

# European white elm

*Ulmus laevis*

Eric Collin  
CEMAGREF, Nogent-sur-Vernisson, France

These Technical Guidelines are intended to assist those who cherish the valuable white elm genepool and its inheritance, through conserving valuable seed sources or use in practical forestry. The focus is on conserving the genetic diversity of the species at the European scale. The recommendations provided in this module should be regarded as a commonly agreed basis to be complemented and further developed in local, national or regional conditions. The Guidelines are based on the available knowledge of the species and on widely accepted methods for the conservation of forest genetic resources.

## Biology and ecology

White elm (*Ulmus laevis* Pall.) is allogamous, and does not hybridize with the other European elm species which belong to a different section of the genus. Flowers are hermaphroditic and wind pollinated. Generation time is short and seed production is regular and prolific, with a high percentage of viable seed and high germination rates. Seeds dispersed by wind or carried downstream by rivers enable the colonisation of new sites. Root suckering may play a role in the regeneration of established stands whereas stool suckering is thought to be poor.

The typical habitat of the white elm is riparian deciduous forest, where it can tolerate prolonged flooding for longer periods



# European white elm *Ulmus laevis* European white elm *Ulmus laevis* European white elm

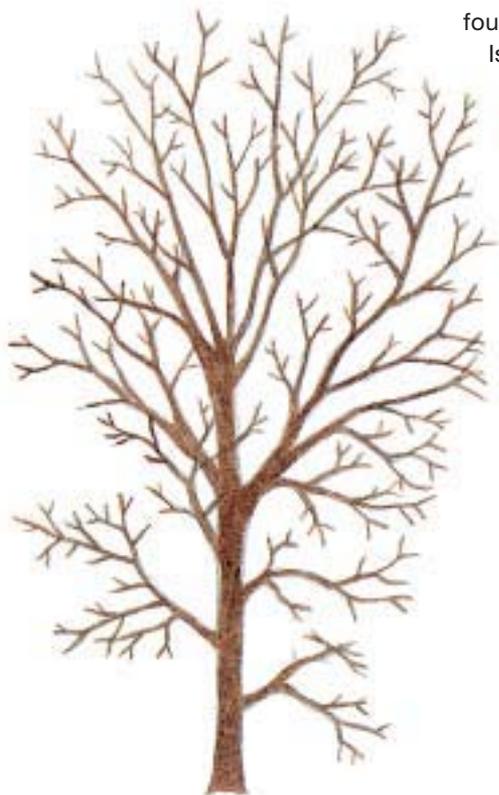
and withstand lower temperatures than the field elm (*U. minor* Mill.), with which it is often associated. Although it is typically found in moist sites, it can tolerate moderately dry, deep soils and it is also found as a component in wooded steppe environments. Along with field elm, the white elm is sporadically found in mixed oak forest. It is not found on mountainous sites and prefers altitudes of less than 300 m. In forest stands, it is a second storey tree, and in the open it can reach heights of 35 m. Individual trees rarely live longer than 200 years, but have been recorded as old as 300.

## Distribution

White elm is distributed across central and eastern Europe, from the Ural Mountains to eastern France, and from southern Finland to the Caucasus and Bosnia. Since it is relatively rare and often confused with the other two elm species indigenous to Europe, its distribution in southern France and northern Switzerland has been underestimated in the past. It must still be confirmed if small riparian populations recently discovered in southern France are autochthonous or established aliens. Natural populations of white elm are not found in the British Isles, Italy or Spain, and very little is known about this species in western Europe.

## Importance and use

White elm is of low economic value and unlike other European elms, the timber is not prized. The cross-grained wood causes difficulty in machine cutting and defects. Wood density is lower than in other elm species, and it produces poor quality firewood. However, due to its fast growth, ornamental value, and tolerance to soil compaction, de-icing salts and air pollution, white elm has long been used for amenity plantings in towns and on roadsides. It is rarely affected by Dutch Elm Disease (DED) in western Europe, and its renewed use in urban forestry has been suggested.



# Ulmus laevis European white elm Ulmus laevis European white elm Ulmus laevis European

## Genetic knowledge

*Ulmus laevis* has not been divided into sub-species and varieties. More information is particularly needed about *U. celtidea* - an endemic species occurring in Russia, taxonomically very close to the white elm.

Studies using different molecular markers have revealed significant differences of white elm from the other two European elm species, and also highlighted similarities with its North American counterpart in the same section, the American white elm (*U. americana* L.).

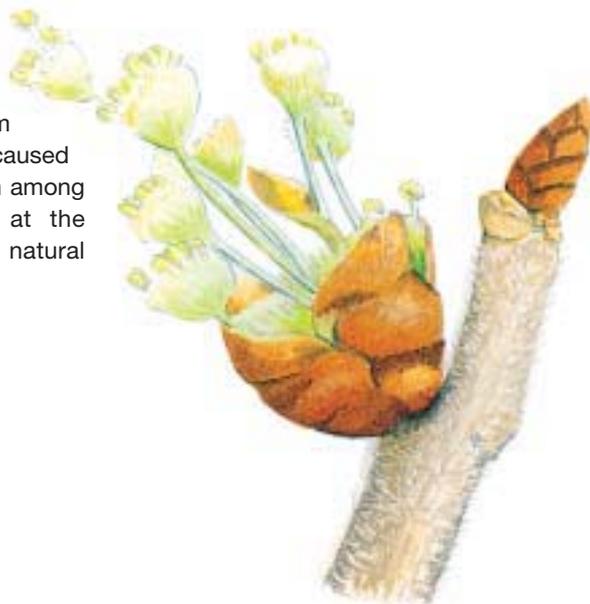
Chloroplast DNA studies of a large, West European sample identified the same haplotype in 93 % of the trees, and only two other types: a rare type in southwest France, and another on the south eastern limit of the sampled zone. Isoenzyme studies carried out in Finland suggest that random genetic drift may have caused substantial differentiation among the small populations at the northern fringe of the natural range.

## Threats to genetic diversity

Habitat destruction has caused enormous damage to white elm populations, and continues to pose a major threat to the genetic diversity of the species. Dramatic changes in the landscape are occurring in riparian forests along the banks of large rivers, especially where land can be drained and reclaimed for agriculture or poplar cultivation. Consequently, white elm is now often restricted to fragmented populations of a limited size, facing the risk of genetic drift.

The impact of DED on white elm populations is more serious in central and eastern Europe, where infections and mortality are frequent, than at the western fringe of its natural range. This is largely due to the bark beetles

(*Scolytus* sp.) which are the vectors of the DED fungal agent (*Ophiostoma novo-ulmi*), which prefer to feed on field elms in western Europe and rarely visit white elms.



# Ulmus laevis European white elm

## Guidelines for genetic conservation and use

Despite this pathological threat, the *in situ* conservation of white elm genetic resources is still possible through the establishment of a network of conservation stands. These stands should be selected across the natural distribution range, incorporating ecological variation, comprising at least 50 flowering trees in each. In countries where the distribution of this species in the wild is unknown, a preliminary inventory should be undertaken. Priority should be given to marginal populations and rare floodplain communities in danger of deforestation. Silvicultural management should stimulate and promote natural regeneration. However, planting of the original or local material may be required when regeneration is poor or the number of seed trees is insufficient.

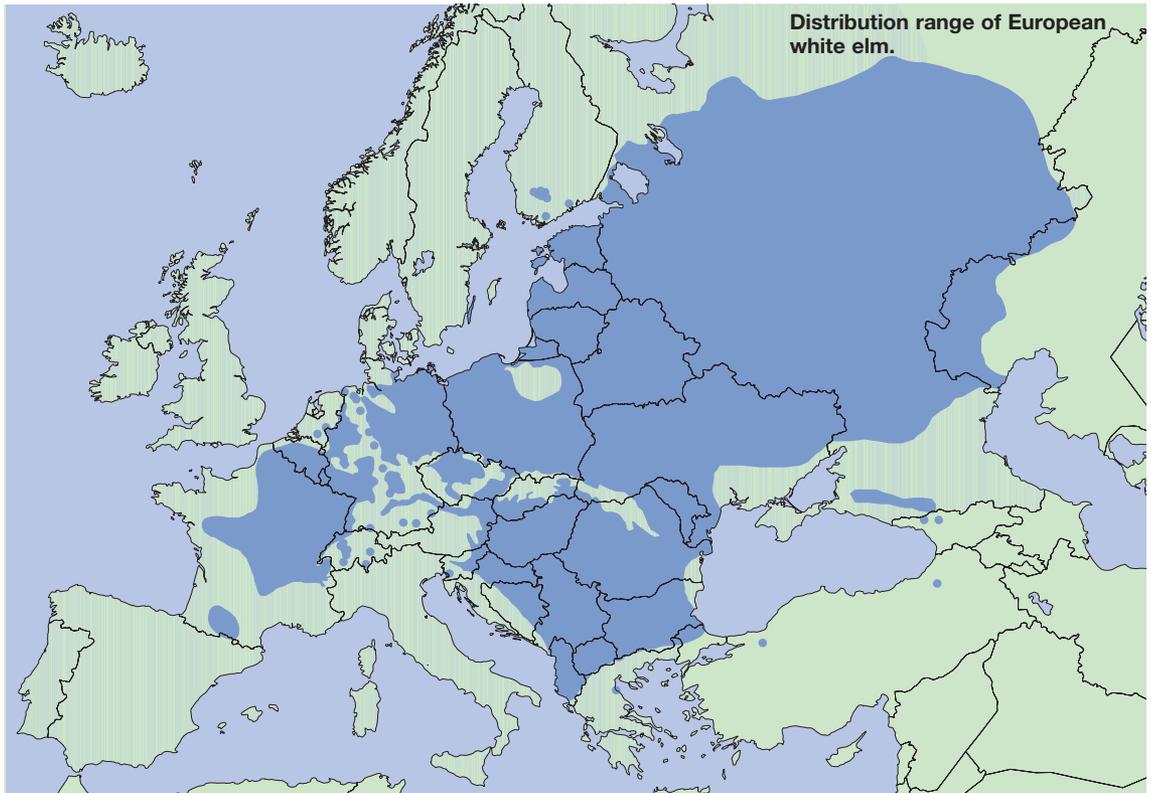
Complementary *ex situ* conservation measures must be undertaken when no legal habitat protection measure can be taken, when populations are small and fragmented, or when the impact of DED is too strong. In emergency cases, 'static' conservation measures, such as clonal archives and cryopreservation of seed lots can be applied. However, 'dynamic' ex

*situ* conservation units, such as conservation seed orchards (in artificial conditions) or *pseudo in situ* conservation units (plantations in original habitat), which brings together diverse material from the same eco-region and enhances genetic exchange, are highly recommended. White elms can easily be propagated by cuttings, and field clonal archives can be maintained as low hedges (1.5 – 2 m), which are less attractive to the vectors of DED.

A European core collection of elm clones has already been established with material from the nine countries participating in the EU RESGEN project. It is important that this collection is complemented with material originating from all the relevant regions of Europe.



# European white elm *Ulmus laevis* European white elm *Ulmus laevis* European white elm



*The Author wishes to acknowledge contribution from Dr. Lorenzo Mitterpergher and CAB International Forestry Compendium CD-Rom (2003). for the 'Biology and ecology' and 'Importance and uses' paragraphs*



*These Technical Guidelines were produced by members of the EUFORGEN Noble Hardwoods Network. The objective of the Network is to identify minimum genetic conservation requirements in the long term in Europe, in order to reduce the overall conservation cost and to improve the quality of standards in each country.*

*Collin, E. 2003. EUFORGEN Technical Guidelines for genetic conservation and use for European white elm (*Ulmus laevis*). International Plant Genetic Resources Institute, Rome, Italy. 6 pages.*

*Drawings: Ulmus laevis, Giovanna Bernetti. © IPGRI, 2003.*

ISBN 92-9043-603-4

### Selected bibliography

- Collin, E. 2002. Strategies and guidelines for the conservation of the genetic resources of *Ulmus* spp. Pp. 50-67 in Noble Hardwoods Network: Report of the fourth and fifth meetings, September 1999 and May 2001 (J. Turok, G. Eriksson, K. Russel and S. Borelli, compilers). International Plant Genetic Resources Institute, Rome, Italy.
- Mitterpergher, L., A. Fagnani, and F. Ferrini. 1993. The White Elm: an interesting and ill-known elm [in Italian]. *Monti e Boschi* 44 (4): 13-17.
- Webber, J. 2000. Insect vector behavior and the evolution of Dutch elm disease. Pp. 47-60 in *The Elms: breeding, conservation and disease management* (C. P. Dunn, editor). Kluwer Academic Publishers, Boston, USA.
- Whiteley R.E., Black-Samuelsson S., Jansson G. 2004. Within and between population variation in adaptive traits in *Ulmus laevis*, the European white elm. (manuscript).



EUFORGEN secretariat c/o IPGRI  
Via dei Tre Denari, 472/a  
00057 Maccarese (Fiumicino)  
Rome, Italy  
Tel. (+39)066118251  
Fax: (+39)0661979661  
euf\_secretariat@cgjar.org

### More information

[www.euforgen.org](http://www.euforgen.org)