

Plant health: a seed supplier's perspective

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As seed is at the very start of many supply chains it is essential that we get all aspects of supply right from sourcing the seed through to dispatch to our customers.

Seed is generally considered to be low risk from a disease point of view and we comply with all government regulations and legislation to ensure that the risk of disease entering and moving round the UK is minimised. This includes having seed from outside the EU phytosanitary tested, being inspected to enable us to issue Plant Passports and notifying DEFRA before we import species such as *Quercus*, *Pinus* and *Prunus* from elsewhere in the EU. We actually go further than required, for example we don't import *Castanea* seed at all because we feel that the risk of importing disease such as *Ceratocystis platani* is too great even if we comply with the regulation that does actually allow imports from Pest Free Zones.

Once seed is collected and extracted, it is cleaned to remove potential contaminants. We then use various methods to reduce the risk of disease being present on the seed, for example, the high temperature in our kiln has been shown to kill *Ciboria* and Red Band Needle Blight.

However, ensuring that we have healthy forests in the future goes far wider than just ensuring that the seed itself is disease free. We also have to look at the resilience of the plants that seed produces.

DEFRA Tree Health Management Plan

The document describes how the Plant Biosecurity Strategy for pests and diseases of trees in England is starting to be implemented; it builds on the Tree Health and Plant Biosecurity Action Plan. This states that "threats to our tree population have increased along with globalisation

of trade . . . In addition, trees are facing other pressures from changes to our climate. Therefore, the Government believes we should build the resilience of our tree population to minimise the impact of pests and diseases".

In relation to building resilience they state that:

- The use of healthy planting stock is critical to the biosecurity and resilience of our tree population
- Diversity in tree supply and genetics within tree species is at the core of woodland adaptation

This view is backed up by statements in the OECD Forest Seed and Plant Scheme such as: "emphasis should be made on preserving species diversity and ensuring that height genetic diversity within species and seed lots thereby enhancing the adaptive potential of Forest Reproductive Material".

Diversity is key to risk reduction

Not just for climate change and environmental reasons but also to enhance a forest's ability to deal with threats to its health. When we look

at the challenges our forest species have faced in the past they have been characterized by the shock of the unexpected infiltration of pests or diseases. We know that in the future we will face further challenges but we have no idea of what they will be. These are the 'known unknowns'; we know that unknown disease challenges will occur, driven by continuing globalisation of trade of goods and movement of people.

Diversity and resilience are two of our best weapons to tackle the increased risks that the modern generation of foresters face. Existing regulations provide an initial framework that we need to follow, for example the EU FRM (Forest Reproductive Material) regulations state that seed collections should be made from balanced quantities of seed from at least 30 trees across the whole area. This helps to ensure that genetic diversity is maintained. It also states that "trees must in general be free from attacks by damaging organisms and show resilience to the adverse climate and site conditions in the place where they are growing". To ensure future profitability compliance with this needs to be balanced against the need for efficiency and quality gains. At Forestart our aim is to help the industry achieve this balance.

When seed is collected from the wild we pick from as many individual trees as possible to ensure that the resulting seed lot has diversity and therefore more potential resilience than a collection from a single tree where offspring are closely related. Seed orchards allow us to collect from trees that have been selected to produce better quality timber trees but even these are designed to ensure genetic diversity. For example, our Sitka spruce orchards contain a least 40 clones which allows us to capture the vast majority of the desired genetic diversity of the population. We could have fewer clones and thus have a higher improvement rate in specific traits



Collecting Noble fir





iversity of Sitka spruce the UK. This work could also be applied to other forestry species.

Technologies for future forest profitability

To ensure the future profitability of our forests we must take advantage of the technologies at our disposal but use them wisely. The use of vegetative propagation allows us to take advantage of the best genetic gains our breeding programs have to offer. The advice is to use seed of at least eight or nine families in a planting scheme. Using vegetative propagation and seed grown material together will help to maintain genetic diversity. The use of somatic embryogenesis is a further step along this road so even more consideration needs to be given to ensure diversity. For example, in Sweden lines are destroyed after a production run and that particular cross is not used again.

Another area of research that we are involved with is the Sitka Spruced project which is mapping the Sitka genome. This is being led by Oxford University and will provide the industry with valuable information about which gene controls which aspect of Sitka. This will provide us with the tools to monitor and manipulate the genetic diversity of our trees and could enable us to breed trees that produce seeds and cuttings that are resistant to pests and diseases. We are proud to be involved in projects that are looking at the basis of genetic influence on resistance to pests such as hylobius, and drought and frost tolerance. In the future this work could be extended to many other areas of plant health in many different species.

The forestry industry has a well-established knowledgebase. This is our first line of defence in the battle against destruction of our livelihoods by the onslaught of pests and disease exasperated by climate change and globalisation.

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Forestart is a supplier of tree seed to nurseries, landowners and managers.



INTERNATIONAL YEAR OF
PLANT HEALTH

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<http://www.fao.org/plant-health-2020/en/>