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Personal information

I am a plant pathologist with a PhD from Manchester University (1975) for plant disease research. In December 1975 I was appointed as a project leader at Forest Research (then the Research Division of the Forestry Commission) at Alice Holt Research Station in Hampshire, working mainly on diseases of beech and poplar and on wood decay in amenity trees. After retiring early from Forest Research in 2002 at Civil Service Grade 7, I have worked part-time as a lecturer on tree diseases at institutes including Imperial College, the Kew School of Horticulture and Harper Adams University. I have also worked as a consultant, expert witness and author, specialising in tree-related risk to people and property, as well as the biology and care of veteran trees. My work on tree diseases has contributed to my awareness of the risks associated with international trade in trees and tree products.

Here, I focus on tree biosecurity, which is addressed mainly in Qu. No. 3 of the Committee's request for evidence.

Qu.1 Are the UK Government's targets for increasing forestry coverage, and tree planting, for England and the UK sufficiently ambitious and realistic?

The Government is committed to planting 11 million trees by 2022 and to establishing 30,000 ha of new woodland in England annually by 2025. These targets may, I think, be over-ambitious and unrealistic for the following reasons:

- the current rate of planting in England is said to be currently well below the latter target;
- there is cause for concern about (a) hasty and perhaps counter-productive planting in unsuitable places and (b) biosecurity risks associated with importing large numbers of trees for a major planting programme.

An over-ambitious tree planting programme would probably impair biodiversity and biosecurity, as I have mentioned under Qu. 2 and Qu. 3 respectively. Planting at carefully chosen sites can, however, be good for biodiversity while fulfilling an international commitment towards carbon fixation.

Conversely, the targets may be under-ambitious if they are intended to contribute substantially to achieving nett-zero carbon emissions by 2050. Moreover, tree planting is counterproductive if it leads to depletion of soil-based carbon or to an increase in carbon emitted from the food production that has been displaced overseas by conversion of UK land from agriculture to forestry.

Qu. 2. Are the right structures in place to ensure that the UK wide target for increasing forestry coverage is delivered?

No comment.

Qu. 3. How effective is the co-ordination between the four nations on forestry issues, including biosecurity, plant health and other cross-border issues?

Biosecurity: general considerations

Tree biosecurity depends on the capacity to prevent the introduction and establishment of alien pests and pathogens, which could harm existing trees with consequent loss of stored carbon and of biodiversity. There is especial cause for concern about ancient and other veteran trees, which sustain priority wildlife habitat-types such as wood-pasture. The British Isles are to some extent protected from alien pests and pathogens that cannot readily disperse by natural means across a marine barrier. England, Wales, Scotland and Northern Ireland therefore have all the more reason to strengthen measures against the introduction of these harmful organisms through cross-border trade.

Existing measures for tree biosecurity in the UK

The nations of the UK rely on the Plant Health Risk Register, compiled after the presence of ash dieback disease in the UK was detected in 2012. The Register lists 1,225 plant pests and pathogens[1], described collectively as 'pests'. A risk rating for each listed pest helps to indicate whether special measures are needed in order to prevent its introduction or establishment in the UK. For certain pests, a 'plant passport system' (under EU regulations) allows high-risk plant species or plant products to be imported only from approved places of origin. Also, imported plants or plant products can be inspected at ports of entry for the presence of alien pests.

Fundamental weaknesses in the plant passport system and in plant health inspections include the following:

- Many pests can be cryptic during early or asymptomatic stages of development. Many others can be concealed in planting media. A pest could therefore escape detection (a) in a country or region from which it is believed to be absent, or (b) in the course of plant inspection in a receiving country.

- Even if a pest is readily detectable (perhaps using new technologies in addition to conventional visual inspection), it could escape detection if plant inspections are insufficient in frequency or rigour.

- Some potential pests are currently indistinguishable from relatively harmless 'look-alike' species which are already present in the UK. Clearly, such organisms cannot be included in the Plant Health Risk Register until they have been discovered for what they are; perhaps too late to avert a disaster.

[1] The number of 1,225 pests includes sub-species and variants, and thus exceeds the number of species.

- Even if an organism is known as a pest overseas, the risk that it poses could be under-rated (or over-rated) if insufficient is known about its potential behaviour in the UK, where unaccustomed conditions may exist with respect to potential host plants, natural enemies and climate.

Protective measures against alien pests have often failed, sometimes with very serious consequences. Evidence from Brasier (2008) showed that failures were very likely to continue unless plant health controls could be significantly strengthened (but this is difficult within the scope of European Union regulations). Despite Brasier's status as a world expert on Dutch elm disease and on *Phytophthora* diseases of trees, his advice was apparently given little attention until ash dieback disease caused alarm in 2012. The subsequent compilation of the Plant Health Risk Register has been helpful but there remains a need for more effective plant health measures, especially in order to address risks associated with the importation of trees for a major planting programme.

Illustrative examples of biosecurity risk factors

The nature and scale of the risks can be illustrated by the following examples of particular pests, which have overcome (or could easily overcome) the present system of plant health controls in the nations of the UK.

Ophiostoma novo-ulmi, the cause of the 'aggressive' form of Dutch elm disease

In the late 1960s or early 70s, this fungus was imported into the UK on North American elm logs, from which emergent bark beetles carried the fungus to previously healthy trees. The source was discovered only severe outbreaks of Dutch elm disease began, especially around ports of entry. The disease, in its 'non-aggressive' form, was already known to be long-established in the UK and also in the USA and Canada. On both sides of the Atlantic the disease was believed to be caused by a single species of fungus: *Ophiostoma ulmi*, which had become manageable under UK conditions. There was therefore no obvious need to prevent the importation of *O. ulmi* from other countries where it was known to occur.

If the more aggressive fungus *O. novo-ulmi* (arising from hybridisation and then unknown to science) had been discovered alongside *O. ulmi* in North America, the UK could have imposed control measures in order to avert its introduction. There was, however, no obvious reason to suspect its existence in N. America, where its effects on American elm (*Ulmus americana*) were apparently indistinguishable from those of *O. ulmi*. In contrast, it eventually distinguished itself from *O. ulmi* when its aggressiveness towards European elm species led to its discovery through years of painstaking research; long after most of the UK's large elm trees had succumbed.

A lesson from Dutch elm disease is that we should be prepared for the potential introduction of 'look-alike' pests, which are indistinguishable from pests already present in one or more of the nations of the UK. A major tree planting programme could increase the risk posed by look-alike pests such as *O. novo-ulmi*.

Hymenoscyphus fraxineus, the cause of ash dieback disease

Like the previous example, this fungus is a 'look-alike' relative of a fungus already known in the UK, i.e. *Hymenoscyphus albidus*, which harmlessly colonises the foliage of European species of ash, including common ash, *Fraxinus excelsior*. Through co-evolution with the host species, *H. albidus* is not hindered from colonising leaf tissue but it is confined within this tissue and cannot harm the rest of the tree.

The alien 'look-alike' fungus, *H. fraxineus*, has a similarly harmless relationship with Manchurian ash but it can invade branches and stems of newly encountered host species, such as our native common ash, often killing the entire tree eventually.

Hymenoscyphus fraxineus reached the UK many years after becoming established in mainland Europe, perhaps through importation of Asiatic ash plants into the Baltic States. In the early 1990s ash trees were increasingly observed to be declining and dying in those countries. Similar observations ensued in central and western Europe but a 'new' disease, caused by a hitherto unknown fungus, was elucidated only much later. By then, the fungus had reached the UK on imported trees and/or via wind dispersal of spores across the sea.

Unlike Dutch elm disease, ash dieback disease was difficult to recognise as a distinct condition when it first emerged in Europe but it similarly demonstrates the risk posed by pests that are unknown and therefore unregulated. Until this risk is mitigated by regulating not only specified pests but also general pathways of introduction, trees should not be imported in order to serve a major planting programme.

Cryphonectria parasitica, cause of sweet chestnut blight

This Asiatic fungus kills the inner bark of sweet chestnut (*Castanea* spp.), often sufficiently to kill entire trees. Following introduction to North America many decades ago, it killed almost all large specimens of the American sweet chestnut (*Castanea dentata*). In mainland Europe it interferes with the cultivation of European sweet chestnut for nut production. Unlike the two above fungi, which were unknown to science until they wrought havoc, *C. parasitica* has long been subject to plant health controls, according to EU regulations. Nevertheless, the controls have evidently failed, given that the fungus has been found in sweet chestnut trees planted in the UK after importation from the continent. The lesson is simple: existing plant health measures such as plant passports or plant inspection are failing to protect our trees even from well-documented major pests, let alone pests whose existence is not yet known.

Phytophthora species: fungus-like organisms, with root-killing and/or bark killing potential

The fungus-like *Phytophthora ramorum* is one of many *Phytophthora* species introduced to the UK through international trade in plants. Most *Phytophthora* spp. can affect a very wide range of host tree species and they sometimes start attacking previously unaffected hosts, such as Japanese larch,

which has been lethally affected by *P. ramorum* in the UK (Forestry Commission, 2017). *Phytophthora* spp. can cryptically infect nursery trees and they can survive in a dormant state in soil for many years. They spread very easily through international trade and, owing to their wide host ranges, they pose great risk to trees and other plants in almost every conceivable situation. Importation of trees for a major planting programme will increase the importation of *Phytophthora* spp. Also, given that these organisms are spread by soil disturbance, a planting programme could contribute further to their prevalence, which is already increasing because of climate change (Brasier & Scott, 1994).

Anoplophora glabripennis, the 'Asian longhorn beetle"

This large beetle, a native of China, seriously damages many tree species. Its larvae tunnel through sapwood, disrupting water conduction and physically weakening trees with consequent public safety hazards. The adults cause further harm by feeding on the bark of twigs and small branches. The beetle has caused very serious and costly harm in North America and has also colonised parts of mainland Europe. Given that its larvae are hidden in sapwood for a few years before they emerge as adult beetles, it can escape the attention of inspectors. The larvae can breed not only in nursery trees but also in 'green' wood products such as packing materials, as in the case of an outbreak in Kent in 2012 (Forest Research, 2020). This outbreak appears to have been eliminated but only through an aggressive programme of preventive tree felling. The lesson is that we cannot rely on control measures dependent on the detection of pests with a cryptic stage in their development.

Xylella fastidiosa

The above fungi and insect illustrate key lessons for proponents of a major tree planting programme. They are only a small selection of many pests that have evaded plant health controls. Others, not recorded in the UK, pose a very serious threat. One example is the bacterium *Xylella fastidiosa.* Its several sub-species are recognised as a major threat because they cause severe disease in many trees and other plant species. They are believed not to have become established in the UK but could easily become so, given that they are spread by common sap-sucking insects (leafhoppers). Unfortunately, plant passports are very unlikely to provide assurance of *Xylella*-free status in trees that are imported for planting in the UK. This is admitted in a Defra statement: "*Evidence from the European Food Safety Authority also highlights that infected plants may not show symptoms for long periods, making it more challenging to confirm that plants are disease-free before they are moved*." (Defra, 2020).

Implications for a major tree-planting programme in the UK

Given that potentially devastating pests can be imported with trees, the likelihood of such occurrences will increase if large imports are needed to sustain a planting programme. Preference should in my opinion be given to natural regeneration, including the expansion of existing hedgerows, copses and shelterbelts, together with the managed establishment of scrub. Such

methods help to ensure that locally adapted and thus perhaps more resilient genotypes of trees will form future woodlands. These methods may also help to minimise soil disturbance and the movement of machinery, which are a major risk factor in the spread and propagation of *Phytophthora* spp. which are extremely harmful as mentioned above.

Qu. 4 Why were previous ambitions for increasing tree planting in England not met and what lessons should be learned?

No comment.

Qu. 5 In relation to increasing forestry coverage in England, what should the Government be trying to achieve? For example, how should the following policy objectives be prioritised?

- **Mitigating or adapting to climate change;**
- **Promoting biodiversity and nature recovery;**
- **Increasing biosecurity and plant health;**
- **Improving human well-being and health;**
- **Protecting natural and cultural heritage;**
- **Food security;**
- **Creating commercial opportunities from forestry, tourism and recreation; and**
- **Any other priorities?**

Compared with mainland Europe, the UK has a relatively small tree cover. An accelerated increase in cover may therefore be regarded as improving the balance of land use, while also helping to achieve a nett-zero carbon budget. Dense planting of trees in the 'wrong' places can, however, be very harmful to biodiversity that has developed in non-woodland or lightly wooded situations, especially wood pasture or ancient parkland over many centuries. Also, natural regeneration from existing trees and shrubs would enable woodland cover to be increased in many areas without the risks associated with imports for planting.

Most of the above listed objectives can, in my opinion, be served by adopting a strategy for establishing trees (preferably by natural regeneration) in places where they will help to re-connect habitats that have become isolated by intensive land use and by the building of infrastructure and housing. Re-connective 'corridors' can, however, also aid the dispersal of alien pests and pathogens, as can the planting of trees and shrubs along roads and railways. It is therefore essential that biosecurity is not compromised by the importation of pest-infested plants to serve a planting programme.

Qu. 6) Are the right policies and funding in place to appropriately protect and manage existing woodlands in England? How will prospective changes to policy and legislation effect this?

Wood pasture, ancient parkland and other areas with open-grown (often ancient) trees could be harmed or destroyed if current policies and funding incentivise the planting of such areas to create high forest. The need to protect habitats associated with veteran trees is included in planning guidance for England but there is a need to protect such trees and their surroundings in other land-management contexts.

With regard to biosecurity, there is cause for concern that existing woodlands and non-woodland trees could be greatly harmed if a planting programme leads to the importation or establishment of alien pests. As explained under Qu. 3, some pests or potential pests can exploit pathways that are not adequately controlled under EU plant health regulations. Perhaps Brexit represents an opportunity for the UK to control such pathways more effectively.

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