



Disease-resistant elm cultivars

Their potential role in the conservation of the White-letter Hairstreak

2020 REPORT

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**Butterfly
Conservation**

Saving butterflies, moths and their habitats

Disease-resistant elm cultivars, *Butterfly Conservation* trials report, 2020

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1. Abstract

The Hampshire & Isle of Wight Branch of *Butterfly Conservation* (BC) initiated trials of elm cultivars and species resistant to Dutch Elm Disease (DED) in 2000, in fulfilment of Objective 5 for the White-letter Hairstreak (WLH) in BC's *South Central Regional Action Plan*: to evaluate their potential as host plants for the butterfly, now on the IUCN Red List as 'in imminent danger of extinction'. This report, originally published in 2010, has been substantially revised in the light of the 'Princeton' fiasco. 'Princeton', an American Elm cultivar, was widely promoted in the UK without having been tested for resistance by the European method of inoculation. This method is far more invasive, to reflect the much greater vector efficacy of the larger elm bark beetle, *Scolytus scolytus*, not found in the US. The loss of many 'Princeton' elms to DED obliged the relegation of other American cultivars until proven here. In 2015, the White-letter Hairstreak was found breeding on the DED-resistant cultivars LUTECE and 'Sapporo Autumn Gold'. The discovery of the WLH on LUTECE is particularly significant as the tree has a very different periodicity from the reputedly favourite native host, wych elm, suggesting the insect is possessed of a considerable adaptability which could see it breeding on all the high-resistance cultivars featured in this report.

2. Introduction

The elm trials are located at five sites in southern Hampshire. The sites feature diverse ground conditions, from arid rendzinas atop an outlier of the South Downs to waterlogged London Clays below 1m A S L along the shores of Portsmouth Harbour. This report focusses on 12 cultivars available in Europe with a scientifically proven '5 out of 5' resistance to DED, and the anomalous species *Ulmus laevis* which, whilst devoid of any innate resistance, is rarely infected owing to a triterpene in its bark rendering it unpalatable to the vector *Scolytus* bark beetles. The high DED-resistance of the cultivars featured in this report has been determined in Europe by the Institut Nationale pour la Recherche Agronomique (INRA) in France, the Istituto per la Protezione delle Piante (IPP) in Italy, the Universidad Politecnica de Madrid, and Eisele GmbH in Germany. Testing in all instances was by inoculation with unnaturally high concentrations (10^6 spores / ml) of the DED pathogen *O. novo-ulmi* subsp. *americana*.

The BC trials have therefore focussed on the growth and appearance of the trees, together with their tolerance of environmental stresses such as exposure, drought, and waterlogging.

3a. List of highly DED-resistant trees included in the trials

CULTIVAR	ORIGIN
'Ademuz'	Universidad Politecnica Madrid, Spain
'Columella'	Dorschkamp, Wageningen, Netherlands
'Fiorente'	IPP, Florence, Italy
'Morfeo'	IPP, Florence, Italy
'Nanguen' = LUTÈCE *	Dorschkamp, Wageningen, Netherlands
'New Horizon'	WARF, Wisconsin, US
'Plinio'	IPP, Florence, Italy
'Rebona'	WARF, Wisconsin, US
'San Zanobi'	IPP, Florence, Italy
'Sapporo Autumn Gold'	WARF, Wisconsin, US
'Wanoux' = VADA	Dorschkamp, Wageningen, Netherlands
'Wingham'	IPP, Florence, Italy (as FL493)
SPECIES	ORIGIN
<i>Ulmus laevis</i>	Various locations in Europe

3.b Other elms included in the trials

Below is a list of other cultivars and species planted. These are not described here on account of their resistance to DED or other diseases in Europe being found to be either substandard or, as with most of the American cultivars, simply unknown.

CULTIVAR	ORIGIN
'Arno'	IPP, Florence, Italy
'Lewis & Clark' = PRAIRIE EXPEDITION	North Dakota State University, US
'Morton' = ACCOLADE	Morton Arboretum, Illinois, US
'Morton' = ACCOLADE openly pollinated	Morton Arboretum, Illinois, US
'Prospector'	USDA National Arboretum, US
'Valley Forge'	USDA National Arboretum, US
SPECIES	ORIGIN
<i>Ulmus davidiana</i>	Liaoning Province, China
<i>Ulmus davidiana</i> var. <i>japonica</i>	Sapporo, Japan
<i>Ulmus gaussenii</i>	Anhui Province, China
<i>Ulmus glabra</i>	Mount Šimonka, Slovakia
<i>Ulmus laciniata</i>	Sapporo, Japan
<i>Ulmus parvifolia</i>	Osaka, Japan

* Names in upper case, or different font, are the 'selling names' used in commerce, as opposed to the registered cultivar names which are always written in lower case within single inverted commas. Unlike registered cultivar names, selling names may vary from country to country.



Figure 1. LUTECE elm, Newport, IoW, hosting the WLH in 2015 Photo: Caroline Dudley

4. Performance

Most of the elms are hybrid cultivars, with Asiatic ancestors *U. wallichiana* or *U. pumila*, from whom they have inherited their anti-fungal genes. However, environmental conditions in the Far East are, with few exceptions, very different from those of southern England. A critical aspect of the trials was therefore the assessment of the trees' adaptation to a temperate maritime climate.

Many of the cultivars also differ in appearance from the European species, often being significantly smaller with uncharacteristic foliage, while others grew very slowly or exhibited poor structure. Ergo: some would not, for all their virtues, look at home in the wider English countryside, and better retained as ornamentals in the urban environment.

5. Availability in the UK

On 1 January 2018 strict import controls were introduced by DEFRA to reduce the risk of the accidental import of alien phytophtherae unknown in the UK, in particular Elm Yellows (phloem necrosis). Accordingly, all consignments of elms from the EU must now carry phytopassports declaring their area of origin free of elm diseases. This has meant the termination of all imports of the worthy elm cultivars raised by IPP Italy owing to the prevalence of Elm Yellows across much of the country. However, these same trees are still reviewed in this report as there is no restriction on their propagation in the UK from specimens already established here, cuttings of which may be sourced via the author, provided they are not used for commercial purposes.

6. The butterfly

The White-letter Hairstreak *Satyrrium w-album* is a monophagic species entirely reliant on Elm. Larvae have been very occasionally found feeding on oak and bird cherry in continental Europe, but these occurrences are regarded as random. Moreover, it is *sexually mature* elm which is preferred as the larvae hatch in mid-March, a number of weeks before the leaves flush, and immediately feed on the elm flowers before progressing to the seeds. (Figure 2). However, recent research by Bink et al. in the Low Countries has discovered that larvae hatching on flowerless trees are able to survive by remaining in diapause for up to six more weeks, ie. until the leaves flush, provided climatic conditions allow them to rehydrate on hatching. This phenomenon could explain the occasional sightings of the butterfly on English elm suckers.

The White-letter Hairstreak is also endemic to much of the Far East, including Siberia and Japan, where it thrives on several of the elms used in hybridization or planted in their own right in Europe and the US. However, the butterfly is not found in North America.

The WLH was found to have colonized elms at two of the BC plantations, Great Fontley and Nelson Reservoir, in 2019. The butterfly had already been found breeding on the cultivar 'Nanguen' (selling name: LUTÈCE) planted at Newport, Isle of Wight, on 'New Horizon' at Vauxhall Pleasure Gardens, London, and on 'Sapporo Autumn Gold' in Hertfordshire.

NB. The French natural history unit VarWild has produced a 14 minute film of the lifecycle of the WLH, with close-up photography: <https://www.youtube.com/watch?v=vdDNGF2HDr0>



Figure 2. White-letter Hairstreak larva on elm flower.

Photo: Peter Eeles

7. New developments

Spanish *Ulmus minor* clones

The discovery by the Escuela de Montes, Universidad Politecnica de Madrid, of native Field Elms *Ulmus minor* with a very high resistance to Dutch elm disease must represent the most significant development in the 90-year history of European elm breeding. The trees are currently undergoing assessment at other stations around Spain before their release to commerce; their ability to sucker readily from roots should make them excellent candidates for hedgerow and thicket planting.

Hybridizations in England and Germany

In England, the late Dr David Herling was successful in 2019 in hybridizing the highly-resistant Italian clone FL493 (later named 'Wingham') with a mature field elm *Ulmus minor* discovered at Tonge Mill in Kent. Named 'Arcadia', one of its progeny has proven completely asymptomatic after inoculation with the pathogen, as supervised by Forest Research, Alice Holt. *Butterfly Conservation* members in Hampshire and Wiltshire have also initiated trials, with seeds from openly-pollinated cultivars such as 'Morfeo'. Meanwhile in Germany, the Eisele nursery in Darmstadt has raised two highly resistant, as yet unregistered, complex hybrid cultivars of its own; patents pending.

Import restrictions

Long-overdue restrictions on tree imports from the EU, introduced by DEFRA on 1 January 2018, have reduced the range of cultivars imported into the UK. In response, attempts are being made to persuade British nurseries to obtain Plant Breeders' Rights (PBR) to raise and sell such trees in the UK. However, most British nurseries only propagate trees for forestry, often by the million, and there has so far been little interest expressed in raising relatively small numbers of 'amenity tree' cultivars for conservation and landscaping, necessitating the purchase of PBR. The importation of all trees from Europe may well be subjected to two years' quarantine, as advocated by Forest Research, in recognition of the threat from alien phytophtherae, 17 of which have been accidentally introduced to the UK in the past 30 years.

Elm Yellows

The recent discovery of the Elm Yellows phytoplasma *Candidatus phytoplasma ulmi* across France remains a cause for concern, as many hybrid cultivars with exotic species such as *U. wallichiana* in their ancestries have been found to be especially susceptible, the disease historically unknown in Asia. At least one European elm authority considers it likely the disease already exists in the UK, its presence masked by the resemblance of its overt symptoms to those of DED.

Elm zig-zag sawfly

The sawfly *Aproceros leucopoda* is a new Asian pest capable of repeatedly defoliating elms; first recorded in Europe in 2003, it was found in Britain in 2017. The number of generations is temperature dependent, and Britain may yet prove too cool for the insect to have a major impact. Feeding preferences of the sawfly have been studied, and it is known to eschew the White Elm *Ulmus laevis*.

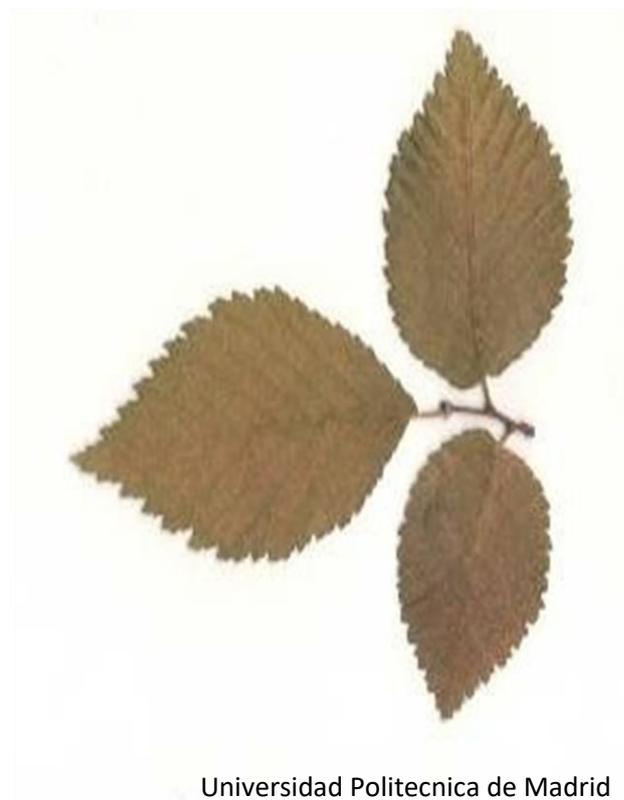
8. The trees described

The following pages offer descriptions of the most disease-resistant cultivars from both sides of the Atlantic, and the anomalous species *U. laevis*. All photos by author unless otherwise credited. A performance checklist is offered on each: +++ = Good, ++ = Average, + = Poor.

'Ademuz' (not yet in commerce)

Ulmus minor cultivar from Spain

Origin: Universidad Politecnica de Madrid, release 2022?



DESCRIPTION

'Ademuz' is one of a number of highly DED-resistant Field Elm *Ulmus minor* clones under assessment by the Escuela de Montes, Universidad Politecnica de Madrid, as potential forestry trees. The branches are largely devoid of corky tissue, the leaves, on 5 mm petioles, are ovate, typically oblique at the base and acuminate at the apex, the average length and width 5.5 × 3.5 cm, the margins doubly serrate. The tree, cloned from an unidentified specimen near the eponymous town north-west of Valencia, develops a balanced, open structure, and was considered the most attractive of the 'Madrid 7', scoring 4.5 out of 5. Foliar density relative to 'Sapporo Autumn Gold' is described as 'medium'. Retrospective DNA analysis has confirmed that the clone is pure *U. minor*, devoid of *U. pumila* DNA, the latter species introduced to Spain in the late 16th century.

PERFORMANCE

- +++ Stability (resistance to wind rock)
- +++ Resistance to exposure (leaf scorch, branch breakage)
- +++ Resemblance to native elm
 - ++ Suitability for street planting
- +++ Rate of growth
- +++ Tolerance of waterlogging
- +++ Tolerance of drought

Wikipedia: http://en.wikipedia.org/wiki/Ulmus_%27Ademuz%27

'Columella'

Hybrid cultivar: 'Plantyn' self- or openly-pollinated

Origin: Dorschkamp, Netherlands; released 1987.



DESCRIPTION

'Columella' has a most distinctive fastigiate, monopodial structure, although the crown eventually broadens with age. The peculiarly twisted leaves are in asymmetric clusters on short branchlets, often encircling them and remaining thus well into winter, a trait inherited from its Exeter Elm ancestor. 'Columella' readily defoliates in drought, a trait inherited from its Himalayan elm ancestor. Trees in the Netherlands >25 years old are now collapsing because of graft incompatibility with their wych elm rootstocks. However, all trees post-2012 have allegedly been propagated by rooting cuttings. One dozen trees planted near the sea in Portsmouth in 2003 all died, probably because of salt intolerance. Where planted as urban street trees, the cultivar appears to have been very successful in the UK.

PERFORMANCE

- +++ Stability (resistance to wind rock)
- +++ Resistance to exposure (leaf scorch, branch breakage)
 - + Resemblance to native elm
- +++ Suitability for street planting
- ++ Rate of growth (height increase: 67 cm, d.b.h. increase: 0.9 cm p. a.)
- ? Tolerance of waterlogging
- + Tolerance of drought

Wikipedia: http://en.wikipedia.org/wiki/Ulmus_%27Columella%27

'Fiorente'

Hybrid cultivar: *U. minor* × *U. pumila*

Origin: Istituto per la Protezione delle Piante, Italy; released 2012



DESCRIPTION

'Fiorente' was originally raised and patented by IPP Italy as a hardwood source, being monopodial, with apical dominance and rapid growth (the name translates as 'flourishing'). It is widely held to be the most attractive cultivar on the European market. Formerly omitted from the 'Premier League' by dint of its DED resistance, as it can be badly defoliated *if* heavily infected, but it recovers well the following year. Moreover, it has adapted extremely well to most types of ground in Hampshire, from arid rendzinas on chalk downland to winter-waterlogged lowland soils over clay. The alternate leaves are of moderate size, < 8 cm long × < 5 cm broad; generally lanceolate in shape, they are rough on the upper surface and pubescent beneath, remaining green well into the autumn and shed relatively late, often persisting into December in the UK.

PERFORMANCE

- +++ Stability (resistance to wind rock)
- +++ Resistance to exposure (leaf scorch, branch breakage)
- ++ Resemblance to native elm
- +++ Suitability for street planting
- +++ Rate of growth (height increase: 100 cm, d.b.h. increase: 1.5 cm p. a.)
- +++ Tolerance of waterlogging (>3 months' inundation over winter)
- +++ Tolerance of drought

Wikipedia: [http://en.wikipedia.org/Wiki/Ulmus %27Fiorente%27](http://en.wikipedia.org/Wiki/Ulmus_%27Fiorente%27)

'Morfeo' (not in commerce beyond Italy owing to elm yellows)

Hybrid cultivar: 'Heybroek 405' (*U. × hollandica* × *U. minor*) × *U. chenmoui*

Origin: Istituto per la Protezione delle Piante, Italy; released 2011



DESCRIPTION

'Morfeo' is a robust, fast-growing tree able to freestand at a very early age. The stem commences forking at between 1.5 and 2.0m from the ground, the branches on juvenile trees with irregular patches of corky bark. The reddish branchlets bear mid-green **elliptic** leaves, <120 mm (avg. 88 mm) long × <80 mm (avg. 56 mm) broad with 10mm petioles. The leaves closely resemble those of the **Field Elm**, with typically asymmetric base and acuminate apex; they turn **crimson** in late October, before falling in early November. The **sessile samarae** ripen in mid-May, and are narrowly obovate, 17–22mm long × 9–13mm broad with the seed offset next to the notched apex. In the UK the tree begins flowering in its fourth year, the **perfect, apetalous** wind-pollinated flowers appearing in mid-March. Reputed to sucker from roots, it has yet to do so in the BC trials.

PERFORMANCE

- +++ Stability (resistance to wind rock)
- +++ Resistance to exposure (leaf scorch, branch breakage)
- ++ Resemblance to native elm
- ++ Suitability for street planting
- +++ Rate of growth (height increase: 70 cm, d.b.h. increase: 1.5 cm p. a.)
- +++ Tolerance of waterlogging
- +++ Tolerance of drought

Wikipedia: http://en.wikipedia.org/wiki/Ulmus_%27Morfeo%27

'Nanguen' = LUTÈCE

Hybrid cultivar: ('Plantyn' × (*U. minor* × *U. minor*)) × ('Bea Schwarz' × 'Bea Schwarz' selfed)

Origin: Dorschkamp, Netherlands; released 2002 by INRA, France (patent holders).



DESCRIPTION

The stem of LUTÈCE typically forks at a height of 1-2m, with <5 branches steeply ascending to form an open crown. The leaves are <11cm long × <10cm wide, similar in shape to those of the Field Elm *U. minor*, but with a very rough upper surface and coarsely serrated margins. The leaves are very late to flush, rarely before mid-May, a trait inherited from its Himalayan Elm *U. wallichiana* ancestor. In adolescence, the tree requires prolonged staking before it is able to freestand at about age 6 years. A specimen planted 2003 at Newport, IoW, was found to host the WLH in 2015. However, in France some young LUTÈCE plants were reputedly decimated by the Elm Yellows phytoplasma, a pathogen as yet unknown in the UK; the Himalayan elm ancestor is known to be particularly susceptible to the disease.

PERFORMANCE

- ++ Stability (resistance to wind rock)
- +++ Resistance to exposure (leaf scorch, branch breakage)
- +++ Resemblance to native elm
- ++ Suitability for street planting
- +++ Rate of growth (height increase: 87cm, d.b.h. increase: 1.9cm p. a.)
- +++ Tolerance of waterlogging
- +++ Tolerance of drought

Wikipedia: http://en.wikipedia.org/wiki/Ulmus_%27Nanguen%27

'New Horizon'

Hybrid cultivar: *Ulmus davidiana* var. *japonica* × *U. pumila*

Origin: Wisconsin Alumni Research Foundation (WARF); released 1995



DESCRIPTION

The tree initially has a compact, pyramidal form, with comparatively dense foliage comprising glabrous, dark-green, elliptical leaves < 12cm long by 7cm broad, occasionally without the asymmetric bases typical of the genus. Flowering, and consequent fruiting, is meagre, a trait inherited from its Japanese elm 'mother'. The tree increases in height only slowly, while its trunk thickens comparatively quickly. Like its Siberian Elm parent, the crown of 'New Horizon' can occasionally suffer <25% natural twig dieback over winter, seriously disfiguring the tree. Moreover, 'NH' is the most sensitive of all the trees on test to ground conditions, but has proven able to survive several months' winter flooding. Available only as >5m standards from Hilliers, it was found colonized by the White-letter Hairstreak in London in 2017.

PERFORMANCE

- +++ Stability (resistance to wind rock)
- ++ Resistance to exposure (leaf scorch, branch breakage)
- + Resemblance to native elm
- +++ Suitability for street planting
- + Rate of growth (height increase: 13cm, d.b.h. increase: 1.0cm p. a.)
- +++ Tolerance of waterlogging
- +++ Tolerance of drought

Wikipedia: http://en.wikipedia.org/wiki/Ulmus_%27New_Horizon%27

'Plinio' (not in commerce beyond Italy owing to elm yellows)

Hybrid cultivar: 'Plantyn' × *U. pumila*

Origin: Istituto per la Protezione delle Piante, Italy; released 2004



DESCRIPTION

'Plinio' is a Jekyll and Hyde character, forming an ungainly, unsteady tree with sparse, splaying branches and an often inadequate root system where grown on fertile soils (photo, left), whereas on thin, arid rendzinas (chalk soils, photo right) more substantial roots are stimulated, whilst exposure encourages sturdier, denser, topgrowth. NB. The suckering growth in the photo is from a neighbouring field elm, *U. minor*. 'Plinio' has proven one of the most successful cultivars trialed at the site on Ports Down (a South Downs outlier, drift geology Brickearth). The leaves are <6.5 cm long × <3cm broad, glabrous on both sides, but devoid of autumn colour. The tree is one of the most DED-resistant ever raised in the Italian elm breeding programme, but no longer available from Italy owing to prevalence of elm yellows there. Rarely planted in the UK.

PERFORMANCE

- ++(+) Stability (resistance to wind rock)
- +++ Resistance to exposure (leaf scorch, branch breakage)
- ++ Resemblance to native elm
 - + Suitability for street planting
- ++ Rate of growth (height increase: 60cm, d.b.h. increase: 1.3cm p. a.)
- ++ Tolerance of waterlogging (>3 months' inundation over winter)
- +++ Tolerance of drought

Wikipedia: http://en.wikipedia.org/wiki/Ulmus_%27Plinio%27

'Rebona'

Hybrid cultivar: *Ulmus davidiana* var. *japonica* × *U. pumila*

Origin: Wisconsin Alumni Research Foundation (WARF); released 1995



DESCRIPTION

'Rebona' bears a close resemblance to its sibling 'New Horizon', but requires less maintenance owing to a better leader. The tree develops a more fastigate pyramidal shape with ascending branches. The glossy clear-green leaves are of modest size, though slightly larger than those of 'New Horizon'. The tree was only included in the BC trials in 2016 and remains too immature for assessment. However others planted elsewhere in the UK have mostly grown well and should be able to survive prolonged winter flooding like its sibling. Flowering, and consequent fruiting is meagre, a trait inherited from its Japanese elm 'mother'. Available only as >5m rootballed standards. As its siblings 'New Horizon' and 'Sapporo Autumn Gold' both host the White-letter Hair-streak, it is a reasonable assumption 'Rebona' will do also.

PERFORMANCE

- +++ Stability (resistance to wind rock)
- ++ Resistance to exposure (leaf scorch, branch breakage)
- + Resemblance to native elm
- +++ Suitability for street planting
- ++ Rate of growth (height increase: 13cm, d.b.h. increase: 1.0cm p. a.)
- +++ Tolerance of waterlogging
- +++ Tolerance of drought

Wikipedia: http://en.wikipedia.org/wiki/Ulmus_%27Rebona%27

'San Zanobi'

Hybrid cultivar: 'Plantyn' × *U. pumila*

Origin: Istituto per la Protezione delle Piante, Italy; released 2003



DESCRIPTION

'San Zanobi' is a moderately fastigiate tree, the branches gradually arching to become pendulous with age. Lack of stability resulting from asymmetric root development was initially a concern, but has been overcome by better propagation practice. Nevertheless, roots should be carefully inspected on delivery. The glabrous, bright green leaves are <15cm long × <6cm broad, however like its compatriot 'Plinio', the tree lacks striking autumn colours. 'San Zanobi' begins flowering in its sixth year in the UK. Widely planted as a street tree in Italy, notably in and around the Villa Medici in Rome. Relatively easily propagated by hardwood cuttings taken in late February. 'San Zanobi' is now available from Hilliers, propagated by Eisele in Germany. Rarely planted in the UK beyond the BC trials sites, 100 were established on the Pan estate, Newport, Isle of Wight c. 2008.

PERFORMANCE

- +++ Stability (resistance to wind rock)
- +++ Resistance to exposure (leaf scorch, branch breakage)
 - + Resemblance to native elm
- +++ Suitability for street planting
- +++ Rate of growth (height increase: 103cm, d.b.h. increase: 1.6cm p. a.)
 - ++ Tolerance of waterlogging
- +++ Tolerance of drought

Wikipedia: http://en.wikipedia.org/wiki/Ulmus_%27San_Zanobi%27

'Sapporo Autumn Gold'

Hybrid cultivar: *Ulmus davidiana* var. *japonica* × *U. pumila*

Origin: Wisconsin Alumni Research Foundation (WARF); released 1975



DESCRIPTION

'Sapporo Autumn Gold' forms a rounded, open crown similar to that of the Field Elm *U. minor*. The leaves are narrowly-elliptical, <9cm long × <4.5cm wide; as the name implies, the leaves turn pale yellow in autumn. Flowering usually begins when the tree is aged six years. The oldest cultivar on trial, it remains one of the most resistant to DED, exhibiting just 2.8% defoliation and 1.2% die-back after inoculation in Italian trials, and has become the yardstick by which new cultivars are judged. The tree is known to host the White-letter Hairstreak in the wild in the UK. However, mature specimens planted at Mudeford, Christchurch, in 1985 were seriously damaged by Dryad's Saddle fungus, while many others have suffered branch breakage in storms, and consequently **cannot be recommended.**

PERFORMANCE

- ++ Stability (resistance to wind rock)
- + Resistance to exposure (leaf scorch, branch breakage)
- +++ Resemblance to native elm
- ++ Suitability for street planting
- ++ Rate of growth (height increase: 53cm, d.b.h. increase: 0.7cm p. a.)
- +++ Tolerance of waterlogging
- +++ Tolerance of drought

Wikipedia: http://en.wikipedia.org/wiki/Ulmus_%27Sapporo_Autumn_Gold%27

'Wanoux' = VADA

Hybrid cultivar: 'Plantyn' × 'Plantyn' selfed

Origin: Dorschkamp, Netherlands; released 2006 by INRA, France (patent holders).



DESCRIPTION

Last of the Dutch clones (No. 762) to be patented and released. Reported as being faster growing than LUTÈCE (in the French trials, VADA achieved 14m at age 20 years), this has been contrary to experience in Hampshire. Primarily intended for street planting, VADA is a fairly fastigate tree showing pronounced apical dominance. The stem tends to weave, but the rootstock seems impressively wind-firm. VADA, like LUTÈCE, leafs relatively late, in May. Leaves on vigorous shoots are large, glossy, and ultimately very dark. Towards the end of summer however, the foliage deteriorates, the lower leaves fall, bestowing a rather shabby appearance, though often remains free of blackspot. Available as bare-root saplings from France and as standards from the Netherlands. Planted widely in Paris, notably 300 in the Parc de Sceaux, and 92 in the Jardin de Tuileries.

PERFORMANCE

- +++ Stability (resistance to wind rock)
- +++ Resistance to exposure (leaf scorch, branch breakage)
 - + Resemblance to native elm
- +++ Suitability for street planting
 - ++ Rate of growth (height increase: 53cm, d.b.h. increase: 0.9cm p. a.)
 - ++ Tolerance of waterlogging
- +++ Tolerance of drought

Wikipedia: http://en.wikipedia.org/wiki/Ulmus_%27Wanoux%27

'Wingham'

Hybrid cultivar: (((*U. wallichiana* × *U. minor*) × (*U. pumila* × *U. minor*)) o.p. × (*U. × hollandica* 'Vegeta' × *U. minor*)) o.p. Origin: Istituto per la Protezione delle Piante, Italy; released 2003



DESCRIPTION

'Wingham' grown on fertile alluvial soils makes a fast-growing, amorphous tree with splaying branches, in some ways reminiscent of the Dutch/French clone LUTECE with which it shares some *U. wallichiana* ancestry. Given the strong 'Vegeta' (Huntingdon Elm) character of the foliage, it may be that the tree itself will develop into the ascending vase shape of the Huntingdon Elm with time. Between 2001 and 2009 at Castellaccia the plant averaged an extraordinary annual height increment of 194cm, complemented by a girth increment of 2.84cm. However, its performance on poor soils, notably on chalk and clay, has not impressed, and specimens on the South Downs have struggled to survive. Indeed, the tree appears to emulate the miscalled 'English' Elm *U. minor* 'Atinia' in its environmental preferences, notably fertile river valleys.

PERFORMANCE

- +++ Stability (resistance to wind rock)
- +++ Resistance to exposure (leaf scorch, branch breakage)
- ++ Resemblance to native elm
- ++ Suitability for street planting
- +++ Rate of growth (on fertile soils only)
- +++ Tolerance of waterlogging
- + Tolerance of drought

Wikipedia: http://en.wikipedia.org/wiki/Ulmus_%27Wingham%27

***Ulmus laevis* – European White Elm**

Species, grown from seed

Origin: Loire Valley, France.



DESCRIPTION

Ulmus laevis is an anomaly, a fast-growing species with little or no resistance to DED, but which nevertheless usually survives to great age by dint of Alnulin, a triterpene in the bark which deters *Scolytus* sp. (and also elm zigzag sawfly) from feeding on, and thus infecting, it. A unique, vast, surface root system enables it to survive anoxic ground conditions during prolonged (>100-day) winter floods. It has little value as timber or firewood, but makes an important amenity tree and host of the White-letter Hairstreak. The tree is most easily identified in spring by flowers and later seeds on 25-30mm-long stalks. In maturity, the roots form distinctive buttresses around the base of the trunk. Readily available from the continent. (NB Seed from EU often offered on Ebay is subject to the same DEFRA import regulation as plants). Occasionally offered by UK nurseries.

PERFORMANCE

- +++ Stability (resistance to wind rock)
- ++ Resistance to exposure (leaf scorch, branch breakage)
- +++ Resemblance to native elm
- ++ Suitability for street planting
- +++ Rate of growth (height increase: 80cm, d.b.h. increase: 3.9cm p. a.)
- +++ Tolerance of waterlogging (>3 months' inundation over winter)
- + Tolerance of drought

Wikipedia: https://en.wikipedia.org/wiki/Ulmus_laevis

9. Recommended trees commercially available in the UK

Countryside

Sheltered sites with moist, well drained soils:

‘Ademuz’

‘Fiorente’

‘Nanguen’ = LUTÈCE

Exposed downland with arid, chalk soils:

‘Ademuz’

‘Fiorente’

‘Nanguen’ = LUTÈCE

Sites with heavy soils, poorly drained, wet but not waterlogged:

‘Ademuz’

‘Fiorente’

‘Nanguen’ = LUTÈCE

Ulmus laevis

Riverside sites with alluvium, flooded for several months overwinter:

Ulmus laevis

‘Wingham’

Town

Parks & Gardens:

‘Fiorente’

‘New Horizon’

‘San Zanobi’

Streets:

‘Columella’

‘Fiorente’

‘San Zanobi’

‘Rebona’

‘New Horizon’

Riverside sites flooded for several months overwinter:

‘Rebona’

‘New Horizon’

Ulmus laevis

10. Bibliography

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11. Disease-resistant elm cultivars & *Ulmus laevis*: Suppliers in or to the UK

There is currently only one British nursery with Plant Breeders' Rights enabling propagation of patented DED-resistant elm cultivars for sale. Owing to historically poor demand, numbers imported by UK nurseries are usually low, except for standards supplied for street planting by Hillier Nurseries. Ergo, ordering well in advance is highly recommended.

Selective list of suppliers:

'Ademuz'

Peter Shallcross, Wallmead Farm, Tisbury, Wiltshire.
Saplings 1.5-2.0m, bare-root
W: N/A
E: peterjshallcross@gmail.com
T: 07974 140848

'Columella'

Hillier Nurseries, Andlers Ash, Liss, Hants
Standards 60-70cm girth, rootballed
W: www.hilliertrees.co.uk
E: hosseinarshadi@hillier.co.uk
T: 01794 368733

'Fiorente'

Peter Shallcross, Wallmead Farm, Tisbury, Wiltshire.
Saplings 1.5m, bare-root
W: N/A
E: peterjshallcross@gmail.com
T: 07974 140848

Hillier Nurseries, Andlers Ash, Liss, Hants
Standards 18-25cm girth, rootballed or in 45-litre containers
W: www.hilliertrees.co.uk
E: hosseinarshadi@hillier.co.uk
T: 01794 368733

'Morfeo'

Can no longer be imported from Italy; could be propagated from cuttings taken from trees in UK.

'Nanguen' = LUTÈCE

Frank P Matthews, Berrington Court, Tenbury Wells, Worcestershire
1.0m potted whips, and larger potted saplings
W: www.frankpmatthews.com
E: nick@frankpmatthews.com
T: 01584 810214

'New Horizon'

Hilliers Nurseries, Andlers Ash, Liss, Hants
Standards 10-70 cm girth, rootballed or (smaller sizes) in 45-litre containers
W: www.hilliertrees.co.uk
E: hosseinarshadi@hillier.co.uk
T: 01794 368733

Selective list of suppliers, cont.:

'Plinio'

Can no longer be imported from Italy; could be propagated from cuttings taken from trees in UK.

'Rebona'

Hilliers Nurseries, Andlers Ash, Liss, Hants
Standards 18-25cm girth, rootballed or in 45-litre containers
W: www.hilliertrees.co.uk
E: hosseinarshadi@hillier.co.uk
T: 01794 368733

'San Zanobi'

Hilliers Nurseries, Andlers Ash, Liss, Hants
Standards >4m high, rootballed
W: www.hilliertrees.co.uk
E: hosseinarshadi@hillier.co.uk
T: 01794 368733

'Wanoux' = VADA

Boomkwekerij Gebr. Van den Berk B.V., Sint-Oedenrode, Netherlands
Standards, rootballed
W: www.vdberk.com
E: info@vdberk.co.uk
T: 00 31 413 480480

'Wingham'

Frank P Matthews, Berrington Court, Tenbury Wells, Worcestershire
+1.0m bare-root whips, larger potted saplings available 2020
W: www.frankpmatthews.com
E: nick@frankpmatthews.com
T: 01584 810214

Ulmus laevis

Peter Shallcross, Wallmead Farm, Tisbury, Wiltshire.
Saplings 1.5-2.0m, bare-root
W: N/A
E: peterjshallcross@gmail.com
T: 07974 140848

Landford Trees, Salisbury, UK
Saplings 1.5-2.0m bare-root saplings (order before end of August)
W: <https://landfordtrees.co.uk/>
E: ed@landfordtrees.co.uk
T: 01794 390808

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