Plant Biosecurity

The role of local councils in delivering a healthier future for the UK's plants and trees

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About APSE

The Association for Public Service Excellence (APSE) is a not-for-profit local government body working with over 300 councils throughout the UK.

Promoting excellence in public service, APSE is the foremost specialist in local authority frontline services and operates one of the UK's largest research programmes in local government policy and frontline service delivery matter.

About the Author

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His last research report on 'Making space for nature in our burial grounds' can be found at https://apse.org.uk/index.cfm/apse/research/current-research-programme/making-space-for-nature-in-our-burial-grounds/

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Foreword

As the national chair of APSE, I am constantly being made aware of new challenges and responsibilities being added to the already growing amounts of existing duties facing local authorities, but this report identifies an area of responsibility which impacts not only on current, but also future generations, indeed the future survival of humans as a species.

Long gone are the days when local authorities simply provided services for residents, now local authorities are seen as place shapers, environmental champions, awareness raisers and importantly exemplars of best practice. This report outlines how local authorities must not only be aware of how their actions can influence and improve the way we as councils look after the UK's plants and trees, but importantly, provides an understanding of why we must do this as well as clear examples of best practice in achieving this responsibility.

We find ourselves living in a world that is on the verge of irreparable environmental damage, with rising temperatures, increasing levels of pollution, unsustainable demands on natural resources, and a global imbalance on how we share the planet.

Ecosystems that have taken millions of years to develop are being broken apart due to human activities such as the movement of non-native plants between different countries, resulting in the widespread introduction of previously unknown plant pathogens. Unless we take prompt action our children and future generations will be living on a very different and impoverished planet, a planet that as far as we are aware, is the only one which sustains life as we know it.

However, as the report outlines, we can change this scenario. By adopting more nature aware approaches such plant biosecurity, then this will be a major step forward.

As local authorities we can care for the plants we source. buy, transport, and grow and by an increased understanding of plant biosecurity measures, avoid many of the diseases, pests and invasive non-native species which have had devastating effects both here in the UK and globally.

By ensuring the health of our plants and trees we can then confidently look at the wider goals of large-scale tree planting to help mitigate the effects of climate

change, promote native landscapes and improve local biodiversity levels, by ensuring what we plant is safe to do so.

This report will not solve all the problems of plant and tree diseases and pests. Nor will it eliminate the prospect of invasive non-native species. But what it will do is raise awareness and provide exemplars of good plant biosecurity practices which together will support government plant biosecurity aims and objectives and hopefully strengthen European and global actions in this area.

This report although primarily aimed at those who deal with plants and trees and invasive non-native species on a daily basis has equal importance to those who sign off procurement contracts, agree areas for economic development, house building, manage climate change actions, ecologists, strategy and policy makers, elected members, in fact it can also be used to help educate residents to garden more sustainably.

The point of this report is that it hopes to show that lessons can be learned by anyone who reads it, because its relevance is not just about ensuring healthy and sustainable plants and trees but about making decisions which can help the long-term sustainability of the planet and the life on it.

Cllr Jacqui Burnett,
APSE National Chair

Executive Summary

APSE has seen an increase in the number of requests relating to tree and plant diseases and invasive non-native species. Whether it is how local authority members are dealing with dead wood from trees affected by Ash Dieback or Japanese Knotweed.

As a consequence of this, and in support of the Government's Plant Biosecurity and Invasive Non-native Species strategies published in 2023, APSE carried out a survey in late 2023 amongst its members as to the level of knowledge on the wider aspects of plant biosecurity. The results were enlightening. Whilst many respondents were aware of certain practices, a knowledge of plant biosecurity as a totality was relatively sparse.

In order to raise awareness about the principles of plant biosecurity and government strategies, APSE has created a report outlining the origins of plant pathogens, pests and invasive non-native species, the developing understanding of their impacts and spread and, ultimately, the development of plant biosecurity measures and their importance in addressing these problems. The report also gives a brief summary of the two main plant biosecurity and invasive non-native species strategies released in 2023.

Within the report are examples of some of the key diseases, pests and invasive non-native species which are most affecting local authorities in the UK as identified within the APSE 2023 Plant Biosecurity Survey.

It is hoped readers of the report will not only gain a better understanding of the history behind the wider elements of plant biosecurity but why this area of activity is so critical in a world where the trans-global movement of plants, many of which find themselves within local authority parks and green spaces, is so important and thereby work as agents to ensure plant pathogens, diseases and invasive non-native species can be avoided in the future.

Introduction

Dutch Elm Disease, Ash Dieback, Oak Processionary Moth, Japanese Knotweed and Giant Hogweed are just a few examples of the diseases, pests, and non-native invasive species which UK local authorities are struggling to control. With hindsight, it is possible that most of these pests and invasive species, could have been avoided, or controlled, using plant biosecurity measures.

In late 2023, APSE undertook a survey of local authorities across the UK to assess the level of awareness and implementation of biosecurity measures used in managing their tree and plants. The results which will be discussed later in this report were as might have been expected, some knowledge but significant disparities regarding the approaches being taken to address biosecurity as a critical tree and plant management tool. It should be noted that this report is concerning its focus mainly on the trees and plants managed by local authorities and is not therefore looking at the wider impacts on agriculture, or animal and marine pests, although reference may be made to this at times within the report.

The survey's findings should not be interpreted as criticism of local authorities. Instead, it recognises the increasing demands placed on local authorities. Biosecurity is not always able to be seen as a major priority – but it should be.

The relatively recent outbreaks of Ash Dieback have shown not only the environmental and biodiversity consequences of plant and tree diseases. But, with estimates currently running at £15 billion to deal with this disease across the UK, the financial impacts are also significant.

It is clear that with plant and tree disease outbreaks on the increase, local authorities will need to be fully equipped with the knowledge and practices required to deal with such occurrences. By adopting co-ordinated biosecurity measures, not just within their own areas but with neighbouring authorities, they will be better placed to be able to ensure their trees and plants and wider greenspaces can be protected both now and in the future.

Therefore, the question can be asked, why has biosecurity seemingly become a major issue? What is driving Government action on these new plant pests and diseases as they gain greater exposure both professionally and in the wider media? 'Biosecurity' as a phrase may be new to some of us, but the problems it addresses are steeped in history.

A potted history of plant diseases and pests

The plants and trees we see across the world today have taken millions of years to evolve and in doing so, many have adapted into specific communities within strict biogeographical and environmentally favourable boundaries.

It is thought that the earliest trees appeared around 380 million years ago in the form of ferns and horsetails which later developed into woodier trees allowing them to gain greater height and develop better water transportation. The first pine trees appeared around 150 million years ago, followed by flowering plants around 125 million years ago and with them early bees and other pollinators. Between 67 – 56 million years ago maples and oaks appeared. Within another several million years many of the trees we recognise today.

Giant ferns were some of the earliest trees to appear on the planet

Before human intervention many of these plants and trees dealt with any diseases or pests through adaptation and as such a relatively stable balance was achieved between plant and disease via a process of co-evolution.

However, with the advent of agriculture plants were grown to meet the needs of humans, often in areas beyond their natural range, but through selection, care, and cultivation, many of the displaced plants grew and thrived. The downside to this was

that many of the diseases and pests with which these plants had co-existed, were now introduced into new areas where their natural predators were not present, and native plants in the area had no resistance to them. As a consequence, these invasive pathogens multiplied and spread to more and more new areas.

Due to the slow development of agriculture and relatively low human population numbers, the study of plant pests and disease was not initially a concern, but as agricultural knowledge and skills developed and human numbers increased people began to notice their impacts through insect plagues ad famines as recorded in the writings of Aristotle and the Bible , for example in the books of Amos, Deuteronomy, and Kings 1 in the Old Testament, there are stories of 'mildews, blasts, and blights' affecting crops.

Although people recognised the impacts of plant pests and diseases, particularly insects, these being the most visible, there was very little understanding of why these occurrences took place. Many believed that they were brought on by God's wrath because of human sins. This view was held across many cultures and perhaps the most well-known response to trying to appease the gods of harvest was through human sacrifice as carried out by the Aztecs in the hope that rain would come to feed their crops. It should be noted that APSE does not recommend this technique when considering biosecurity approaches! Even in Europe similar, although not quite as blood thirsty ceremonies were carried out, where on Easter Eve a straw man was burned, and the ashes spread on the crops to encourage a healthy harvest.

The 16th and 17th centuries were periods of scientific development which began to question the belief that calamities were the result of 'man's sins' and instead began to look at more reasoned approaches to problems. One such area of study was how to deal with plant pests and diseases which were significantly affecting crop yields and resulting in starvation for many.

However, as land was still relatively plentiful, particularly in the recently colonised (from a European perspective), Americas, if yields were low or diseased, then the solution was to simply choose a new area of land on which to grow crops. But even here disease was still a problem and for farmers and other commercial crop growers they began to adapt their practices by burning crop residues, turning land over, adopting crop rotation methods which allowed land to regenerate and diseases to die out.

Slowly a new science developed, that of 'plant pathology', which is the study of pathogens causing diseases in plants, and looks at issues such as which diseases occur, where and why, and perhaps most importantly how the disease can be managed.

By the end of the 19th and early 20th centuries, advances in identifying plant pests and diseases led to a belief that by adopting specific plant management methods and using the growing number of chemical treatments, collectively this would lead to a pest free world.

A New Dawn Fades

Man's desire to control nature rather than live as part of it led to the belief that the use of chemicals would lead to the eradication of pests and diseases both in plants and in areas where diseases such as malaria were a constant deadly threat. The result was that insecticides and herbicides were often indiscriminately sprayed on crops and the wider environment, including people.

In her seminal 1962 book, 'Silent Spring', the scientist Rachel Carson stated:

"How could intelligent beings seek to control a few unwanted species by a method that contaminated the entire environment and brought the threat of disease and death even to their own kind?"

Many saw this as a damning inditement of the use of chemicals to control pests and diseases both in plants and humans, though it proved a highly unpopular view with farmers and chemical manufacturers who did their best to discredit the findings. But what many failed to recognise was that the crux of the argument was the indiscriminate and over-use of such chemicals was the problem, not always the chemicals themselves. The basic problem was that, if chemicals are available and marketed widely enough, growing numbers of people will use them, from large scale commercial growers to the neighbour next door in their garden, and often in quantities which may not be necessary.

However, studies in the 1970's started to identify that many of these chemicals were having adverse effects on humans and animals; impacting on the overall quality of the environment, particularly the health of our soils, where indiscriminate spraying of pesticides and herbicides had been killing large numbers of soil ecosystems (fungi, worms, specialist bacteria and a whole range of other specialist lifeforms), turning top soils into sterile deserts. As a consequence, many chemicals began to be widely banned, the most famous being DDT. Even today, studies are showing the potential negative impacts of the over-use of chemicals on plants.

Recently it has also become apparent that many pests and diseases are becoming resistant to certain pesticides and herbicides through either genetically modifying those areas of their DNA which the chemical is designed to attack, or by protecting the target areas the chemical was focussing on. Research has shown that resistance to chemical treatments is inevitable, as weeds, pests and diseases adapt over time. This does not mean that is the end for chemical applications, as new products are regularly being developed. However, what this resistance has led to, is agriculturalists and horticulturalists reconsidering their reliance on chemicals and looking for new and innovative ways to deal with plant pests and diseases.

Increasingly, there is a realisation that there is no one silver bullet to deal with pests and diseases in plants. The way forward appears to be the integration of a number of different approaches, including reassessing traditional methods. One example of this is the integrated approach to pest management which is described as a way of controlling pest populations including insects, weeds, and other disease organisms by not relying solely on chemical applications. This approach means to achieve long-term prevention of pest-induced damage by using a combination of techniques such as mechanical, cultural, biological, and chemical means as well as habitat manipulation, change of cultural practices, and the development and use of resistant plant varieties.

It is clear that the threats to the UK's plants and biodiversity from native and alien pests and diseases has become a very real concern over the past few decades as destructive pathogens have decimated elms and ash trees across the UK, bringing significant human, financial and environmental costs.

These threats cannot be dealt with through isolated and un-coordinated actions alone, and this fact has been recognised by central Governments and partners across the world. In the UK, the Government and its partners have been addressing issues of pests and diseases in plants and trees for many years often tackling each occurrence as it happened. But now there has been the recognition that more co-ordinated actions need to be taken to achieve greater levels of *'biosecurity'* across the UK.

Biosecurity refers to a set of precautions which aim to prevent the introduction and spread of harmful organisms. Originally used in reference to the management of biological weapons and bioterrorism, the term biosecurity, is now being applied to the protection of plants and trees with regards to preventing the introduction and spread of non-native tree pests, such as insects, and disease-causing organisms, called pathogens, such as some bacteria and fungi.

Key Plant Biosecurity Strategies for Great Britain

The movement and importation of plants and plant products is now seen as the primary source of the introduction of pests and diseases both known and new as well as non-native invasive species. It is estimated that there are around 2000 non-native species in the UK, of which 10%-15% have become invasive. Many of our current non-native invasive species are due to the plant hunting craze of the Victorian era where the demand for new and exotic species for our parks and gardens led to many of the problem species we now find ourselves having to deal with such as Japanese knotweed, Himalayan balsam, Giant hogweed and *Rhododendron ponticum* being introduced.

However, more recently, the drive to plant thousands of trees to try to address the negative impacts of climate change has seen the importation of trees rise significantly. In the past, meeting such demands have not always been subject to stringent import checks.

This is of particular concern, as since the 1990's, a stream of invasive pathogens potentially damaging to trees, natural ecosystems and horticulture have been entering the UK. Notable examples include the alder dieback, the 'sudden oak death', chestnut bleeding canker and box blight. It is estimated that of the 234 pathogens first recorded in the UK between 1970 and 2004 Jones & Baker, 2007, ca. 67% were associated with wild or ornamental plants. Organisms like these represent a significant threat both to the UK natural environment and our horticultural heritage.

The above pathogens link very closely to the fact that, since 1992, the total UK annual plant imports from abroad have more than doubled in commercial value, from roughly £370 million to about £900 million. Of this, about 31% is comprised of rooted plants. This a particular worry as the soil around the roots represents a non-native microbial ecosystem that could well harbour risk organisms of many types. Therefore, from a biosecurity point of view, it cannot be good practice to transport soil or plants between distinct ecological zones which may have their own distinct microbial life forms including pathogens and pests. Without proper inspection and potential quarantine, it is difficult to ensure such organisms are not unleashed in areas where they have no natural predators. This point is of significant importance, as a substantial proportion of the plants sold in UK nurseries and other retail outlets are now directly imported.

Such demands are likely to increase as growers and horticulturalists look for new plants which can withstand the warmer and wetter conditions caused by climate change. This increased importation, much of which is coming from new areas such

as China and South America, may significantly enhance the risk of introducing known and unknown pests, pathogens, and non-native invasive species from these areas into the UK.

Because of these concerns, the UK Government and relevant partners have developed both a UK-wide Plant Biosecurity Strategy and a Great Britain Invasive Non-native Species Strategy. These complementary strategies aim to respond to these challenges and growing threats through a number of different ways, including: Strong partnership working (including industry and the public), reducing and managing the risks posed by plant pests, pathogens and invasive non-native species (including animals and marine life) and, where possible, eradicating, if necessary, facilitating the safe trade of plants and constantly monitoring and gathering data to allow present and future actions.

Plant biosecurity strategy for Great Britain (2023-2028)

The detection of Ash dieback in 2012 was a key moment in that the disease changed public awareness as to the threats such incidents could have both on the tree landscape of the UK as well as the wider environmental and social impacts the disease has caused. It is estimated the UK may lose as much as 95% of its ash trees because of the pathogen and will face costs of over £15 billion to clear up the resultant devastation. This disease led to the first plant biosecurity strategy being published in 2014.

When the UK left the EU in 2020, it was felt the time was right to *'review and rescope'* Government's approach to combating the plant biosecurity risks to the UK. Also, plant biosecurity is now recognised as being an important tool to fight climate change, insofar as healthy trees and plants absorb large amounts of carbon emission and help regulate temperatures and reduce flooding. Furthermore, healthy plants play an important role in reducing poverty and hunger and boosting economic development.

The latest strategy outlines the series of actions which need to be collectively taken to protect the future biosecurity of the UK's plants and trees.

The strategy has been developed in co-operation between the Scottish and Welsh Governments due to the fact pests and diseases do not respect national boundaries, as well as with the involvement of other key stakeholders. It is noted that the strategy is focussing very much on plants and trees whilst acknowledging there are wider

connections with soil health, animal biosecurity and the prevention of invasive species incursions. The strategy is therefore a vision for the next 5 years of plant biosecurity in Great Britain which will *'protect Great Britain's plants through a strong partnership of government, industry and the public, working together to reduce and manage risks posed by plant pests and pathogens, and facilitate safe trade'.*

The strategy has 4 key outcomes:

Outcome 1: World class biosecurity regime

Making the most of opportunities to tailor and strengthen our response to prevent and manage the introduction and spread of pests and pathogens that pose a threat to Great Britain's plant health.

Outcome 2: Society that values healthy plants

Raising awareness of the importance of healthy plants and trees and encouraging the adoption of responsible behaviours across society.

Outcome 3: Biosecure plant supply chain

Government and industry working in partnership to support a biosecure plant supply chain.

Outcome 4: Enhanced technical capability

Building plant health capability and making best use of both existing and innovative science and technology to keep pace with changing threats and ensure preparedness for the future.

It is estimated that the natural capital value of the UK's plants and trees is £15.7 billion per year which includes the economic, environmental, and social benefits they bring. £4.2 billion of this relates to the carbon sequestration role of plants and trees which will play a vital role in helping to achieve the Government's Net Zero target by 2050. But it should be remembered the value of our plants and trees should not be seen purely in monetary value. 98% of the oxygen we breathe is produced by trees and plants, 80% of the food we eat is provided by plants, and 80% of the world's terrestrial species of animals, plants and insects live in forests etc.

Therefore, this strategy is not simply about protecting plants and trees, it is also a key statement as to how we need to develop more sustainable lifestyles which acknowledge our part in conserving and protecting the natural world on which we rely.

The Great Britain Invasive Non-native Species strategy (2023-2028)

Invasive Non-Native Species (INNS) threaten our biodiversity, our ecosystems, and our economy. They are one of the top five drivers of biodiversity loss globally. Not only do INNS affect the productivity of land for agriculture and amenity, they can also have significant impacts on local biodiversity levels often crowding out native species. The management and eradication of INNS in the UK alone costs Great Britain's economy nearly £1.9 billion pa in direct costs. Other impacts include the threat to newly planted trees which are seen as a major tool in reducing the impacts of climate change, as well as the impact upon nature restoration programmes across the country.

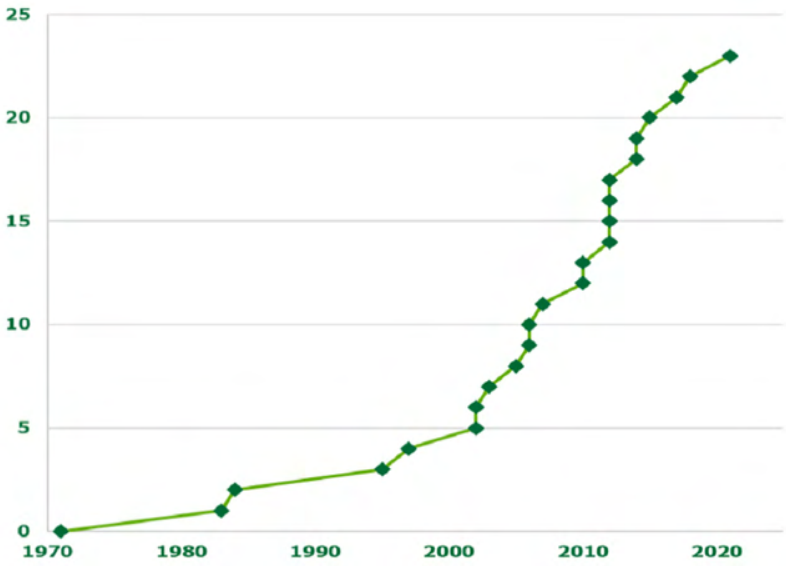
The number of INNS in Great Britain continues to rise. As of 2021, there were approximately 2,000 non-native species established with 10 to12 new non-native species becoming established every year. This trend is mirrored globally and, if not adequately addressed, numbers will continue to increase for the foreseeable future. With these considerations in mind a refreshed strategy has been developed on the back of the 2008 and 2015 strategies

The new Strategy sets out:

- The aims and actions for addressing the threats posed by invasive non-native species.
- A framework to deliver the most effective response to preventing, eradicating, and managing invasive non-native species.
- To improve co-ordination and co-operation by government, stakeholders, land managers and the public against invasive non-native species, across Great Britain.

Most councils are suffering from the impact of invasive non-native species. Therefore, the Strategy will give help and advice on how best to develop a local plan with relevant partners and stakeholders to combat these threats.

Figure 1: The increase in the number of new pests and disease outbreaks affecting trees since 1971 (Source Forestry Commission)



Whilst it is acknowledged that plant pests, diseases and invasive non-native plant species have been causing, and still are causing damage to our plant communities, (**see Figure 1**) these two strategies aim to reduce and control these problems in the future.

Plant diseases and pests are being introduced to countries across the world, they threaten not only food security but also already fragile levels of biodiversity and the many inter-linked ecosystems we all rely on.

Factors such as climate change, the world-wide transportation of plants for food, horticulture, industry etc. are causing the spread of such pests, diseases, and non-native species to increase more rapidly. Growing resistance to chemical treatments leading to new pest and pathogen adaptation means we are constantly fighting the threats these organisms bring. We therefore need to adapt and adopt new and co-ordinated approaches to detecting such occurrences before they become a problem and once detected have management and eradication plans in place. This will take considerable effort, but it is necessary, therefore a greater awareness and understanding of what this will entail in order to manage and prevent future outbreaks will be the first step along this journey.

Table 1

New pests and disease outbreaks since 1971. (Source Forestry Commission)

Year (since 1971)	New pest and disease outbreak
1971	Dutch elm disease
1983	Great spruce bark beetle
1984	Phytophthora alni
1995	Gypsy moth
1997	Dothistroma needle blight
2002	Phytophthora ramorum
2002	Horse chestnut leaf miner
2003	Phytophthora kernoviae
2005	Bleeding canker of horse chestnut
2006	Oak processionary moth
2006	Phytophthora pseudosyringae
2007	Pine tree lappet moth
2010	Acute oak decline
2010	Phytophthora lateralis
2012	Ash dieback
2012	Asian longhorn beetle
2012	Sweet chestnut blight
2012	Phytophthora austrocedri
2014	Phytophthora sikiyouensis
2014	Sirococcus tsugae
2015	Oriental chestnut gall wasp
2017	Elm zigzag sawfly
2018	Eight toothed spruce bark beetle
2021	Phytophthora pluvialis

What do we know about biosecurity? A local authority perspective

Providing national strategies, guidance notes and examples of best practice are all very helpful, but if people are unaware of the issue in the first instance, or at the very least have limited knowledge, then all this information may go unheeded.

The APSE Plant Biosecurity Survey 2023

APSE had noted through it work, that there was a growing interest for information around the issue of plant biosecurity if not always recognised as such. A recent online seminar on Ash Dieback had significant numbers of UK authorities attending and APSE's Parks and Greenspaces annual seminars, advisory groups and network query services have also been covering plant biosecurity and issues around invasive non-native species at the request of authority members. Clearly plant biosecurity is on local authorities' agendas, but to what degree?

Therefore, in late 2023 APSE sent out a short survey to gauge local authority officers' levels of awareness and knowledge regarding plant biosecurity, with particular reference to an awareness of the UK Plant Biosecurity Strategy (2023 – 2028). The survey also wanted to know more about the main issues relating to and affecting plant biosecurity in local authority areas, Furthermore the survey also hoped to identify the measures local authorities were taking to ensure their plants, as far as possible, were being protected from current and future plant diseases and also how that their greenspaces were being managed to prevent the encroachment of invasive non-native species.

From the responses received, it was clear that most local authorities were aware of various pests, diseases and invasive non-native species affecting their areas, those most frequently mentioned were Ash Dieback, Japanese knotweed, Himalayan balsam, oak processionary moth and giant hogweed.

Of those local authorities responding to the survey, only 36% knew about the UK Plant Biosecurity Strategy (2023-2028) which was clearly an issue regarding the dissemination of the aims and objectives of the strategy and its partner strategy regarding invasive non-native species. Reassuringly, 58% did consider biosecurity measures in their operational practices, despite only 10% recording that they had a specific biosecurity policy. Biosecurity measures were being included in staff training, albeit often as part of wider training areas such as health and safety. When asked as to the means of dealing with pests, diseases, and invasive non-native species there was clearly a mixture of approaches from manual removal to the limited use of chemical treatment. Worryingly, a notable proportion stated they did not have the

funds to address such issues, which does not bode well both for their own authority or neighbouring authorities, for as previously mentioned, pests, diseases and invasive non-native species do not respect administrative boundaries.

Perhaps the most important question was to identify the specific actions local authorities were taking to practically address biosecurity issues. Procuring locally sourced plants was a clear favourite, but again there needs to be a confidence that the growers of these plants are following effective biosecurity measures. Over 20% of respondents stated that they regularly monitored the presence and spread of pests, diseases, and invasive non-native species, reporting any information to relevant bodies such as Defra. A small number were also developing localised action plans to deal with specific outbreaks rather than hoping these would be addressed as part of the normal grounds' maintenance frequencies. An interesting response was that biosecurity requirements were being built into their contract specifications.

The full survey, responses and comments can be found at the following link :
https://apse.org.uk/index.cfm/apse/members-area/briefings/2024/24-07-plant-biosecurity-survey-results1/

Considering the survey results, it was felt that it would be useful to provide some examples of guidance notes and best practice in relation to meeting biosecurity requirements from a local authority perspective.

Identifying the major plant diseases, pests and invasive non-native species affecting the UK

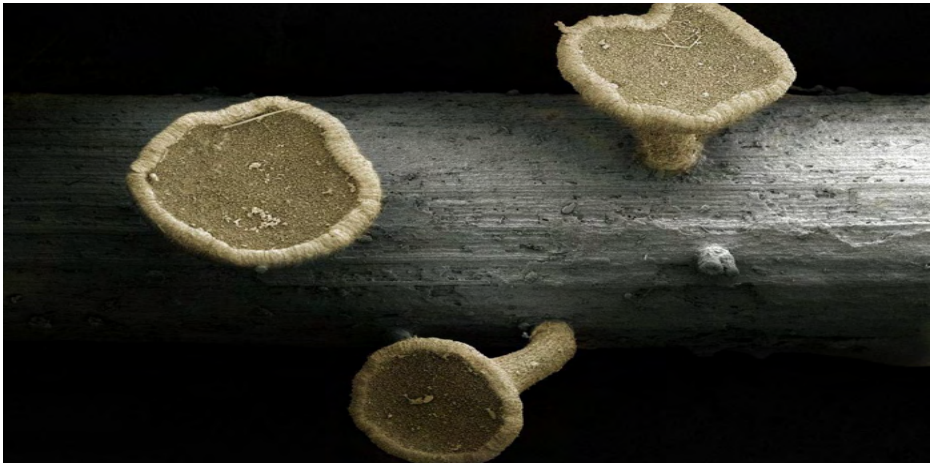
Tree pests and diseases

The UK over the past century has seen the appearance of numerous new pests, diseases, and invasive non-native species. These diseases are mainly caused by pathogenic organisms such as fungi, bacteria, viruses, protozoa, as well as insects and parasitic plants. Such diseases are usually transmitted in a variety of ways through the air, via water, by animals and increasingly by human activity such as the worldwide trade in plants. These diseases can remain infectious for many months or years causing untold devastation both to the trees and plants infected but also in the wider impacts such as reductions in biodiversity levels and further economic and social impacts.

New emerging plant diseases have already become more frequent, and in coming decades it is expected that shifts in the geographic distributions of pests and pathogens in response to climate change and increased global commerce will make them both more frequent and severe.

Below are a few of the major pests and pathogens which are currently or have the real potential to affect trees within the UK.

Ash Dieback: Perhaps the most publicised example of a recently introduced tree pathogen has been the appearance of Ash Dieback (*Hymenoscyphus fraxineus*). Carried by a fungus, its spores can travel in the wind. So it is possible that it arrived in the UK naturally, though it more likley to have been inadvertently imported on ash saplings. The UK was importing thousands of ash plants from infected parts of Europe until a ban came into place in 2012. This undoubtedly sped up the spread of the disease within the UK because the disease was able to spread from areas of new planting via wind to mature trees This fungus threatens the entire UK stock of ash trees, albeit that a small percentage may be resistant to the disease. In Japan and Asia, the fungus that causes ash dieback decomposes ash leaf litter as part of the soil microbiota and does not cause disease in the native ash species. But in the European ash species which have no natural resistance to the fungi, it has killed millions of trees. It is estimated that, Ash dieback will kill up to 80% (some projections are as high as 95%) of ash trees across the UK. At a cost of billions, the effects will be staggering. It will change the landscape forever and threaten many species which rely on ash.



Hymenoscyphus fraxineus – Ash Dieback **Photo credit Paul Beales and David Crossley**

Oak Decline: A disease which affects mainly mature trees. The causes behind acute oak decline are still being researched but environmental stresses like soil conditions, drought, waterlogging, and pollution can all impact the tree. Insects, fungi, and bacteria then move in on the vulnerable tree and push it into decline.

Asian and citrus longhorn beetles: Globally, both species have spread from Southeast Asia to Central Europe and North America and are killers of a wide range of broadleaf tree species. They're not in the UK yet, although there was an outbreak in 2012 which was successfully eradicated, but there's a high risk of them being imported on wood packaging, particularly from China.

Asian Longhorn Beetle photo credit FERA

Dutch Elm Disease: This now infamous tree disease has killed millions of elm trees in the UK over the last 50 years. It's changed parts of our landscape forever and it's still spreading north. Spread by elm bark beetles, Dutch elm disease was accidentally imported into the UK from Canada in the late 1960s. It spread quickly, reaching Scotland in just 10 years.

The movement of elm products caused the spread of the disease, particularly on logs with bark attached but also through saplings, packaging crates and mulched bark.

Horse chestnut bleeding canker: Horse chestnut trees are icons in our parks and gardens, but they are under threat from two invaders: a bacterium and a leaf miner. Horse chestnut bleeding canker is a bacterial pathogen. The bacteria multiply within the water transport systems of the tree just under the bark, eventually blocking them. This causes the tree to die because it can no longer take up water. It is not known how the disease got into the UK, but it is likely it was imported as it was relatively rare up to 2000. In 2007 when the last survey was carried out, 36% of the horse chestnut trees surveyed in Wales and 76% of the trees surveyed in Southeast England showed symptoms. The impact therefore could be significant with the loss of many mature horse chestnut trees.

Horse chestnut leaf miner: The first horse chestnut leaf miner record in the UK was taken in 2002 in England. The moth probably originates from natural stands of horse chestnut in its native southern Europe, and was first seen attacking trees in the 1970s.

It has since spread quickly, likely through the accidental transport of pupa in dead leaves and leaf litter, and through the transport of moths in vehicles. Some of the bigger jumps in populations have been attributed to imports of infested horse chestnut saplings. While it doesn't kill trees, years of leaf miner infestations can leave horse chestnuts weakened. This can leave the trees in a vulnerable state where they are more susceptible to diseases like horse chestnut bleeding canker.

Horse chestnut leaf miner

Oak processionary moth: The oak processionary moth not only strips oak trees of their leaves, leaving them vulnerable, but also poses a health risk to humans causing rashes and breathing difficulties. The oak processionary moth was first found in London in 2006 and has been spreading ever since. It was accidentally imported to the UK in egg form in the canopy of trees for planting.

Oak processionary moth

For a fuller description of the main tree pests and pathogens affecting the UK please refer to the Woodland Trusts webpage which identifies the disease/pest, its impact and what work is being done to combat these diseases/pests. The website also contains the precautionary biosecurity measures needing to be taken to stop the spread of these diseases and pests. The website can be found at the following link : https://www.woodlandtrust.org.uk/trees-woods-and-wildlife/tree-pests-and-diseases/key-tree-pests-and-diseases/

The above examples of tree pests and pathogens were highlighted within the APSE survey as being the key plant disease being addressed by local authority respondents. But these examples were also chosen as they highlight the need for biosecurity measures in that all of them are likely to have been introduced as a result of the importation of trees or tree products, and as previously stated, as the demand for trees is increasing as a means to address climate change there are lessons needing to be learned about how we source, purchase, handle, transport and plant future trees and plants.

Invasive non-native species

Non-native plants are those that occur outside their natural range due to direct or indirect introduction by humans. If the introduced plants persist in natural or unmanaged habitats, they are termed 'naturalised'.

Many naturalised species do not present a problem but some that spread and outcompete native species can threaten ecosystems, habitats, or native species. Only where this occurs are the plants termed **invasive non-native species.** These are considered to be invasive either due to lack of natural control mechanisms (such as herbivores); rapid rate of spread (by seed or vegetatively) or suppression of other species (such as the use of chemical inhibitors affecting germination or growth known as *'allelopathy',* as well as heightened competition for resources).

Invasive non-native plants can:

- Change ecosystems and habitats and have non-biotic effects, such as reducing or impeding water flow leading to flooding, or changing the chemical composition of the soil, or lock up nutrients.
- Outcompete native plants either by habitat change or by spreading so rapidly as to crowd out slower growing species, threatening the long-term survival of species.
- Take a long time to become invasive. Many of the plants now considered invasive have been growing in the UK for over 100 years and for much of that time showed no sign of becoming a problem.
- Be expensive to eradicate. It is also very costly to restore degraded habitat if it can be done at all.

Defra has provided a list of the plants which pose the greatest threat, together with what you need to do if you keep, grow, find or sell certain invasive plant species and your responsibilities to prevent their spread

David Holdsworth, the CEO at The Animal and Plant Health Agency (APHA) stated that *"invasive non-native species are one of the top five drivers of global biodiversity loss and have been a significant driver in over 60% of global native species extinctions. In Great Britain they have threatened a wide range of native species, habitats and ecosystems. They also cause serious economic damage, costing the British economy at least £2 billion per annum, and the global community well over $400 billion USD."*

The main examples of invasive non-native species which were highlighted as problems for local authorities in the APSE survey included:

Japanese Knotweed: (*Reynoutria japonica*) is a fast-growing and strong clump-forming perennial, with tall, dense annual stems. Stem growth is renewed each year from the stout, deeply penetrating **Rhizomes** (creeping underground stems). Although originally introduced to Britain as an ornamental garden plant, Japanese knotweed is an invasive non-native species. Although it rarely sets seed in this country, Japanese knotweed can sprout from very small sections of rhizomes. Under the provisions made within Schedule 9 of the Wildlife and Countryside Act 1981, it is an offence to cause Japanese knotweed to grow in the wild.

Japanese Knotweed

Giant hogweed: (*Heracleum mantegazzianum*) is a close relative of cow parsley originally from Southern Russia and Georgia. It can reach over 3m (10ft) in height. The sap can cause severe skin burns. It is widely distributed in the wild and poses a serious risk to people who are unaware of its potential for harm. Chemicals in the sap can cause photodermatitis or photosensitivity, where the skin becomes very sensitive to sunlight and may suffer blistering, pigmentation, and long-lasting scars. Although there is no statutory obligation for landowners to eliminate giant hogweed, local authorities will often take action to remove infestations in public areas.

Due to the severity of the threat, legislation has been applied to invasive aliens, including giant hogweed. The Wildlife and Countryside Act 1981 (as amended) lists it on Schedule 9, Section 14 meaning it is an offence to cause giant hogweed to grow in the wild in England and Wales (similar legislation applies in Scotland and Northern Ireland). Also, it can be the subject of Anti-Social Behaviour Orders where occupiers of giant hogweed infested ground can be required to remove the weed or face penalties. Local Authorities have powers under certain circumstances to require Giant hogweed to be removed.

Giant hogweed

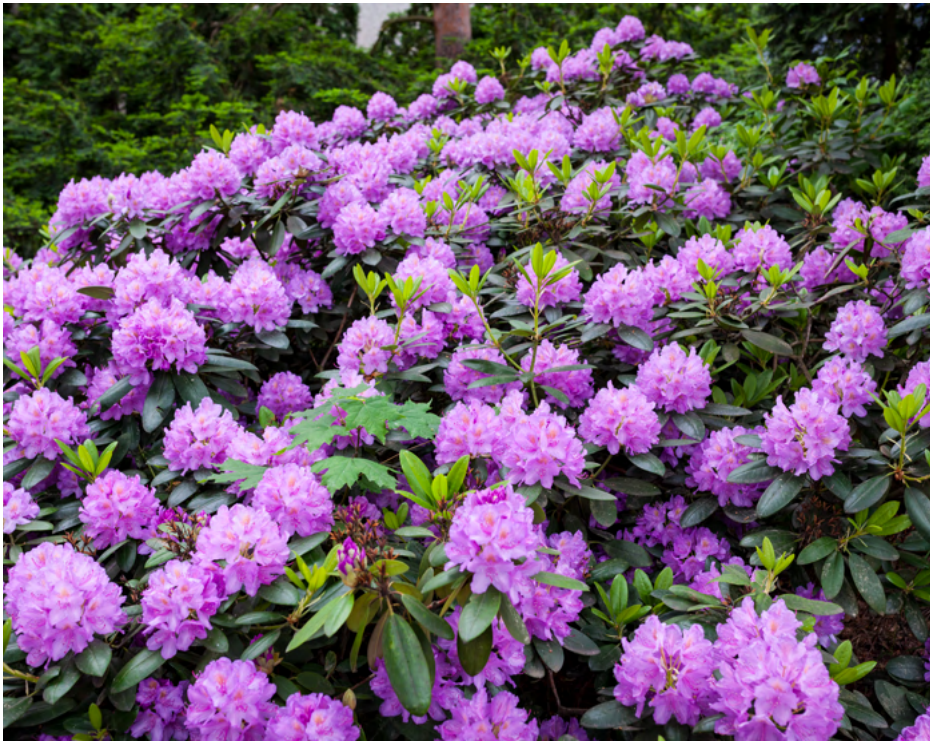
Himalayan balsam: (*Impatiens glandulifera*) Himalayan balsam reaches well over head height, and is a major weed problem, especially on riverbanks and waste land, but can also invade gardens. It grows rapidly and spreads quickly, smothering other vegetation as it goes. Introduced into the UK in 1839, Himalayan balsam tolerates low light levels and also shades out other vegetation, so gradually impoverishing habitats by killing off other plants Under the provisions made within Schedule 9 of the Wildlife and Countryside Act 1981, it is an offence to plant or cause Himalayan balsam to grow in the wild.

Himalayan balsam

Rhododendron ponticum: Rhododendron ponticum was first introduced into the UK in the 1700's as an ornamental plant. Growing in dense thickets this plant shades out native plants, preventing regeneration of trees in woods and obliterating the ground vegetation on moors. It is poisonous to livestock and cannot be controlled by grazing. It is host to disease organisms which attack oak and beech.

Strictly confined to acid soils, its habitats include moorland, woods, screes, rocky banks, derelict gardens and streamsides. It is no longer extending its broad geographical range and is being controlled at some sites but is still spreading at many others. It has been estimated that the cost of controlling and eradicating this species across the UK will run into tens of millions of pounds.

Due to its invasive nature Rhododendron ponticum is covered by the Wildlife and Countryside Act 1981. It is listed under Schedule 9 of the Act and Section 14 of the Act states that it is an offence to plant or otherwise cause the species to grow in the wild.



Rhododendron ponticum

Dealing with invasive non-native species cuttings and waste

One thing to consider about dealing with any invasive non-native species is, apart from taking action to control or eradicate it, the question is what to do with the waste created. Giant hogweed for example, is a **controlled waste** (like Japanese knotweed) so if it is taken off site, can only be disposed of in licensed landfill sites with the required documentation. To avoid this, dispose of any plant material (dug up or cut down) by composting or burning. To ensure you meet all the requirements regarding dealing with such waste it would be advisable to consult the following website which provides detailed information. https://www.gov.uk/guidance/prevent-the-spread-of-harmful-invasive-and-non-nativeplants#:~:text=You%20can%20dispose%20of%20invasive,underground%20and%20can%20produce%20roots).

In certain cases, health and safety considerations also need to be taken into account when handling such plants, for example guidance suggests, when controlling Giant hogweed always wear gloves, cover your arms and legs, and ideally wear a face mask when working on or near it. Contaminated clothing and tools are potentially hazardous too. Wash any skin that comes into contact with the plant immediately. Ensure that contractors working on your land are aware of the risks and are competent to deal with this weed. The APHA website https://aphascience.blog.gov.uk/2023/09/08/tackling-invasive-species/ provides wealth of current information on how to deal effectively and safely with invasive non-native species .

Burns, blisters and scare caused through contact with giant hogweed

It should be noted that there are many other invasive non-native species affecting the UK, but these four examples were chosen as a consequence of their severity to such an extent that they are illegal to grow and are legislated against.

Again, all these invasive non-native species were likely to have been brought into the UK by plant hunters as new exotic plants for large gardens years before their long-term impacts were known.

Preventing the introduction and spread of tree pests and diseases

The need for greater emphasis on biosecurity precautions and control

As stated previously, biosecurity refers to a set of precautions that aim to prevent the introduction and spread of harmful organisms. These include non-native tree pests, such as insects, and disease-causing organisms, called pathogens, such as some bacteria and fungi.

The Royal Horticultural Society (RHS) believes that avoiding pests, diseases, and weeds by good practice in cultivation methods, cultivar selection, plant hygiene and encouraging or introducing natural enemies, should be the first line of control. If chemical controls are used, they should be used only in a minimal and highly targeted manner. For example, where pests, diseases or weeds pose a serious threat to the wider environment, to important heritage specimens, to habitat, or to native wildlife.

Tree pests and diseases can be transported between or within countries via a number of pathways, including:

- Live plant and tree products, such as potted plants, often in the soil surrounding the roots.
- Timber and wood packaging materials (WPM), such as shipping crates and pallets, it is estimated up to 90% of diseases and pests enter via this route.
- Dirty tools, kit, machinery, and vehicles, such as chainsaws, boots, and all-terrain vehicles.
- Soil and organic material, such as leaf litter
- Natural methods, such as wind and water.

As mentioned earlier in the report, there has been a significant increase in the number of non-native tree pests and diseases being introduced to the United Kingdom since the early 2000s. This demonstrates the need for action to provide our trees, woods, and forests with greater protection. By implementing appropriate biosecurity measures, we can significantly reduce the risk of introducing and spreading tree pests and diseases.

There are many organisations who can offer advice about plant measures but there does appear to be some basic principles in adopting essential plant biosecurity measures.

Think kit:

- Make sure all equipment, including boots, clothing, ropes and saws, are free from soil and organic material before entering and leaving a site.
- Only take the required amount of equipment on site.
- Regularly clean ropes as per the manufacturer's guidance or use dedicated ropes for particular sites.
- Clean and disinfect chainsaws, pruning saws and other cutting tools as part of routine maintenance, and before using them on a new site.
- Have a plant biosecurity kit. For this you will need a stiff brush and a water source to scrub your boots. Some people use portable pressure washers to clean larger items such as bikes. For professionals working with trees, it is recommended that a more comprehensive kit is needed as this is seen as a high-risk group. This also needs to be considered for any voluntary groups who may be helping plant trees.

This kit would include:

- Bucket.
- Boot pick.
- Brush.
- Disinfectant.
- Hand sanitiser.
- Water container or large reused water bottle.

It is important to remember, that when applying disinfectant make sure it is to a clean surface, as disinfectant may not work on soiled surfaces so brush or wash off organic material before application.

Think transport:

- Remove any build-up of soil and organic material on vehicles and machinery, including cabs, wheels, and foot wells, before leaving each site.
- Use proper off-site wash-down facilities regularly.

Think trees, plants, and materials:

- Responsibly source planting stock through nurseries or suppliers that adhere to national standards such as the Plant Health Management Standard. or that have their own biosecurity policy in place that you trust.
- Source planting stock from pest and disease-free areas.
- Keep accurate, up-to-date records of all purchases and supplies to assist with tracing exercises in the event of an outbreak.
- Regularly monitor plant and tree stock for signs of ill-health, and report any suspect symptoms using TreeAlert.
- If you're responsible for importing or moving plants, check your plant passport and registration requirements with APHA before doing so.
- Source landscaping materials from pest-and-disease-free areas only.
- Be aware of any restrictions in place, or phytosanitary (plant health) measures and treatments required when importing certain materials or their packaging.
- Specify British-grown plants when sourcing planting stock, to reduce the risk of an accidental introduction of invasive non-native pests or diseases.

When working on a site that is subject to a Statutory Plant Health Notice, or where a pest or disease has been confirmed, you must follow any additional biosecurity guidance for that pest or disease in addition to the measures here.

If you must remove infected or infested material from such sites for safety reasons, you must ensure that:

- it's kept separate from other arisings.
- it's not used for mulch or firewood.
- it's disposed of at a licensed handling facility, or through deep burial or on

site. It may be worth using the following link for further advice. Disposing of trees and plants affected by disease or pests: RPS 71 - GOV.UK (www.gov.uk)

- you obtain a movement licence if required.

For more detailed information on adopting plant biosecurity measures you can visit the following government link. https://www.gov.uk/guidance/prevent-the-introduction-and-spread-of-tree-pests-and-diseases

As well as adopting internal procedures to promote plant biosecurity many organisations and local authorities have recognised the importance of educating the public where plant biosecurity may be an issue.

There are some simple steps members of the public can take to help limit any spread of tree pests and diseases, such advice includes:

- drive and park your vehicle only on hard-standing surfaces such as tarmac where possible when visiting outdoor areas such as woodlands, parks or gardens.
- before you leave: clean mud, organic material and water off your boots, bikes and buggies, and check over your dog because fungi, bacteria and insects can get everywhere.
- 'Don't risk it!': please don't bring any plant or tree products back from trips abroad, these might be carrying harmful non-native tree pests or pathogens.
- report any trees that you suspect are in ill-health to the Forestry Commission, Scottish Forestry and Natural Resources Wales using TreeAlert.

Government has also recognised that Industry professionals working in the arboriculture, forestry and landscaping industries are considered a particularly high-risk group for their potential to spread tree pests and diseases.

The Forestry Commission has worked closely with the relevant organisations to develop industry-specific biosecurity guidance to reduce their members' risk of introducing or spreading pests and diseases. Those involved include the Animal and Plant Health Agency, The Arboricultural Association the British Association of Landscape Industries (BALI), The Confederation of Forest Industries (ConFor), 4Horticultural Trade Association (HTA), Institute of Chartered Foresters (ICF), Landscape Institute and The London Tree Officers' Association.

Plant biosecurity measures in parks and green spaces

Many of the plant biosecurity measures highlighted in the report have been largely tree related, and although applicable across the whole 'plantscape', there are some measures which particularly lend themselves to more horticultural practices seen in our parks and greenspaces.

Sourcing and procuring new plants

When considering the use of new plants, as mentioned previously we need to ensure the provenance of the plants we are procuring. This includes specifying accurately the plants you want, finding out whether the plants have been treated with a chemical up to 6 weeks before purchase as often such treatment can mask pests and diseases which may then appear after planting, and whether the provider of the plants is a member of an accredited scheme, as they will have been independently audited and will have to meet strict requirements.

Previously, plants could move around in the EU without restriction if they were grown in an EU country (including the UK), certified free from pest and diseases and for a traveller's own use or consumption.

The UK has now left the EU and there are no longer exemptions for transporting plants for personal use. This means that, from the 1 January 2021, you must have a phytosanitary certificate for almost all plants and living parts of plants.

This applies to plant material from both the EU and any other country outside of the EU. Therefore, if you are purchasing certain plants from outside the UK e.g. within the EU, you will need to obtain a phytosanitary certificate. Specifically, for each consignment from the plant health authority in the country they're exporting from.

A phytosanitary certificate is a statement from the plant health authority that the consignment:

- has been officially inspected or tested, or both.
- complies with legal requirements for entry into Great Britain
- is free from quarantine pests and diseases.

Further details can be found at https://www.gov.uk/guidance/import-plants-and-plant-products-from-the-eu-to-great-britain#get-a-phytosanitary-certificate

One way to help ensure these requirements are met is building up a solid working relationship with a chosen accredited supplier who is not averse to you regularly checking samples of the plants you are considering buying, therefore showing they are aware of such requirements and are complying with required legislation. A final point is to agree lead in times when you purchase plants. Ideally, see the plants when they are in full leaf to be able to identify any pests and then agree to collect them later in the year when they are ready for planting.

Donations

One area where plant diseases and pest are often introduced is when donations are accepted, often from other parks or gardens. Real care in monitoring the quality of the plants being donated before you accept and plant them is advisable.

It is certainly worth continuing to monitor donated and, if possible, purchased plants on arrival for pests and diseases. Ideally, if there is space to quarantine plants such as a polytunnel or greenhouse with a single entrance point with an easily cleaned floor which can be washed and drained without seepage to other parts of the parks or gardens and can prevent access from animals. In addition, it is advisable to restrict the number of staff who enter the facility and have colour coded tools used specifically for this area and ensure a strict cleansing regime is in place for tools, containers, brushes, and footwear. If different types of plants have been donated, try to keep them separated. Finally, any waste created should be disposed of in an appropriate manner by covering skips and other general plant waste disposal areas and locate them downwind from production/retail areas.

It is recommended that plants should be quarantined for at least two weeks before they are planted and again, they need to be monitored for the next several weeks to ensure there are no pests or diseases which have been dormant. As well as checking on plants we need to carefully monitor areas that can be sources of infection on-site. Standing water can also harbour some water borne diseases such as Phytophthora Root Rot (Phytophthora sp.) therefore you should also test irrigation sources regularly to ensure they are free from pests and disease.

Hedgerows, weeds and other onsite plants can multiply diseases and act as a green bridge, carrying the disease from season to season. As a final point where urban gardens back onto woodlands or greenspaces there is a need to check disease is not

being spread from these areas especially where fly tipping of garden waste occurs, this also applies to the spread of invasive non-native species.

A further point is to ensure any onsite contractors follow biosecurity procedures by ensuring they have internal biosecurity policies; this can even be built into contract requirements.

There are many different guidance notes on biosecurity practices in Parks and Gardens but one worth consulting, although now slightly dated is the 'Parks and Gardens- Biosecurity Best Practice Protocols (2012), The Food and Environment Research Agency(FERA)https://plantnetwork.org/wordpress/wp-content/uploads/12568/parksbiosecuritysmall.pdf. It is also worth reading best practice guides and tips contained within the brief Defra guidance note, Top 10 best practice tips for anyone who moves plants in the UK. https://planthealthportal.defra.gov.uk/assets/uploads/Biosecurity-Best-Practice-Tips.pdf

Staff Training

Local authorities can keep staff up to date on current plant pest and disease threats by visiting the Plant Health Portal https://planthealthportal.defra.gov.uk/ and The UK Plant Risk Register https://planthealthportal.defra.gov.uk/pests-and-diseases/uk-plant-health-risk-register/ which provides information about plant pests and diseases, including risk assessments, links to other sites of interest and information on plant health controls and services provided by government. It also shows how to recognise symptoms and their hosts, including common, indigenous pest and diseases and ultimately helps staff identify symptoms and their causes and thereby get such problems identified early.

As was shown in the APSE survey on plant biosecurity, many local authorities are now building this awareness raising into regular staff briefings and health and safety meetings thus keeping the awareness of plant biosecurity at a high level.

Local authority plant biosecurity policies

As stated earlier in this report Government has published its 5-year plant biosecurity strategy for the UK it which it aims to prevent the growing number of pests and disease affecting the future of the UK's plants, trees, and food crops. In doing so it also aims to produce a bio-secure plant supply chain. From a local authority perspective, as well as providing information on national plant biosecurity actions it can help councils to develop their own plant biosecurity policies and strategies.

With regards to plant biosecurity policies these can range from full-blown subject specific policy documents to simple inclusions within existing strategies such as tree strategies or wider climate change strategies.

Case Studies

A good example of a comprehensive plant biosecurity policy is that produced by South Gloucestershire Council. Their Plant Biosecurity Policy released in December 2022, although part of a wider Green Infrastructure and Nature Recovery Action Plan, the policy has a clear definition of what the Council means by plant biosecurity and the role of the local authority in ensuring plant health as a priority.

The policy also includes:

- The policy's links to other corporate policies.
- The national legislative framework in which it will operate.
- Policy vision and 3 key objectives – understand and detect, prevent, respond.
- A defined action plan as to how the objectives will be achieved.
- A list of operational processes and practices introduced.
- How the action plan will support national plant biosecurity campaigns such as 'Check, Clean, Dry' https://www.nonnativespecies.org/what-can-i-do/check-clean-dry and 'Be Plantwise' https://www.nonnativespecies.org/what-can-i-do/be-plant-wise/
- A monitoring and annual reporting system.
- Useful Contacts.
- Appendices outlining invasive non-native species identified by government.

A copy of the policy can be found at https://beta.southglos.gov.uk/static/4ee0c6a90ac54efb04281d37088b5734/South-Gloucestershire-Council-Plant-Biosecurity-Policy-2022.pdf

An example of where plant biosecurity has been introduced into an existing strategy is provided by Reading Council in their Tree Strategy issued in 2021. In the strategy there is an objective to *"continually review RBC purchasing and working practices to ensure RBC are working to good arboricultural practice to minimise the chance of introducing and/or spreading pests, diseases or invasive species within the Borough."*

This objective is expanded within the document to identify actions. roles, practicalities, what it includes and timescales. Although abbreviated, these include:

- Ensure biosecurity is considered on development sites.
- Continually review RBC purchasing and working practices to ensure RBC are working to good arboricultural and horticultural practice to minimise the chance of pest/ disease introduction to, and spread within, the Borough.
- Ensure and encourage good practice to private landowners.
- Ensure landscape schemes on development sites consider biodiversity when sourcing and maintaining trees.
- Devise action plan on dealing with invasive species.
- To involve all Council land owning/managing departments, led by Parks; Planning Department; Developers; private householders; planning agents; Landscapers, Tree Consultants.
- Ensure working practices and management follow Government guidance.
- Consider biosecurity when agreeing details of landscaping and maintenance on development sites.

A full copy of the Tree strategy and the biosecurity objective can be found at https://images.reading.gov.uk/2021/03/Tree-Strategy-March-2021.pdf

To have such policies not only raises the issue of plant biosecurity within the council and its stakeholders but it also signals these aims to private landowners, industry, and the wider general public. Such policies can also be used as contractual

documents for any private contractor who wishes to tender for council work where plant biosecurity may be an issue e.g. the treatment of invasive non-native species. Certainly, within the results from the APSE survey on plant biosecurity, there was evidence that approach was beginning to be adopted.

Conclusions

Aristotle, Plato's student, recorded plant diseases as early as 350 B.C. And his colleague Theophrastus observed and speculated about diseases of cereals, legumes, and trees. Plant diseases were clearly destructive in ancient times when their impact caused thousands of people to live in fear of famine. Famines may not be a threat in the UK, but the destructive power of pests, diseases and invasive non-native species can still have significant environmental, social, and economic impacts.

As stated previously in the report, the cost of invasive non-native species alone costs the UK in excess of £2 billion each year and the loss of biodiversity due to these plants is worrying. Equally plant and tree pests and diseases can have untold consequences. It is estimated between 1970 and 1990, 28 million elms were lost to Dutch elm disease resulting in habitat loss for insects, birds, fungi and microbes as well as the aesthetic value to miles of traditional English countryside, and we are currently facing a similar situation with other pests and diseases.

As we now know, many of these occurrences were as a result of early plant hunters or more recently, the increasing importation of plants and trees, some from new geographical areas where any pathogens they may have been carrying were set free in a new environment where they had no natural predators or other ecological balances, and as such the opportunities for them to run wild or hybridise were unknown, the relatively recent impact of Ash Dieback is a good example of this.

Without proper checks both by government agencies, local authorities, industry growers and importers and the general public, then the increasing trade in imported plants may lead to the introduction of further pests, diseases and invasive non-native species.

It is hoped that the measures being taken by government outlined in the Plant Biosecurity Strategy for Great Britain (2023-2028) and The Great Britain Invasive Non-native Species Strategy (2023-2028), will go some way to addressing these concerns. But there is a collective responsibility on all of use to ensure such incidents are avoided by adopting more plant biosecurity approaches, whether this is just having a general awareness of what to look out for or actively introducing and maintaining better plant hygiene and purchasing protocols, many of which are outlined in this report.

As local authorities, we hold in trust many of the parks, woodlands, and wider greenspaces for the public and our future generations, therefore,as custodians we need to ensure that we incorporate the growing knowledge we are developing

about plant pathogens and invasive non-native species into our everyday roles and responsibilities regarding future plant care. We also need to accept that due to climate change and natural means of pathogen spread we may still have new threats entering the UK, but where we are responsible for procuring, transporting, and planting and caring for new and existing trees and plants then as far as possible we are preventing such problems by adopting proper and effective plant biosecurity measures. This will increase in importance as we plant more trees to combat the impacts of climate change and look for more climate resilient plants for our urban parks and gardens. Ideally, we need to make sure that biosecurity practices are beyond our own administrative boundaries and that plant biosecurity measures are adopted across regions and ultimately across the UK, as working in isolation will not stop the spread of pathogens and invasive non-native species. Perhaps regional working groups may be one way in which co-ordinated action can be taken using the government's plant biosecurity and invasive non-native species strategies as guiding principles.

The recent APSE seminar on plant biosecurity contains a great deal of information and valuable links which members would find helpful in also addressing some of these issues.https://www.apse.org.uk/index.cfm/apse/events/previous-seminars/2024-seminars/biosecurity-seminar/

Importantly, we need to also consider how we can help educate others on this subject whether it be through contractual requirements or through supporting or developing local plant biosecurity campaigns particularly in those greenspace areas where there is already a plant biosecurity issue. This is particularly important in areas where there is a high visitor footfall.

From a public perspective, there is a general lack of knowledge about the need for plant biosecurity. Like most of us who visit a garden centre, we do not ask where the plant originated from, whether they have been recently sprayed and with what chemicals, whether the soil the plant we have chosen is grown in locally sourced soil or has the soil come from some far-off country where a particular pest or disease is common but may be a threat if imported to the UK . One way we can alter this, is to look at our own practices, particularly if we grow plants for retail sale. By adopting better plant hygiene and sourcing, we can pass these messages on to customers. We can also build these messages into our climate change education campaigns as most local authorities now carry out such activities. Therefore, wherever there is an opportunity to promote plant biosecurity be it in corporate strategies and policies, in

contractual agreements, at council meetings, through the regular training of our staff and in our schools and colleges, as well as in our daily contact with our residents, those opportunities must be taken.

We have now entered a period known as the Anthropocene, a term used to describe an age 'where a single species has caused such destructive effects on the natural world and had an awareness of doing so'. This is not simply referring to climate change but the wider impacts of our actions including the global trade in plant and trees and the devastating effect this has had regarding the introduction of plant pathogens, pests and invasive non-native species causing untold damage to biodiversity levels around the world. However, because we are aware of what we have done, we have the ability to make things better. It will take effort, but we have not described ourselves as homo sapiens – the 'wise human' without some justification.

It is with some hope that we are beginning to recognise that as a society we cannot exist outside of the natural systems which have evolved over billions of years. We are beginning, albeit slowly, to adopt different approaches to how we treat the natural world and plant biosecurity is one of these ways. Without healthy plants and trees, we cannot survive as a species, therefore each and every one of us, whether a decision maker, a front-line operative, or a purveyor of knowledge has their own role to play in ensuring our plants and trees and wider ecosystems receive the care and respect they deserve and need.

Useful Links

Plant biosecurity strategy for Great Britain (2023-2028)

https://www.gov.uk/government/publications/plant-biosecurity-strategy-for-great-britain-2023-to-2028

The Great Britain Invasive Non-native Species strategy (2023-2028)

https://www.gov.uk/government/publications/the-great-britain-invasive-non-native-species-strategy

Main tree pests and diseases

https://www.woodlandtrust.org.uk/trees-woods-and-wildlife/tree-pests-and-diseases/key-tree-pests-and-diseases/

Invasive non-native species

https://www.gov.uk/guidance/invasive-non-native-alien-plant-species-rules-in-england-and-wales#list-of-invasive-plant-species

Dealing with invasive non-native species waste

https://www.gov.uk/guidance/prevent-the-spread-of-harmful-invasive-and-non-nativeplants#:~:text=You%20can%20dispose%20of%20invasive,underground%20and%20can%20produce%20roots

https://aphascience.blog.gov.uk/2023/09/08/tackling-invasive-species

Disposing of trees and plants affected by disease or pests: RPS 71 - GOV.UK (www.gov.uk)

Sourcing biosecure plants

https://planthealthy.org.uk/assets/images/Plant-Health-Management-Standard-V1.2.pdf

https://www.gov.uk/guidance/import-plants-and-plant-products-from-the-eu-to-great-britain#get-a-phytosanitary-certificate

Biosecurity measures in parks and gardens

https://plantnetwork.org/wordpress/wp-content/uploads/12568/parksbiosecuritysmall.pdf

Biosecurity Best Practice Tips

https://planthealthportal.defra.gov.uk/assets/uploads/Biosecurity-Best-Practice-Tips.pdf

Identifying plant and tree pests and diseases

https://planthealthportal.defra.gov.uk/assets/uploads/Biosecurity-Best-Practice-Tips.pdf

https://planthealthportal.defra.gov.uk/pests-and-diseases/uk-plant-health-risk-register/

Example of a Plant Biosecurity Policy

https://beta.southglos.gov.uk/static/4ee0c6a90ac54efb04281d37088b5734/South-Gloucestershire-Council-Plant-Biosecurity-Policy-2022.pdf

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"How could intelligent beings seek to control a few unwanted species by a method that contaminated the entire environment and brought the threat of disease and death even to their own kind?"

https://www.rachelcarson.org/silent-spring

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This is of particular concern, as beginning in the 1990's, a stream of invasive pathogens potentially damaging to trees, natural ecosystems and horticulture have been entering the UK. Notable examples include the alder dieback, the 'sudden oak death' (chestnut bleeding canker and box blight It is estimated that of the 234 pathogens first recorded in the UK between 1970 and 2004 Jones & Baker, 2007, ca. 67% were associated with wild or ornamental plants. Organisms like these represent a significant threat both to the UK natural environment and our horticultural heritage.

https://bsppjournals.onlinelibrary.wiley.com/doi/10.1111/j.1365-3059.2008.01886.x#b53

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Because of these concerns, the UK Government and relevant partners have developed both a UK-wide plant biosecurity strategy and a Great Britain invasive non-native species strategy . These complimentary strategies aim to respond to these challenges and growing threats through a number of different ways, including: strong partnership working,(including industry and the public), reducing and managing the risks posed by plant pests, pathogens and invasive non-native species (including animals and marine life) and where possible eradicating, if necessary, facilitating the safe trade of plants and constantly monitoring and gathering data to allow present and future actions.

https://www.gov.uk/government/publications/plant-biosecurity-strategy-for-great-britain-2023-to-2028

https://www.gov.uk/government/publications/the-great-britain-invasive-non-native-species-strategy

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APSE had noted through it work, that there was a growing interest for information around the issue of plant biosecurity if not always recognised as such. A recent online seminar on Ash Dieback had significant numbers of UK authorities attending and APSE's Parks and Greenspaces annual seminars, advisory groups and network query services have also been covering plant biosecurity and issues around invasive non-native species at the request of authority members. Clearly plant biosecurity is on local authorities' agendas, but to what degree?

https://apse.org.uk/index.cfm/apse/events/previous-seminars/2022-seminars/ash-dieback-and-its-current-and-future-impact-on-local-authorities-across-the-uk/

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The full survey, responses and comments can be found at the following link : *https://apse.org.uk/index.cfm/apse/members-area/briefings/2024/24-07-plant-biosecurity-survey-results1/*

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For a fuller description of the main tree pests and pathogens affecting the UK please refer to the Woodland Trusts webpage which identifies the disease/pest, its impact and what work is being done to combat these diseases/pests. The website also contains the precautionary biosecurity measures needing to be taken to stop the spread of these diseases and pests. The website can be found at the following link :

https://www.woodlandtrust.org.uk/trees-woods-and-wildlife/tree-pests-and-diseases/key-tree-pests-and-diseases/

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Defra has provided a list of the plants which pose the greatest threat, together with what you need to do if you keep, grow, find or sell certain invasive plant species and your responsibilities to prevent their spread.

https://www.gov.uk/guidance/invasive-non-native-alien-plant-species-rules-in-england-and-wales#list-of-invasive-plant-species

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One thing to consider about dealing with any invasive non-native species, is apart from taking action to control or eradicate it, the question is what to do with the waste created. Giant hogweed for example, is a controlled waste (like Japanese knotweed so, if it is taken off site, can only be disposed of in licensed landfill sites with the required documentation. To avoid this, dispose of any plant material (dug up or cut down) by composting or burning. To ensure you meet all the requirements regarding dealing with such waste it would be advisable to consult the following website which provides detailed information.

https://www.gov.uk/guidance/prevent-the-spread-of-harmful-invasive-and-non-nativeplants#:~:text=You%20can%20dispose%20of%20invasive,underground%20and%20can%20produce%20roots

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The APHA website https://aphascience.blog.gov.uk/2023/09/08/tackling-invasive-species/ provides wealth of current information on how to deal effectively and safely with invasive non-native species.

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The Royal Horticultural Society (RHS) believes that avoiding pests, diseases, and weeds by good practice in cultivation methods, cultivar selection, plant hygiene and encouraging or introducing natural enemies, should be the first line of control. If chemical controls are used, they should be used only in a minimal and highly targeted manner. For example, where pests, diseases or weeds pose a serious threat to the wider environment, to important heritage specimens, to habitat, or to native wildlife. *https://www.rhs.org.uk/prevention-protection/invasive-non-native-plants*

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Responsible source planting stock through nurseries or suppliers that adhere to national standards such as the Plant Health Management Standard.

https://planthealthy.org.uk/assets/images/Plant-Health-Management-Standard-V1.2.pdf

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It is disposed of at a licensed handling facility, or through deep burial or on site. It may be worth using the following link for further advice. *Disposing of trees and plants affected by disease or pests: RPS 71 - GOV.UK (www.gov.uk)*

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A phytosanitary certificate is a statement from the plant health authority that the consignment:

- Has been officially inspected or tested, or both.
- Complies with legal requirements for entry into Great Britain.
- Is free from quarantine pests and diseases.

Further details can be found at *https://www.gov.uk/guidance/import-plants-and-plant-products-from-the-eu-to-great-britain#get-a-phytosanitary-certificate*

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There are many different guidance notes on biosecurity practices in Parks and Gardens but one worth consulting, although now slightly dated is the 'Parks and Gardens- Biosecurity Best Practice Protocols (2012), The Food and Environment Research Agency(FERA) *https://plantnetwork.org/wordpress/wp-content/uploads/12568/parksbiosecuritysmall.pdf* It is also worth reading best practice guides and tips contained within the brief Defra guidance note, Top 10 best practice tips for anyone who moves plants in the UK *https://planthealthportal.defra.gov.uk/assets/uploads/Biosecurity-Best-Practice-Tips.pdf*

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Local authorities can keep staff up to date on current plant pest and disease threats by visiting the Plant Health Portal *https://planthealthportal.defra.gov.uk/ and The UK Plant Risk Register https://planthealthportal.defra.gov.uk/pests-and-diseases/uk-plant-health-risk-register/* which provides information about plant pests and diseases, including risk assessments, links to other sites of interest and information on plant health controls and services provided by government. It also shows how to recognise symptoms and their hosts, including common, indigenous pest and diseases and ultimately helps staff identify symptoms and their causes and thereby get such problems identified early.

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How the action plan will support national plant biosecurity campaigns such as 'Check, Clean, Dry' *https://www.nonnativespecies.org/what-can-i-do/check-clean-dry* and 'Be Plantwise' *https://www.nonnativespecies.org/what-can-i-do/be-plant-wise/*

- A monitoring and annual reporting system
- Useful Contacts

- Appendices outlining invasive non-native species identified by government

A copy of the policy can be found at *https://beta.southglos.gov.uk/static/4ee0c6a90ac54efb04281d37088b5734/South-Gloucestershire-Council-Plant-Biosecurity-Policy-2022.pdf*

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A full copy of the Tree strategy and the biosecurity objective can be found at *https://images.reading.gov.uk/2021/03/Tree-Strategy-March-2021.pdf*

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The recent APSE seminar on plant biosecurity contains a great deal of information and valuable links which members would find helpful in also addressing some of these issues. *https://www.apse.org.uk/index.cfm/apse/events/previous-seminars/2024-seminars/biosecurity-seminar/*

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