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Yew, a survivor

by Wim Peeters

Hardly known as a tree but nevertheless the oldest in Europe

The oldest tree in Europe, a yew, most probably grows in Fortingall, Perth and Kinross, Scotland. However the stem is split up in two separate parts, a phenomenon that occurs with yew, both parts are undoubtedly part of one single gigantic stem with a circumference of 1722 cm. So it is very odd to see that arborists hardly accept yew as being 'a real tree'. This can be due to the fact that yew stays rather small, or maybe it's because we do not have any really big yew trees in Belgium and Holland.

How old yews are has for a long time been a point of discussion. And until the seventies of the previous century, even in England, it was an accepted idea that even the oldest trees were no more than 250 years of age. Since the eighties, this idea slowly changed, however it is still to the present day impossible to date exactly these ancient trees. If you want to find out more about dating monumental yew trees you can take look at this link www.ancient-yew.org/s.php/how-old-are-yews/2/8.

Adaptability

For the oldest trees it is commonly accepted that they can be at least 1500 years old. For some other trees, as with the previously mentioned Fortingall Yew, even older ages are mentioned. They would date from pre-Christian times. Whatever the exact age, yew is nowadays accepted as the oldest living tree in Europe. The reason why this tree can reach such an old age can give us an insight into the survival strategies of trees. The first and most important point is that trees can only reach old ages when they will not be cut down by humans. The cultural and historical reasons why this tree has not been felled would lead us too far; it is the biological explanations we are interested in.

Yew can grow on any type of soil as long as it is not too dry or, more importantly, too wet. Furthermore, yew can just as easily grow in the shade under big trees as in full sun. Yew seedlings can thus easily grow under the protection of big trees. As these trees become old and start to slowly die back, yew is able to adapt to the changing situation. They can easily withstand full sun, while seedlings of other trees will hardly get a chance, which will result in a closed canopy of a pure yew stand. In the end you will reach a yew forest as can be seen in Kingley Vale, Sussex, England, in Reenadinna Forest, Kerry, Ireland, in Druid's Grove, Surrey, England and at St Baume, Tarn-et-Garonne, France. Yew can easily adapt to a changing situation as long as it is not a sudden change.

Ring of trees

Another advantage of this species is that it will not become very high. However although trees of up to 20 m do occur, most trees are hardly 15 m. In addition they grow very slowly. They take time to form their structure. This slow growing implies that the stem and branches also thicken very slowly. Just like any other tree, yew has to deal with an overload that will make the branches bend and even

break. Because yew stays rather small and very slow growing, and also because the wood is very strong, it takes a really long time before this gain of weight causes the branches to break. In Mandeville, Eure, France a tree with a circumference of 690 cm with a complete crown and a stem without any hollowing can be found. It is an exception, but it can give an idea about the time it takes before degeneration starts for the yew.

Because the tree is rather low, it very often occurs that branches partially crack or just bend to the ground and go on growing. These branches can root so new trees are formed which will add to the stability of the tree. In this way a ring of young trees is formed around a hollowing stem that can go on thickening. A beautiful example is to be found in Ormiston, East Lothian, Scotland. But even when a tree falls, it is not absolutely lost. As long as part of the root survives and stays connected to the soil, the tree can grow on. Examples can be found at Kingley Vale, Sussex, England, at Bennington, Hertfordshire, England and at Cofton Hackett, Worcestershire, England.

Internal Roots

When branches break, heartwood will be exposed and because heartwood is not able to form a reaction zone, will slowly rot. As the wood is not just very strong, but is also very resistant to rot, it will have enough time to form a wall of healthy wood, thick enough to support the tree, although the tree is slow growing. It is remarkable that the heartwood will rot faster than the sapwood. Or more correctly: the sapwood will take even more time to rot away than the heartwood. There are numerous examples of hollow trees with an outer shell of dead sapwood around a hollow stem. On a well known pen and ink drawing of the tree in Bettws Newydd, Monmouthshire, Wales, made in 1890, the hollowing of the stem is very well visible. In the year 2011 there is hardly a difference because the sapwood still stands. In the hollow, where once the heartwood was present, the tree has formed a new stem, with a current circumference of 220 cm, from an internal root. This internal root is another feature that helps the species survive a very long time. When the heartwood is rotting, in the organic waste that will be formed inside the stem, roots can be formed. When a root makes contact with the soil, the root can develop into an internal stem. The tree in Ninfield, Sussex, England has a stem that appears to be formed from internal roots, while the original stem has rotted away.

Adventitious buds

Yew is also very resistant against fungus. The only species that can be found on a regular basis is chicken-in-the-woods, *Laetiporus sulphureus*, which will cause cubic rot, but even for this species it is a hard job to break the barrier zone. As chicken-in-the-woods breaks down the cellulose and only lignine will stand, the wood becomes more brittle. When branches after a long while break, the overload they have had to deal with will be solved. The tree will become hollow, less heavy and more flexible. It is to be considered whether the relation of chicken-in-the-woods and yew should rather be recognised as a symbiotic instead of a parasitic relationship; a vision that gradually gains acceptance.

Yew has an exceptional advantage as it is one of just a few conifer species that is capable of forming young shoots from adventitious buds. When branches break, the tree can compensate for this

overload, but only when it has formed a new crown. Therefore these adventitious buds are indispensable. Without adventitious buds there will be no new branches, and for the trees' sake the more it forms, the better. When branches break, the tree has to recover, and recovery costs energy. So the tree has to do as much photosynthesis as possible. And therefore the tree needs its leaves preferably to be as close to the broken branch as possible. The more leaves the tree has, the better and the more efficiently it can recover. This renewal from adventitious buds is a smooth process in the yew, whereas with the oak, for example, it is not so smooth. It can happen that a yew, after hard pruning or extreme breaking of branches, is not able to form any, or sufficient shoots. In Llanlleonfel, Powys, Wales a tree did not sprout again after injudicious pruning and died. It also happens that a tree, after being pollarded, sprouts again, but will not be able to form a sufficient barrier zone, and this will cause the tree to die after one or more years, following the pollarding. Another advantage of these adventitious buds is the ability to form new shoots on the trunk and the trunk base, just as with lime trees. And although yew forms fewer new shoots on the trunk base than lime, they can both form new stems that can build their own roots to guarantee the survival of the tree.

For arborists it has been known for a long time that a hollow tree has as much survivability as a tree with a vast stem. When a yew tree starts to break down, it can happen that parts of the stem die. However, the living parts can break down into several independent pieces, which increases the survivability of the tree.

A very long life

All these elements together can cause the tree to live nearly forever. In the juvenile stage, say the first five hundred years, the tree usually has a vast stem. But when the tree ages, this slowly evolves to a hollow ring, surrounded by young trees, while it happens that inside the hollow stem a new vast stem will be formed. In the end this will result in a set of young and old trees that form an impenetrable bunch of what appear to be individual trees, that in fact are originated from one single seed. How long a tree will take to grow into such a form, will most probably stay an open question.

Image 1

The tree in Le Mésnil Ciboult, Orne (France) has a circumference of 1247 cm and a height of \pm 8 m. The hollow stem has been emptied, but at the edge of living and dead wood an internal stem is forming that will be able to close the hollow stem from within.



Image 2

Both in England, Wales, Scotland, Normandy as Brittany, you can discover an old cemetery with old yew trees. Trees that can make us in Belgium and Holland just dream about it. (Capel-y-ffin, Powys, Wales)



Image 3

At Kingley Vale, a nature reserve close to West Stoke in Sussex, England, you can find hundreds of yew trees. About twenty trees have a circumference of about five metres.



Image 4

Layering



Image 5

The heartwood of this tree in La Chapelle Caro, Morbihan, France, is clearly infected by chicken-in-the-woods, what causes cubic rot. The sapwood however stays intact while the heartwood will slowly rot away.



Image 6

In Tandridge, Surrey, England, it is easy to see how the roots of this enormous tree grows far beyond the crown and the root protection zone.



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