

THE CHALLENGES OUR WOODLANDS FACE

TODAY AND TOMORROW

Speaking at the RFS Open Day **John Weir** asked that we consider new approaches to increasing the long-term resilience of our woodlands.

Our woodlands have been managed successfully during the last century under the assumption that the environment they are growing in will be relatively stable. This key assumption is now proven to be flawed.

Over the last ten years there has been a significant increase in the number of pests and diseases attacking our trees, and this is compounded by the challenges of the changing climate.

We have the knowledge, and I believe the imperative, to act now to ensure that the woodlands we manage and plant will be resilient to these challenges, and we will leave a sustainable resource for those who come after us.

Our Resource

I left forestry school in 1980 armed with the knowledge of best silvicultural practice and a lot of information about matching tree species to soil types. The forest industry I joined had entered an era where technology was able to manipulate site conditions to suit the growing of single species. I remember well not only heavily cultivating the site to manipulate soil moisture regimes, but changing the nutrient status through the application of fertilisers and herbicides to control heather and grasses. In doing so I personally was responsible for many thousands of hectares of Scotland being covered in Sitka spruce. Many of my colleagues were achieving similar excellent results to the south with Corsican pine. Whilst many of my friends suggested that this was not sustainable, I would challenge them with the outputs of the financial appraisal accounts I worked with.

This all started to change as we went through the 1990s into this century with the driving mechanism for woodland expansion being grant

aid, targeted for conservation, ecology and access. This resulted in new woodland planting in England being of native tree species, sourced locally and a low stocking density with little regard to timber quality. Depending on your viewpoint this has created either a haven for nature, within an accessible expanded woodland landscape, food for grey squirrels or simply a green wash rather than productive forestry.

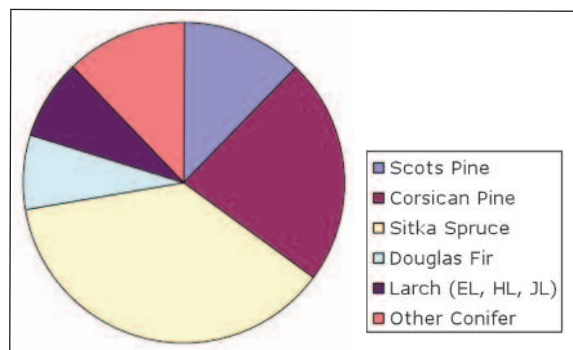
The end result of this is that today five conifer species account for 88% of the conifer total whilst similarly five broadleaf species made up over 72% of the broadleaf total.

Put the two together and ten tree species account for 80% of the whole woodland cover.

Pests and Diseases

Dutch elm disease affected the country in two waves. The second wave in the 1970s effectively removed this species from much of our countryside. Time healed those sad memories and many people put this biosecurity issue to the backs of their minds.

The spruce bark beetle gave our industry quite a fright and many will remember the sanitation zones; fortunately our scientists were



Conifer species today.

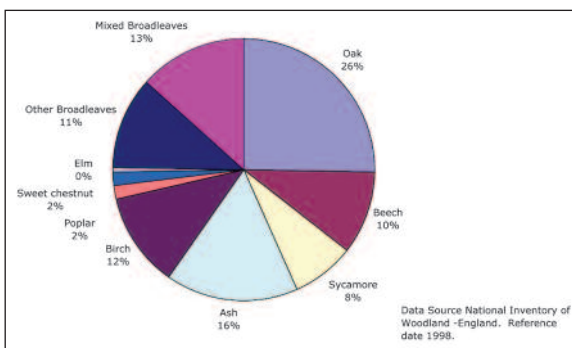
able to help and introduced an effective predator. Today the population of this pest is at a manageable level. However, in the western seaboard of America there is a shoot weevil that has had such an impact on Sitka spruce that they no longer plant it commercially. Let's hope that one never gets here.

Now we have *Dothistroma* needle blight on Corsican pine and *Phytophthora ramorum* on Japanese larch, to name the most well-known pests and diseases, and it's clear our current range of conifer species is very much challenged.

Many broadleaf growers have expressed their concerns about the oak declines and there are suggestions that this problem is increasing. The oak processionary moth has the potential to seriously accelerate these declines if it succeeds in causing serious defoliation out in our forests. In addition, the southern beeches are being negatively impacted by *Phytophthora pseudosyringae*.

Squirrels in many parts of England make the growing of quality timber a challenge, whilst deer numbers have never been higher.

Last autumn we all were given a real wake-up call. Chalara dieback of ash was identified in the wider environment in England. We should not have been surprised as this disease had been marching across Europe towards us for the last ten years or so. Just prior to this we found that a considerable amount of young planting stock already had the disease. It turned out that forest industry is highly dependent on importing young trees from Europe. There were those that try to blame government for allowing the importation but I suggest we should look to ourselves. It is



Broadleaf species in England by species.

the grower that puts the pressure on the nursery producer to carry the risk of what to grow, how much and at what price. How many of us have a conversation with our nursery producers, never mind carrying some responsibility ourselves by contract growing? They made no secret of what they're doing.

So how did all these diseases get to this country? We know the answer, it's in the movement of plants, or at least the majority of it is. Whilst seed is not a risk-free way of importing plant material, it certainly carries less risk than importing whole plants and the associated earth. I do not think it would be possible, certainly in the short term, to grow all our requirements in the UK, but it should be something that we aspire to. If we want this to happen we must do what we can to make the nursery producers' role more practically sustainable. In other words we must recognise the importance of this partnership in making our woodlands more resilient for the future.

Our Tree Species Heritage

After the last Ice Age the English Channel formed around eight and a half thousand years ago. This event limited our country to around 35 native tree species. Only three of these were conifers, of which only Scots pine makes high forest. Mankind, in managing the broadleaf resource for its own use, reduced the high forest species to five dominant species. However, until only very recently, mankind has not been precious about the origins and uses of trees. It's not clear when species such as sycamore came to our shores but we think that the Romans probably brought sweet chestnut. The Victorians were fanatical tree collectors and this has had a huge influence on the trees we grow today. Whilst it seems only like yesterday to me that the rows and rows of dark conifers on the hills were being objected to, today there is a generation who probably believe they are native and certainly enjoy taking their recreation within the forests and are now concerned when they are harvested.

Sometimes I hear the question asked, how native are native trees? There can be no doubt that in our timber producing broadleaf trees there

has been a lot of movement of tree seed. Records show that the acorns have been moved long distances.

I believe that we must use a much wider range of conifer and broadleaf species. There is plenty of evidence in our existing forests, arboreta and gardens to help us decide which tree species we can grow to diversify the growing stock.

I've had the privilege of viewing the Post World War species trials laid down by the Forestry Commission (known as the forest gardens) and many of the stands established using what is known as the Anderson principles before the era of mechanisation. There are species within these that are performing so well that it is hard to understand why they did not get more use. Coast redwood, Japanese cedar, Oriental spruce, Wellingtonia, Macedonian pine, the true cedars, to name but a few of the conifers that are less well used. All these have the potential to produce construction grade timber if the correct silvicultural practices are adhered to. Our industry is used to white wood achieving between C16 and C24. It will be a while before significant quantities of these species will come to the market. Then there will be challenges of processing and marketing the wood, but maybe the fact that many of the species has a more durable hardwood will be a selling point.

The ambience and feel of our native woodlands is something that I think is so important that we should not risk changing it. However I do not mean that we should carry on as we are. There are more native species that we do not make much use of, such as small leaved lime and hornbeam. There are species of trees that some refer to as our adoptive natives: sycamore and sweet chestnut, for example. Looking to the near continent there are other species. Should we consider making more use of the exotic broadleaves already widely grown within the UK such as red oak and tulip tree?

One critical thing we must remember is that no two trees have exactly the same requirements and if we wish to use this wider palette successfully we must match the tree to the environmental conditions we expect it to grow in.

Climate Change

Things are changing, of that I have no doubt. Leaf opening of oak trees is now some three weeks earlier than recorded in the middle of last century. There are certainly more extreme and frequent weather events. In the garden centres there are more southerly plants than ever before.

Our Native Trees

I hear comforting words like "our trees have seen these things before, they are long-lived things they can cope". The scientists say the rate of change we are facing is unprecedented. Crude interpretation of the figures suggest the rate of change may be the equivalent of moving south at a rate of three miles per year. An animal may be able to move this quickly but plants certainly can't. Ecologists say, that given time, our forests will adapt, but how long will it take? Can we as a society, with our dependence on our woodlands, wait for this to happen? Then I hear my own statements being played back to me that we have, over the centuries, already imported more southerly and continental seed origins into our stands so maybe we need to do nothing.

Reading through the literature from Forest Research it appears that if one takes a tree species 2° latitude northwards from a similar elevation and continentality it will outperform the local trees. This appears to be some sort of adaptive lag as the trees migrated north after the last ice age. Since these papers were produced it is now acknowledged that there has been an increase in temperature of around 1°C. Many are now suggesting that we already can move plants safely 3° north and as an insurance against the future we should include an element of trees from up to 5° south. It would seem prudent to me that we should adopt this as a planting strategy and in doing so recognise that the south of the country should look to France, whilst southern England can help middle England and middle England possibly help southern Scotland.

I think it's also worth remembering that our native trees have ranges that cross a lot of Europe and therefore have adapted to those climates. Provenance may have an important role in our future native trees success. We must also be careful and listen to the scientists' advice. In oak,

A Strategy for Sustainable Forestry

- We must diversify the tree species we use.
- We must give more consideration to the genetics of the tree species.
- We must talk with our nurseries.
- We must take biosecurity much more seriously.
- We must use the knowledge that is available to us.
- We must not procrastinate - we must act decisively and quickly.

for example, it is recommended that we should not use eastern European provenances, indeed the advice is that it would be better to delay planting rather than to use such material.

Recently I found out that much of the oak resource in our nurseries is from Eastern European origin, due to a bad mast year in the UK and Western Europe. This very much against the best scientific evidence. However, nurseries tell me that many agents cannot afford to delay planting or simply specify oak and do not seek any further detail. Is this wise?

Where tree breeding has taken place using selections of superior trees from across a range of latitudes this seems an equally sensible strategy. This is very much where the good work of the Future Trees Trust is applied. If the tree breeding is available from a bit further south than your location so much the better.

Conifers

One of the most significant challenges of a changing climate will be the frequency of drought years. This will be a more likely occurrence on the east of the country. In the Grampian region of Scotland Sitka spruce has already shown that drought crack can be a serious issue. Modelling of climate impacts on much of the North York Moors, as an example, suggest that much of the current Sitka spruce crop will not be sustainable by 2050.

To the west of the UK productivity may well rise as a consequence of climate change. This increased warmth may also be conducive to further outbreaks of pests and diseases. I believe

the key will be to diversify the range of species we use, ensure that we have the right tree species in the right environment and ensure that the provenances of species we plant are matched to our future climate scenarios. Most of our American species have significant natural ranges that we have not needed to exploit up until now.

Other European countries have also exploited the American tree species but have used provenances better matched to their climate. In fact whilst we bred and improved Queen Charlotte Island Sitka spruce, Southern Ireland and the Danes have bred and improved Washington Sitka spruce. The French have done equally valuable work with Douglas fir from slightly more southern origins than that done in the UK.

The knowledge

Forestry Commission England has put together a web area, www.forestry.gov.uk/climatechangeengland to bring together evidence and knowledge to allow people to make their own decisions about how they could make their woodlands more resilient. The web area links to good work from Forest Research and, where possible, tries to remove some of the ifs and buts about the evidence to allow people to take decisive actions.

Key to this decision-making is the free-to-use online support tool, known as ESC 3 (Ecological Site Classification). This tool covers 57 tree species and they are matched to environmental constraints such as exposure, nutrients and soil moisture. The tool requires an accurate grid reference to allow it to access meteorological data and topographical information and a very basic geological map. If the practitioner takes the time to put into the tool good data from soil pits or vegetation, the outputs can be pretty reliable. It is recommended that users take the time to read the supporting literature and become familiar with the limitations of the system; it is after all only a decision support tool.

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