Careagh), Bantry (Clashduff House), Castletownbere (cemetery, the champion tree with a girth of 450 cm), Castletownbere (cemetery, several other individuals of smaller size), Crookhaven (coast line opposite town), Dunbeacon (Carberry Home), Goleen (cemetery), Gurteen (Bandon River), Innishannon (River Bandon bridge), Kilerothane (glebe land near the church), Lissarda (near Macroom), Macroom (Mill Road), roadside of the N71 near Clonakilty (near 'Shalom' B&B), roadside between Toomore and Goleen.

A type with a rather symmetrical leaf-blade but with a rough upper leaf surface was found in the Convent precinct of Castletownbere and at the Gearagh. Another type with a smooth upper leaf surface but a very asymmetrical lower part of the leaf occurs at the Blarney Crossing in Cork city and again in the Convent precinct of



*Figure 4: Leaf form of Cornish elm, approximately natural size.*

Castletownbere. A fourth type with a rough upper leaf surface and a very asymmetrical leaf was encountered at Drumkeen (the Gearagh), Cork city (Blarney crossing) and in Kealkil (Ballingeary Road, opposite 'Future Forests').



*Elm tree at Castletownbere cemetery.*

*Ulmus minor* var. *coritana* (Coritanian elm)

For practical reasons discussed below there was a need to re-introduce the former species *U. coritana* as a sixth variety of *U. minor*. The leaves of the proposed *U. minor* var. *coritana* are larger than those of the other varieties of field elm, 7 to 9 cm long, 4 to 5 cm wide, the leaf margin is bluntly serrate, the petiole and parts of the leaf-blade are extremely asymmetrical (Figure 5).

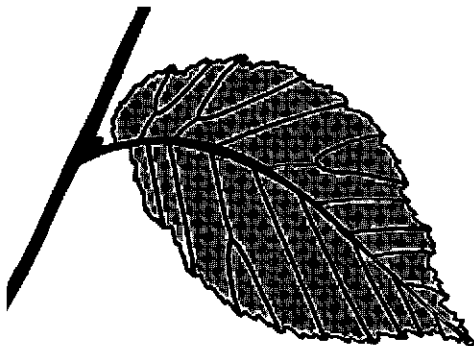


Figure 5: Leaf form of Coritanian elm, approximately three-quarters natural size.

This form was found near Barley Cove, at Lissagriffin and at Toomore. In the farm-yard at Lissagriffin stand the two finest examples of 160 and 170 cm girth at breast height.

*Ulmus x hollandica* (Dutch elm and hybrid elm)

In Co Cork five different forms of *U. x hollandica* occur, only one may be recognised as a cultivar. The others can be considered as spontaneous hybrids between various forms of elms, the result of continuous hybridisation.

*Ulmus x hollandica* 'Major' (Dutch elm); putative first generation hybrid

The leaves are mid-sized, 8 to 10 cm long, 5 to 7 cm wide (the product of length x width being > 28), the leaf-blade is ovate to cordate, the upper surface is smooth, the leaf margin sharply serrate, the lower part of the leaf is rather symmetrical to very asymmetrical (Figure 6).

*U. x hollandica* 'Major' grows at: Ballincen (western part of town), Durrus (Friendly Cove), Innishannon (banks of the River Bandon), Inchigeelagh (eastern exit of the village), Kilountain (banks of the River Bandon), Letter Lower (farm yard), Letter Lower (garden), Toomsbridge (the Gearagh, south lake road). The largest example is the tree at Kilountain, with a girth of 105 cm.

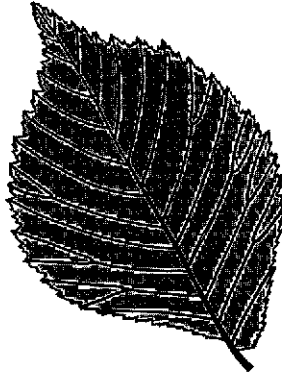


Figure 6: Leaf form of Dutch elm, approximately half natural size.

*Ulmus x hollandica* (hybrid elm); ambiguous hybrids

Five discernible types of hybrid elms – other than the cultivar ‘Major’ – can be found in Co Cork.

Type ‘A’ seems to be another hybrid *U. minor x U. glabra*. Its leaves are big, up to 14 cm long and up to 9 cm wide, the leaf margin is sharply serrate, the upper surface of the leaf is smooth. It occurs at Ardnagashel, Ballineen (western part of town), Bandon River (near Gurteen crossing), Bantry House (upper garden), Castletownbere (near ‘Fast Fish’ company – with a girth of 335 cm this was the second largest elm found), Cork city (Blarney crossing) and Mallow (western part of town).

Very similar in form is type ‘B’, another *U. minor x U. glabra*. As above, the leaves are big, up to 14 cm long and up to 9 cm wide, the leaf margin is sharply serrate, but the upper surface of the leaf is rough. It grows in the lower garden of Bantry House and two individuals of this type were found in the Gearagh.

In type ‘C’, also a putative hybrid of *U. x hollandica* and *U. glabra*, the lower part of the leaf is very asymmetrical, a lobe is covering the petiole, the leaf margin is sharply serrate. It was found near Barley Cove, at Kilcrohane (eastern and western parts of town) and at Macroom (Mill Road). The biggest tree of this type is the one at Kilcrohane with a girth of 125 cm.

The fourth form, type ‘D’ may be a hybrid of *U. x hollandica* and *U. minor* var. *coritana*. The leaf is very similar to type ‘C’, but the leaf margin is bluntly serrate. There are examples at Ballycotton, Ballymaloe Estate and Cork city (Blarney crossing).

Finally, type ‘E’ resembles an old Dutch cultivar (cf *U. x hollandica* ‘Belgica’). The leaves are 8 to 12 cm long, only 4 to 5 cm wide, thus quite narrow, the base of



the lamina is extremely asymmetrical (Figure 7). It occurs at only one location, Killavullen.

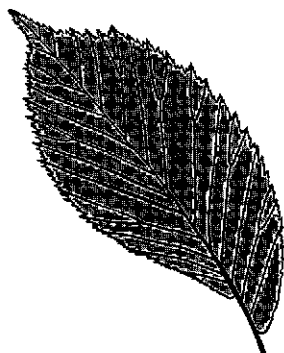


Figure 7: Leaf form of type 'E' hybrid elm, approximately half natural size.

The question whether or not the various individuals of the hybrid elm cluster are of clonal origin or are the product of sexual reproduction cannot be answered within the limits of this study. The definition of the five types was based solely on leaf characters which resemble more or less closely the features of their possible parents.

#### *Mature elms*

In total 28 elms with a girth of 80 cm or more at breast height – translating into a bole diameter of 25 cm or more – were found during the study. Table 1 gives an overview of the trees in question with their respective locations and dimensions.

Of the 28 largest elms, 13 grow on the three southwestern peninsulas, seven in the Bandon River valley, five in the Lec River valley and one in the valley of the river Blackwater. Towns and cities were not particularly investigated, so only one larger tree each were noted in Bantry and in Cork.

Whether or not any conclusions may be drawn from this distribution remains to be discussed.

### **Discussion**

A couple of assumptions need to be made to reduce the number of elm species one may be likely to encounter in Co Cork.

First, it is highly improbable to find *Ulmus laevis* in southwestern Ireland. The species is predominantly distributed in central and eastern Europe.

Second, it is highly improbable that modern cultivars were planted in rural Ireland during the last two or three decades without people knowing. Only three nurseries are known to have sold or to still sell modern cultivars (like the Dutch *Ulmus* 'Columella' or the American *Ulmus* 'New Horizon'). During the research for this study only one of these plantings was encountered (on private premises at Friendly Cove near Durrus).

Table 1: Mature elms of Co Cork.

Location	Species, Variety, Cultivar, Type	Girth cm	dbh cm
Ballineen	<i>Ulmus glabra</i>	80	25
Castletownbere, Cemetery	<i>U. minor</i> var. <i>cornubiensis</i>	80	25
Glengarriff	<i>Ulmus glabra</i>	80	25
Ballineen	hybrid <i>U. minor</i> & <i>U. glabra</i> (type 'A')	85	27
Gurteen	hybrid <i>U. minor</i> & <i>U. glabra</i> (type 'A')	85	27
Inchigeelagh	<i>Ulmus x hollandica</i> 'Major'	90	29
Macroom, Mill Road	hybrid <i>U. x hollandica</i> & <i>U. glabra</i> (type 'C')	90	29
Innishannon	<i>Ulmus x hollandica</i> 'Major'	95	30
Macroom, Crow Wood	<i>Ulmus glabra</i>	100	32
Macroom, Crow Wood	<i>Ulmus glabra</i>	100	32
Macroom, Crow Wood	<i>Ulmus glabra</i>	100	32
Bantry, road to Carcagh	<i>U. minor</i> var. <i>cornubiensis</i>	105	33
Kilountain	<i>Ulmus x hollandica</i> 'Major'	105	33
Mallow	hybrid <i>U. minor</i> & <i>U. glabra</i> (type 'A')	105	33
Ballineen	hybrid <i>U. minor</i> & <i>U. glabra</i> (type 'A')	110	35
Gurteen	<i>U. minor</i> var. <i>cornubiensis</i>	110	35
Cork, Blarney crossing	hybrid <i>U. minor</i> & <i>U. glabra</i> (type 'A')	115	37
Ahakista, near coast	<i>U. minor</i> var. <i>cornubiensis</i>	120	38
Kilcrohane	hybrid <i>U. minor</i> & <i>U. glabra</i> (type 'C')	125	40
Lissagriffin	<i>Ulmus minor</i> var. <i>coritana</i>	160	51
Lissagriffin	<i>Ulmus minor</i> var. <i>coritana</i>	170	54
Castletownbere, Cemetery	<i>U. minor</i> var. <i>cornubiensis</i>	230	73
Castletownbere, Cemetery	<i>U. minor</i> var. <i>cornubiensis</i>	240	76
Castletownbere, Cemetery	<i>U. minor</i> var. <i>cornubiensis</i>	245	78
Castletownbere, Cemetery	<i>U. minor</i> var. <i>cornubiensis</i>	245	78
Castletownbere, Cemetery	<i>U. minor</i> var. <i>cornubiensis</i>	290	92
Castletownbere, 'Fast Fish'	hybrid <i>U. minor</i> & <i>U. glabra</i> (type 'A')	335	107
Castletownbere, Cemetery	<i>U. minor</i> var. <i>cornubiensis</i>	450	143

Third, it is also not very probable that exotic forms of elms from other continents were introduced into rural Ireland. For example, this would rule out *Ulmus pumila*, an Asian elm widely planted in the southern countries of Europe.

On the other hand, we can assume that some English influence should be reflected in today's elm population, especially near estates and manors. We may find older English cultivars like *Ulmus x hollandica* 'Major' or *Ulmus x hollandica* 'Vegeta'. The English impact may have diminished after political independence

in 1922. Under both English and Irish rule, plantings were made so that today it must be assumed that there is a mixed population of native elms plus introduced elms plus any hybrids which arose among and between them. In addition, some elms (*U. minor* and hybrids), which showed useful traits such as straight stems, and which readily produced suckers were probably lifted and transplanted quite widely.

Though these assumptions are all quite plausible and reflect the recent history of the Irish countryside, one has always to be open for surprises and unexpected encounters when dealing with elms in any given area.

As already mentioned, elms tend to make their taxonomy even more complicated by hybridising freely among each other. This happens naturally where the areas of *U. minor* and *U. glabra* overlap. One such result is *Ulmus x hollandica*, which is considered to be a natural first generation hybrid of *U. glabra* and *U. minor*. The cultivated form of this elm is *Ulmus x hollandica* 'Major'. In our study, elms with key leaf characters intermediate between those of the two parent species are considered to belong to this taxon.

And also, man took his chance in producing cultivars consisting of natural hybrids plus other parents (Hiemstra et al 2005). Since all of the hybrid offspring are fertile they hybridise again with the original parent species or with other natural hybrids or with cultivars. The result is called a cluster of hybrids with any number of entities with no clear delimitation between them (Endtmann 1980, Rothmaler 1990). This does not only show in morphological data (Mackenthun 2003) but also in the genetic make-up (Goodall-Copestake et al 2005). It was suggested that the *U. glabra* – *U. x hollandica* – *U. minor* group should be treated as one single species (Machon et al. 1995, 1997). Those *hollandica*-elms that cannot be put into the taxon 'Major' are regarded as possible second generation hybrids. They all do not show intermediate leaf characters of the parent species but lean to either the field elm or the wych elm side of the spectrum.

But the single species approach would blur distinctions between some of the entities within the group. For example, it is known that *U. minor* is more susceptible to Dutch elm disease than *U. glabra* (Mackenthun 2004). This is in an important fact for the future treatment of elms in the countryside.

To avoid both over-simplification and over-splintering a middle path for considering the classification of elms was conceived. It follows mainly the concept by Richens (1983) with just two species and a number of hybrids.

#### *Wych elm*

Notwithstanding the difficulties of elm taxonomy, one distinct entity is *Ulmus glabra*, the wych elm or Scotch elm (Mackenthun 2001). This species is the common elm of many uplands, hills and mountains in most parts of Europe. Its distribution reaches from the Atlantic to the Urals and from Italy to Norway. In natural environments *U. glabra* is the elm of rich soils with a good supply of water.

Some researchers claim that it is the only elm native to the British Isles (e. g. Mackay 1836, Richens 1983, Preston et al. 2002). It is quite likely that wych elm was in the country before man. Later, it was important enough to receive several mentions in early Irish literature (Richens 1983).

We find a number of good wych elms in Co Cork which all show the typical leaf characters. In two locations we found examples with a somewhat atypical leaf but the differences between these two groups are too small to constitute separate taxa.

### *Field elm*

On the other end of the spectrum we find *Ulmus minor* (invalid synonym: *U. carpinifolia*), the field elm, smooth-leaved elm or narrow-leaved elm (Mittenpergher 1996). It is the typical elm of river floodplains in all parts of Europe, except in the north. Covering a wide ecological range it can also populate the dry slopes of floodplain margins. The species was widely planted in many countries, most notably in England in the form of *Ulmus minor* var. *vulgaris* (English elm, '*Ulmus procera*') as well as in Spain and Italy (Mackenthun 2005).

There are good reasons to consider field elm to be a non-native species. It was suggested that it was brought to the British Isles during the Bronze Age some 3500 years ago. The English elm in particular might have been introduced in Roman times as a recent study claims (Gil et al. 2004).

Being most susceptible to Dutch elm disease, field elm vanished from most parts of Europe as a mature tree during the last century, but survives as root suckers in many places.

*Ulmus minor* as a species is subdivided in five varieties (Richens 1983):

- *U. minor* var. *cornubiensis* (Cornish elm): an elm restricted to the westernmost parts of Britain, today considered to be a single clone, not a variety (Coleman 2002);
- *U. minor* var. *lockii* (Lock's elm): today considered to be a single clone, not a variety (Coleman 2002);
- *U. minor* var. *minor* (small-leaved elm): today the commonest type of field elm in continental Europe – probably formerly '*U. suberosa*' (e. g. in Mackay 1836);
- *U. minor* var. *sarniensis* (Jersey elm): a cultivar from south-west England, today only used as amenity tree, most likely to be a single clone (Coleman 2002);
- *U. minor* var. *vulgaris* ('*U. procera*', English elm): formerly the commonest elm in southern Great Britain, again, it is now seen as a single clone (Gil et al 2004, Mackenthun 2005).

Of these varieties or clones only one, the Cornish elm, appears in Co Cork. Within this taxon leaf characters vary a lot. Still, the various types seem to have a sufficient set of features in common and the differences do not appear to be great enough to allow for separate taxa and individual names. As already pointed out, *U. minor* in particular is one of the most polymorphic species in the flora of the British Isles (Stace 1997).

The decision to create a larger group of cornubiensis elms was based on leaf characters as well as on the growth habit of the trees in the cemetery in Castletownbere. As opposed to other forms of elms, *U. minor* var. *cornubiensis* has a straight and strong trunk with the main branches steeply ascending, forming a fan-

shaped crown (Jobling and Mitchell 1974, Blamey and Grey-Wilson 1989, Coleman 2002). Dutch elm expert Hans Heybroek (formerly of the Dorschkamp research institute in Wageningen, pers. comm.) helped with the identification of this elm variety. The pictures of elm silhouettes in Blamey and Grey-Wilson (1989) were useful, plus their remark that *U. minor* var. *cornubiensis* occurs – besides mainland Britain – “also in SW Ireland”. The Cornish elm has a somewhat ‘Celtic’ distribution, covering Brittany in France, Cornwall in England and the southwestern counties of Ireland. One may or may not assume that the variety was brought to these parts of Europe by Celtic people.

It seems that *U. minor* var. *lockii*, *U. minor* var. *minor*, *U. minor* var. *sarniensis* and *U. minor* var. *vulgaris* do not occur in Co Cork (the latter has a similar growth habit to the *cornubiensis* variety but the leaves are entirely different). It is surprising that English elm was not encountered during the study. One reason may be that we simply overlooked it. One has to keep in mind, however, that it is the most susceptible of all European elms and tens of millions succumbed to Dutch elm disease in the British Isles.

There is one distinct elm in Co Cork which clearly belongs to the field elm group but does not fit into the pattern of the five traditional varieties (Richens 1983). However, there is a description of this taxon by Melville (1949). More than 50 years ago he postulated an elm he called *Ulmus coritana* or Coritianian elm. It was named after an old British tribe living in ancient times in the Leicestershire region, the Coritanea. His species was later discarded by nearly all authors, most notably by Richens (1983). He considered *U. coritana* and *U. minor* var. *minor* to belong to the same entity.

However, there are three elms in Co Cork fitting very neatly the description by Melville (1949). One prominent feature is that both the petiole and the midrib are not straight as in *U. minor* var. *minor* we know from continental Europe but that they are more or less distinctly bent. Therefore, it was decided to revive the long gone species as a variety – even if it may only be a preliminary solution until a more sophisticated arrangement of the elms of Co Cork is devised.

The current authoritative flora of the British Isles (Preston et al. 2002) states both *U. glabra* and *U. minor* to be widely distributed in Co Cork. No differentiation is made between varieties, var. *vulgaris* is treated as a separate species (*‘U. procera’*).

### *Elm hybrids*

The putative natural first generation hybrid between *U. glabra* and *U. minor* is *U. x hollandica*, the hybrid elm. This type of elm was given the name ‘Major’ or Dutch elm when it was selected for propagation by early nursery men and thus became a cultivar. It was probably chosen for its growth performance (major being Latin for big) at some unknown point of time in history. It is well known, however, that this cultivar was widely planted in Britain after the Dutch prince William of Orange became king of England in 1688 (Hiemstra et al 2005). It would be no surprise that English influence brought this elm also to Ireland.

In continental Europe, the 'Major' elm appears in some outdated publications but it is hard to find a living specimen in nature. It is quite surprising that there are individuals in Co Cork which neatly fit the description given in More & White (2003).

There can only be guesses concerning the possible origin of other types of hybrids. It is only clear that they diverge in a number of leaf characters from the 'Major' elm. There is no point in giving names to these types since they do not establish separate entities that can be defined in a satisfactory taxonomic way. They must rather be considered as representatives of many forms of ambiguous hybrids occurring in Co Cork. It would be entirely sufficient for practical reasons to lump them all together in one taxon as there is a haphazard element in subdividing this group of elms. Still, it might be useful to describe separate entities for future researchers to decide whether or not they want to follow the concept presented here.

Most of these types 'A' through 'E' of the ambiguous hybrid elms occur in locations where also other forms of elms exist, e.g. in Bantry, Cork and Castletownbere. One might suggest that the various sample trees belong to the same genotype and that the differences in leaf characters are differences between individuals (triggered by ecological factors) or that indeed hybridisation takes place within the population and two leaf samples from two trees represent two different genotypes. Without an analysis of the genetic make-up no answer can be given.

### *Distribution and size*

Considering the elms of Co Cork, three facts are perhaps worth mentioning.

#### Elms next to the shore

Elm trees were always valued for the many practical purposes they could be used for. But also, elm trees were valued for their toughness in nearly all environments. Both the physiological and the ecological amplitudes are rather wide in this genus. They can withstand flooding and drought, poor soils and rich soils, limestone and granite, storm, snow, rain, hail, cold and heat as well as sea water spray. So, it is little wonder that in Co Cork elms are quite often found in places where they face the sea directly. The spray blown inland by strong westerly winds carries aggressive salts few plant species can cope with. Elm seems to flourish under these conditions.

#### Vast numbers of elms

There are enormous numbers of elms in Co Cork. We visited some 50 locations and encountered hundreds if not thousands of elms. There are still miles and miles of hedgerows that quite often contain elms. This is especially true in the Bandon valley. With every cutting of the hedgerow elms re-sprout from the stump and thus give life to a clonal group of new elms. There are thousands of individual trunks and some of them may have the chance to grow into a mature tree. There is no shortage of elms in the county.

### Big elms

With Dutch elm disease present in nearly every place where elms exist in the northern hemisphere one does not expect to find very many big and mature elms. This, generally, is also true in Co Cork. But surprisingly there are a larger number of at least moderately sized elms than could have been foreseen.

At 50 locations visited for the study we found 28 elms with a girth at breast height of 75 cm or more. By Mitchell's Rule (1 inch of girth equals 1 year of age) these elms are older than 30 years – this means they survived the second, most destructive pandemic of Dutch elm disease from the 1970s onwards. Out of those 28 trees, 7 have a girth of 225 cm or more, translating into an age of nearly 90 years and more. These are the survivors of the first and the second Dutch elm disease pandemic. All of them stand in Castletownbere, one in the town centre and six in the cemetery. The biggest of this group of elms, a giant of 600 cm girth and more than 200 years of age, was unfortunately felled by a storm in 2005 (its trunk was rotten inside, there was no trace of Dutch elm disease). The huge tree lay in the far corner of the cemetery for a while and was removed early in 2007. Next to it stands the current elm champion of Co Cork with a girth of 450 cm, translating into an age of some 175 years, a height of 25 m and a crown diameter of 20 m. The mighty bole branches only 1 m above ground level into two big trunks so that from a distance it looks as if it were two trees growing in close proximity.

The big trees are more or less evenly distributed between the southwestern peninsulas and the valleys of the three major rivers in Co Cork.

### *Dutch elm disease*

The Dutch elm disease pandemic was described and analysed in thousands of books, scientific papers, newspaper articles, broadcasts and internet publications (an extensive overview is given in Buchel and Cornelissen 2002). Of course the elm populations on the island of Ireland were strongly affected by the disease. Some forms of elm today only occur as shrubs and little trees. This is especially true for the English elm in Britain.

Without the slightest doubt Dutch elm disease made its impact on the elms of Co Cork too. Some forms of elms may have vanished from the county altogether, other forms may exist only in hedgerows, undetected and unidentified, again other forms may be the sole survivors of a much larger and probably much more diverse population. It may be no coincidence that the largest elms occur on the peninsulas and in the river valleys. The disease came from the east. Near the coast with its strong westerly winds the elm bark beetle, the vector of Dutch elm disease, had little chance to travel any further. Thus, the disease came probably to a standstill when the vector and the fungus were not able to maintain a sufficient level of infection pressure. In the floodplains of the wide river valleys, elm is one of the major species that constitute the natural riparian wildwood. Before the cultivation of the floodplains huge numbers of elms must have existed. Many were lost due to habitat destruction. A large portion of what was left fell victim to Dutch elm disease. But since there were still comparatively great numbers of elms, the number of survivors also was

relatively high. However, no exact mapping of elm trees was included in this study and so the remarks on the distribution of the larger trees may only be regarded as hypothesis.

All in all, we know little about the course of Dutch elm disease in the county. What we can say, however, is that the disease is still present and constitutes a permanent threat to the remaining elms.

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### **Zusammenfassung**

In einer Untersuchung der Ulmen im County Cork im Südwesten Irlands wurden 50 Standorte näher betrachtet. Vier Sippen konnten unterschieden werden, nämlich die Berg-, Cornwall-, Coritanische und Holländische Ulme. Hinzu kommen einige unklare Hybriden. Die Gesamtzahl der Ulmen ist hoch, die der großen und alten Ulmen jedoch vergleichsweise gering. Trotzdem sind im County hinreichende viele Ulmen für ein zukünftiges Ulmenschutzprogramm vorhanden.

### **Schlagworte**

*Ulmus*, Bergulme, Feldulme, Holländische Ulme, Holländische Ulmenkrankheit.