



Department
for Environment
Food & Rural Affairs

Pest specific plant health response plan:

Outbreaks of *Anoplophora chinensis*



Figure 1. *Anoplophora chinensis* adult © Fera Science Ltd.

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Executive summary

Background	
Regulation	GB Quarantine pest
Key Hosts	<i>Acer, Aesculus, Alnus, Betula, Carpinus, Citrus, Corylus, Cotoneaster, Fagus, Lagerstroemia, Malus, Platanus, Populus, Prunus, Pyrus, Salix and Ulmus.</i>
Distribution	China, Croatia, Democratic People's Republic of Korea, Indonesia, Italy, Japan, Malaysia, Myanmar, Philippines, Republic of Korea, Taiwan, USA, Vietnam
Key pathways	Plants for planting, Wood packaging material
Industries at risk	Amenity, garden centres, nurseries, wider environment
Symptoms (2.6)*	Crown dieback, early senescence, host mortality
Surveillance	
Demarcated zones (5.32)*	Infested zone = 100 m around known infested plants Buffer zone = ≥ 2 km
Surveillance activities (5.38-5.42)*	<ul style="list-style-type: none"> • Visual surveys will be carried out in the infested and buffer zone • Regular surveillance of sentinel trees • Destructive sampling
Response measures	
Interceptions (5.1-5.7)*	<ul style="list-style-type: none"> • Consignment should be destroyed or re-exported if live or dead larvae are found or feeding damage is seen. • Tracing exercises carried out where required • UKPHINs notification to be made.
Outbreaks (5.43-5.56)*	<ul style="list-style-type: none"> • Infested and symptomatic plants within 100 m of infested plants to be felled and removed • If felling is deemed inappropriate an alternative eradication measure may be feasible • Plants and hedgerows to be cut to ground level • Inspection of felled trees • Sentinel trees to be installed for monitoring • Restrictions on replanting host species
Key control measures	
Biological	N/A
Chemical	Insecticides are unlikely to prevent spread
Cultural	Felling and destruction of infested trees
Declaration of eradication	
Eradication of an outbreak can be declared if no pest is detected during annual surveys for a period covering at least two lifecycles of <i>A. chinensis</i> i.e. six years in the UK after the last infested material is detected and destroyed.	

* Numbers refer to relevant points in the plan.

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1. Introduction and scope

- 1.1. This pest specific response plan has been prepared by the Defra Risk and Horizon Scanning team. It describes how the Plant Health Service for England will respond if an infestation of *Anoplophora chinensis* (citrus longhorn beetle) is discovered.
- 1.2. The plant health authorities in Northern Ireland, Scotland, Wales and the Crown Dependencies have been consulted on this plan and will use it as the basis for the action they will take in the event of *A. chinensis* being detected in their territories.
- 1.3. This document will be used in conjunction with *the Defra Generic Contingency Plan for Plant Health in England*, (<https://planthealthportal.defra.gov.uk/assets/uploads/Generic-Contingency-Plan-for-Plant-Health-in-England-FINAL-2.pdf>), which gives details of the teams and organisations involved in pest response in England, and their responsibilities and governance. It also describes how these teams and organisations work together in the event of an outbreak of a plant health pest.
- 1.4. The aims of this response plan are to facilitate the containment and eradication of *A. chinensis* and to make stakeholders aware of the planned actions.

2. Summary of the threat

- 2.1. *Anoplophora chinensis* is native to areas of Asia; China, North and South Korea and Japan and is known to occur in Taiwan, Vietnam, Malaysia, Indonesia, Myanmar and Philippines (Eyre and Haack, 2017) (Haack *et al.*, 2010, Lingafelter & Hoebke 2002). In these areas it is known as serious pest of *Citrus* spp., but is also recorded as infesting a wide range of hardwood trees such as *Acer* spp.(maples) and some softwood trees (Keena *et al.*, 2021).
- 2.2. The first recorded outbreak of *A. chinensis* outside of Asia was in the Lombardy region of northern Italy on *Acer* spp., and *Fagus* spp., trees in 2000 (EPPO, 2001, 2009a), although the outbreak is thought to have been initiated 10 - 20 years prior to that (Hérard and Maspero, 2018). Following this there were findings in other regions, although the pest currently is only present in Lombardy and Tuscany, and work is ongoing to eradicate *A. chinensis* in these regions (EPPO, 2020b). Since these initial findings, there have been further outbreaks of *A. chinensis* in France (EPPO, 2018a, 2018c), Croatia

(EPPO, 2015a, 2020a) and Turkey (Bozkurt, 2018; EPPO, 2016a) where eradication work continues, whilst findings in Denmark, Germany, Lithuania, Netherlands, Switzerland and the UK have been declared eradicated (EPPO, 2009b, 2015b, 2017, 2018d, 2018e 2019a, 2019b).

- 2.3. Interceptions and incursions of single or small numbers of *A. chinensis* have been recorded from as early as 1921 in the UK (Eyre *et al.*, 2010). More notably *A. chinensis* was discovered in 2005 on a nursery site in Hampshire, associated with a shipment of 46,000 *Acer palmatum* imported from China (Eyre *et al.*, 2010). The following year a consignment of 41,000 *A. palmatum* plants imported from China were found with associated live *A. chinensis* adults but were held in a container and disposed of at the port of entry. (Eyre and Haack, 2017). In 2008 multiple finds of adults were reported to the NPPO and were traced back to a free plant offer sent by mail to readers of a national newspaper. The plants were sourced from a nursery on the Crown Dependency of Guernsey that had imported 130,000 *A. palmatum* plants from China, via the Netherlands. The nursery had then distributed 60,000 plants to members of the public (Giltrap *et al.*, 2009). During tracing work and following an assessment of the risk of establishment it was decided that it was scientifically and practically most relevant to only assess sites where four or more potentially infested trees had been planted. This was due to the small size of the individual trees being unlikely to support the development of more than one beetle, and therefore sites with fewer than 4 trees were unlikely to produce sufficient adults to facilitate sexual reproduction that could lead to an outbreak. Follow-up destructive sampling and visual inspections deemed the risk of establishment to be low. (EPPO, 2018e, Eyre and Haack, 2017, EPPO, 2008).
- 2.4. Haack *et al.* (2010) compared 219 worldwide interceptions of *A. glabripennis* and *A. chinensis* from 18 countries made between 1980 and 2008. Nearly all the interceptions of *A. chinensis* were on plants for planting material originating from China, Japan and Korea. Unlike *Anoplophora glabripennis*, *A. chinensis* is rarely intercepted in/on wood packaging material (WPM), i.e. between 1998 and 2015 only two interceptions of *A. chinensis* in/on WPM were made in the EU as compared to 23 interceptions on plants for planting (Eyre and Haack, 2017, Hérard and Maspero, 2018), therefore plants for planting represent the highest risk pathway for introduction.
- 2.5. In addition to *Citrus* spp., *A. chinensis* is known to feed on and develop within many species of deciduous trees, including some that commonly occur in the UK such as: *Acer* (maples and sycamores), *Aesculus hippocastanum* (horse chestnut), *Alnus* (alder), *Betula* (birch), *Carpinus* (hornbeam), *Corylus avellane* (common hazel), *Cotoneaster*, *Fagus* (beech), *Lagerstroemia*

(myrtle), *Malus* (apple), *Platanus* (plane), *Populus* (poplar), *Prunus* (cherry), *Pyrus* (pear), *Salix* (willow) and *Ulmus* (elm).

- 2.6. Adults feed on the leaves, petioles and the bark of the host tree but cause little damage. Females create T-shaped slits in the bark in which they lay their eggs (oviposit) and characteristically, these slits are usually sited in the roots or the lower trunk of the chosen host. It is the larvae that cause the most damage as they burrow into and feed on the sap and heartwood, forming round galleries that become progressively wider as the larvae develop. This feeding damage can result in structural weakening of the host tree, crown dieback, secondary infection and ultimately the death of the host tree (Keena *et al.*, 2021, Malumphy *et al.*, 2012).
- 2.7. The death of host trees can result in significant economic, environmental and social impacts, including reductions in timber yield and quality; the loss of ecosystem services and host mortality on sites with amenity and historical importance (Jim and Chen, 2009; Eyre *et al.*, 2010; Roselli *et al.*, 2013). Eradication measures used against this pest can also be very costly, for example in the Lombardy Region in Italy the eradication costs were estimated at €18 million between 2001 and 2013. This figure does not include any loss of earning from movement restrictions implemented to prevent further outbreaks (Ciampitti and Cavagna, 2014).

3. Risk assessments

- 3.1. *Anoplophora chinensis* has an unmitigated and mitigated UK Plant Health Risk Register score of 60 and 30 respectively. Overall scores range from 1 (very low risk) to 125 (very high risk). These scores are reviewed as and when new information becomes available (<https://planthealthportal.defra.gov.uk/pests-and-diseases/uk-plant-health-risk-register/viewPestRisks.cfm?cslref=13295>).
- 3.2. Following the first findings of *A. chinensis* in Italy, the Netherlands, and the United Kingdom (UK) a Pest Risk Analysis (PRA) was carried out by van der Gaag *et al.* (2008) of the Dutch NPPO. This PRA concluded that *A. chinensis* is adaptable and could enter; establish and cause considerable damage to a wide range of hosts in Europe.

4. Actions to prevent outbreaks

- 4.1. *Anoplophora chinensis* is a GB quarantine pest ([Schedule 1](#) of [The Plant Health \(Phytosanitary Conditions\) \(Amendment\) \(EU Exit\) Regulations 2020](#)) and is therefore prohibited from being introduced into, or spread within GB. Further pest and host specific requirements are listed in [Schedule 7](#). *Anoplophora chinensis* is also a GB Priority Pest meaning it is a GB quarantine pest which has been assessed to have the most severe potential economic, environmental and social impacts to GB.
- 4.2. *Anoplophora chinensis* is an EU Union Quarantine Pest (Annex II Part B) and is therefore prohibited from being introduced into or spread within the Union Territory. It is also subject to EU Commission Implementing Regulation 2022/2095.
- 4.3. *Anoplophora chinensis* is an EPPO A2 listed pest and is therefore recommended for regulation by EPPO member countries.
- 4.4. The Plant Health Service for England (including the Animal and Plant Health Agency (APHA), Defra, Fera Science Ltd., and Forestry England) should be aware of the measures described in this plan and be trained in responding to an outbreak of *A. chinensis*.

5. Response activities

Official action to be taken following the suspicion or confirmation of an interception of *A. chinensis*

- 5.1. If *A. chinensis* is suspected by the Plant Health and Seeds Inspectorate (PHSI) or Forestry Commission (FC) to be present in a consignment moving in trade, the PHSI or FC must hold the consignment until a diagnosis is made. Samples should be sent to Fera Science Ltd., Plant Clinic, York Biotech Campus, Sand Hutton, York, YO41 1LZ (01904 462000) or Forest Research, Alice Holt Lodge, Wrecclesham, Farnham, GU10 4LH (0300 067 5600), in a sealed bag or container, within at least two other layers of containment, which are not liable to be crushed during transit. Damaged eggs, larvae or pupae should be sent in tubes of 70% ethanol to prevent further degradation.
- 5.2. In instances where either live beetles or signs of live beetles are confirmed, the inspector shall determine the level of plant health risk in the circumstances. This will take into account the weather conditions, the time of

year and the likelihood of the pest escaping and will require the appropriate remedial action to be taken for example, reloading of material back into a freight container and closing the doors or requiring the consignment be covered to prevent insect escape.

- 5.3. When an infestation of *A. chinensis* is confirmed, the PHSI or FC should advise the client of the action that needs to be taken by way of an official notice. Some destructive sampling of the consignment may be advisable to determine the level of infestation. Defra's Risk and Horizon Scanning team can advise on any destructive sampling and disposal methods. When this has been completed the consignment should be destroyed by either wood chipping, incineration, or deep burial.
- 5.4. An UKPHINS (UK Plant Health Interception Notification System) notification should be made upon confirmation of an interception of live *A. chinensis*. UKPHINS is the IT system for recording findings and non-compliance in order to maintain records and notify other NPPO of plant health issues.
- 5.5. If all or part of the consignment has been distributed to other premises prior to diagnosis, trace forward and trace back inspections should take place upon suspicion or confirmation of *A. chinensis*. Details of recent past and future consignments from the same grower/supplier should also be obtained.
- 5.6. A pest alert to raise awareness of *A. chinensis* and its symptoms should be distributed to packers/processors and importers where *A. chinensis* has been found, and to those in the local area and those associated with the infested premises. The pest fact sheet is available on the Plant Health Portal <https://planthealthportal.defra.gov.uk/plant-health-api/api/pests/13295/notices/6716/documents/4227/document>.
- 5.7. For finds of *A. chinensis* when the chances of establishment are minimal, such as on imported materials at ports or inland within a warehouse, surveillance should be carried out as set out in point 5.2. However, suspected finds of *A. chinensis* in the wider environment will need to be treated as suspect outbreaks and investigated as in point 5.8.

Official action to be taken following the suspicion of an *A. chinensis* outbreak

- 5.8. Suspected outbreaks will be assessed on a case by case basis. An Outbreak Triage Group (OTG) chaired by the Chief Plant Health Officer (CPHO) or their deputy and including specialists from APHA, Defra and other organisations, should be set up to assess the risk and decide on a suitable response at

strategic and operation levels. Where appropriate, the OTG will also decide who will be the control authority, and the control authority will then nominate an incident commander. An Incident Management Team (IMT) meeting, chaired by the Incident Commander, will subsequently convene to produce an Incident Action Plan (IAP). See the *Defra Generic Contingency Plan for Plant Health in England* for full details.

- 5.9. The OTG will determine the alert status, which will consider the specific nature of the outbreak. These alert levels, in order of increasing severity, are white, black, amber and red (more details on these levels can be found in table 2 of the *Defra Generic Contingency Plan for Plant Health in England*). Under most scenarios, an infestation of *A chinensis* suspected in a tree is likely to be given an amber alert status. An amber alert status refers to a serious plant pest/disease with potential for relatively slow, but extensive geographical spread leading to host death and/or major economic, food security or environmental impacts.

Restrictions on Movement of Material

Wood Packaging Material

- 5.10. If *A. chinensis* is suspected to have emerged from wood packaging materials (WPM) at an inland site, all the WPM from the same consignment should be placed on hold pending further investigation.

Nursery or garden centre

- 5.11. If *A. chinensis* is suspected at a nursery or garden centre, all host plants should be placed on hold pending further investigation.

Wider Environment

- 5.12. If *A. chinensis* is suspected in a tree or is found free living in the wider environment, all wood material that could potentially host the beetle, including living or felled trees, plant parts, such as branches and firewood, and other wood products, within a radius of at least 100 m should not be moved out of the zone pending further investigation.

Preliminary trace forward/backward

- 5.13. If an infested consignment or tree is considered as being the source of the suspect outbreak, investigations regarding the origins of infested consignments will be undertaken to locate other related and therefore potentially infested consignments of products, WPM or trees moving to and from the site. If applicable the relevant NPPO should be contacted. For

findings in the wider environment, where no trace forward or backward can be done, the most likely source should be identified and investigated.

Confirming New Outbreak

How to survey to determine an outbreak

5.14. Information to be gathered by the PHSI or FC on the suspicion of an infestation of *A. chinensis*, in accordance with ISPM 6 guidelines for surveillance (<https://www.ippc.int/en/publications/615/>):

- Location of the find – if found on commercial or private premises this should include the name of the business or householder, the postal address and other contact details that are available (such as phone numbers including mobile numbers and email addresses). For street trees/shrubs, the location information should include the address of the nearest domestic or commercial property to the tree(s)/shrub(s). It will also be necessary to find out the name and contact details of the appropriate department in the local authority. If possible, a GPS should be used to provide a ten-figure grid reference.
- The level of infestation should also be recorded such as the number of exit holes present; the number and life stages found, plus the number and a description of any pest symptoms. Any specimens including eggs, larvae, pupae or adult *A. chinensis* should be collected and sent to Fera Science Ltd., at Sand Hutton or Forest Research at Alice Holt as in 5.1.
- A description of the infested host or hosts, including the host species, plus approximate dimensions (diameter at breast height, approximate height), age/maturity, date of arrival on site, source and general condition.
- A description of other trees/shrubs in close vicinity (i.e. their species and approximate size).
- Details of how the pest was first reported or noticed.
- Provide all available information on recent movements of possibly infested trees, shrubs or wood and wood products e.g. logs and pallets

This information should be included on the plant pest investigation template.

- 5.15. Further to information gathering, surveys of other host plants and host wood should be carried out to confirm the extent of the infestation e.g. in surrounding gardens, parks etc. This should include samples and photographs of suspect plants and wood where possible. This initial survey will be used to determine if it is an isolated finding or an established outbreak.
- 5.16. Finance for the surveys will depend on the individual circumstances of the outbreak, and will be subject to discussion, usually between Defra policy, the PHSI and FC.

Sampling

- 5.17. Any eggs, larvae, pupae or adults or symptomatic wood samples found during the course of an inspection, survey or tree removal should be submitted by the PHSI or FC to Fera Science Ltd., or Forest Research as in point 5.1.
- 5.18. Suspect trunks and large branches should be cut into physically manageable sections to allow for a thorough inspection for symptoms to be made before their disposal.

Diagnostic procedures

- 5.19. The morphological identification of *A. chinensis* larvae is made by comparison to voucher specimens and with reference to EPPO Standard PM 7/149 (EPPO, 2021) & Duffy, 1968. In addition, Duffy (1953) is primarily a reference source to GB native longhorn beetle larvae and as such may be used to confirm that specimens are not a native.
- 5.20. The morphological identification of *Anoplophora* sp. adults can also be made with reference EPPO Standard PM 7/149 (EPPO, 2021) and by comparison to voucher specimens. In addition, descriptions and a key is provided by Lingafelter & Hoebke (2002). Bense (1995) provides comprehensive keys to the native European fauna that may also be used to confirm that a specimen is not a native species.
- 5.21. All morphological identifications can be supported by molecular methods as described in the EPPO diagnostic standard EPPO PM7/129 (EPPO, 2021), and is key to egg identification as these cannot be identified morphologically.

Criteria for determining an outbreak

5.22. An outbreak will be declared if there is evidence that *A. chinensis* may have established a population within the wider environment, separate from the material in which the pest has been moved to the UK. For example:

- An adult beetle and/or a fresh exit hole is found on a mature tree anywhere in England. In this situation, an outbreak of *A. chinensis* will be declared because this is likely to be evidence of a local population.
- A single adult beetle is found along with a single exit hole on a recently imported tree. In this situation, an outbreak of *A. chinensis* will **not** be declared because the risk of a local population is low.

5.23. Where an outbreak is not declared and establishment of the beetle is not expected, but there is a chance that adult *A. chinensis* may have escaped and dispersed, and could have colonised trees, the following measures will be required:

- Immediate eradication of any beetle found and destruction of infested material to exclude the possibility of spread.
- Monitoring within a radius of at least 100 m around the finding for at least one life cycle of the beetle plus an additional year including monitoring in at least four consecutive years. Surveillance during the first year will be more regular and intensive.
- Trace forward and backward of associated material, including inspection and targeted destructive sampling as appropriate.
- A pest alert to raise awareness of *A. chinensis* and its symptoms should be distributed to properties in the local area and those associated with the infested premises.
- Further measures which contribute to the eradication of the organism should be carried out in line with ISPM 9: guidelines for pest eradication programmes, which provides guidance on information gathering, surveillance, containment and treatments.

Official Action to be taken following the confirmation of an outbreak

5.24. The scale of the outbreak will determine the size and nature of the IMT and action.

Communication

- 5.25. The IMT will assess the risks and communicate details to the IPPC and EPPO in accordance with ISPM 17: pest reporting (<https://www.ippc.int/en/publications/606/>), as well as within Government to Ministers, senior officials and other government departments, devolved authorities, and agencies (e.g. the Environment Agency) on a regular basis as appropriate; and to stakeholders.
- 5.26. Information on the outbreak will be communicated to residents and businesses inside and outside the infested zone using various media formats e.g. leaflets, official posters, articles in local newspapers, appropriate websites, local radio etc. Consideration should also be given to the use of social media such as a 'Facebook' or 'Twitter' page where members of the public can post questions relating to the outbreak.
- 5.27. Prepared material is already available, including the pest alert, factsheet on differentiating *A. chinensis* longhorn beetle damage from that of native wood-boring insects, and information on the Observatree website [Citrus Longhorn Beetle - Observatree - the official project website.](#)
- 5.28. Description, photos and videos of symptoms, and guidance on surveillance can be further found on the Observatree website [Citrus Longhorn Beetle - Observatree - the official project website](#) or [CLB-Plant-Pest-Factsheet-update-May2016v5.pdf \(defra.gov.uk\)](#).
- 5.29. When a finding or outbreak is considered likely to have a limited public impact, APHA and/or FC's media and communication teams will coordinate external communications, as appropriate. Example scenarios could be finds of beetles associated with recently imported plants at a nursery. If the outbreak occurs in an area that is likely to cause significant media and public interest, for example an inner-city nature reserve/public park with a high density of trees that require felling, then external communications will be coordinated through the Defra Press Office. In all cases, the Defra Press Office must be kept informed of the current status of the outbreak and any action taken.

- 5.30. Depending on the scale and circumstances of the outbreak, a public meeting may be required to inform local residents and relevant stakeholders of the surveillance and eradication programme.
- 5.31. A generic communications plan is available for use across all plant health outbreaks. This will be owned by APHA and FC communications teams and is intended to provide consistency across outbreaks. This plan aligns with the Plant Biosecurity strategy and can be tailored to the outbreak, using pest and outbreak specific information. It includes a list of key stakeholders and templates for:
- Core Narratives
 - Press releases
 - Reactive lines
 - Frequently Asked Questions

Demarcated Zones

- 5.32. Once an outbreak has been confirmed, a demarcated area must be established around known infested trees. This will include two zones:
- The **infested zone**, where the presence of *A. chinensis* has been confirmed, including all plants showing symptoms caused by *A. chinensis* and, where appropriate, all plants belonging to the same lot at the time of planting. As a minimum, the radius of this zone will extend to 100 m around all known infested plants.
 - The **buffer zone**, which will initially be at least 2 km from the infested zone, with the exact delimitation based on preliminary investigations and surveys as to the level of infestation, the distribution of host plants and evidence of establishment. This can be reduced to an area within 1 km of the infested zone following surveys, if considered by the IMT that the eradication of the beetle is possible.
- 5.33. Initial maps of outbreak sites should be produced by officials.
- 5.34. Plants within the infested and buffer zone should be surveyed for signs of the beetle as described in 5.38-5.42.
- 5.35. If it is considered possible that the beetle has been spread to other destinations, such as those with a history of receiving potentially infested trees or wood from within the demarcated area e.g. firewood merchants or

local authority green waste disposal sites, then these areas should be surveyed.

- 5.36. The demarcated area should be adjusted in response to further findings. If *A. chinensis* is found within an area outside the infested zone, this should subsequently be designated as infested and the surrounding areas as part of the buffer zone.
- 5.37. Movement of potentially infested material out of the demarcated area should be prevented. The PHSI or FC will contact garden centres, nurseries and other traders of host plants, as well as owners/managers/tenants of woodland areas, conservation areas and amenity land such as parks, within the demarcated areas to inform them of the requirements that will apply to them (see Pest Management Procedures). Controls on the movement of specified plants or wood will be implemented either by statutory plant health notices, or by a statutory instrument, or a combination of the two, depending on the nature and scale of the incident. The location of any demarcated areas will be published on 'gov.uk' in order to inform all other stakeholders (including residents, businesses and landowners) within the demarcated areas of the requirements that will apply to them.

Surveillance

- 5.38. Priorities for surveying in different areas around the outbreak are listed below. These can be modified by the IMT depending on the specific circumstances of the outbreak. Surveys in different areas may be carried out concurrently.
- The highest priority for surveys will be key hosts of *A. chinensis* within 100 m of known infested trees. These will initially be surveyed by inspectors from the ground and should include inspections of the key hosts in 2.5.
 - The second highest priority is to survey broadleaved trees, hedgerows and wood on or within 100 m of any nurseries selling host plants, firewood merchants or other businesses/organisations that are within the demarcated area and may be moving potentially infested plants or wood out of the demarcated area.
 - Thirdly, broadleaved trees within the first 400 m out from the infested zone should be surveyed.
 - Lastly, host plants within 400-2000 m of the infested zone. In some of this area, for example the inner area, a systematic survey of all host trees may be carried and in outer areas a sample of high-risk trees, such as *Acer*

spp., may be inspected. The areas to be surveyed systematically and by surveying only high-risk trees will be determined by the IMT.

- 5.39. A selection of trap trees or 'sentinel trees' will also be surveyed on a more regular basis, at least twice per year (in spring/summer and winter). These will be single or groups of trees of the most favoured hosts of *A. chinensis* selected to cover the demarcated area.
- 5.40. Inspection of trees (with a trunk diameter of 2 cm or more) could be done as follows:
- Close inspection of the roots and trunk, up to 4m from the ground. This should include the inspection of new plant material around the base of the trunk such as suckers and coppice for signs of exit holes and adult feeding (Adachi, 1990; Hérard *et al.*, 2009; Malumphy *et al.*, 2012; Ciampitti *et al.*, 2013; Hoppe *et al.*, 2019). It has been observed during laboratory experiments that trees with thicker bark can be favoured by *A. chinensis* (Peverieri and Roversi, 2010), so inspections should focus on these.
 - Inspection underneath the tree for signs of frass or prematurely fallen leaves.
 - Inspection under the bark for larval chambers.
- 5.41. If suspicious symptoms are seen in a deciduous tree during ground surveys that cannot be positively identified as being due to another cause, they should be checked by destructive sampling. Depending upon the location and nature of this work, it may be necessary to use arboricultural contractors to conduct this work.
- 5.42. Surveys will be carried out annually and will continue until no beetle has been detected for at least two lifecycles of the beetle (at least six years in UK climate) after the last finding of infested material. These surveys will be carried out by ground surveyors with a specific survey plan developed based on the outbreak situation. The first surveys of the demarcated area will be carried out as soon as possible after the outbreak has been discovered. Subsequent surveys will be carried out once or twice per year.

Pest Management procedures

- 5.43. All infested plants and plants with symptoms of the beetle, as well as all host plants within the infested zone, should be cut down and removed.

Anoplophora chinensis adults do not tend to disperse far if there are suitable host plants in the vicinity (van der Gaag, 2010). However, it is possible for *A. chinensis* to disperse further in search of a host plant, with 2 km recorded in Japan (Cavagna *et al.*, 2013; Lethmayer, 2013), therefore felling of preferred hosts further than 100 m should be considered. However, any such action would also be dependent on the outbreak situation (including the extent, age, time of year and source of the outbreak) and host distribution in and around the infested zone. If infested plants are found outside the flight period for the beetle, (1st June until 30th October) the felling and removal should be carried out prior to the start of the next flight period, but ideally within a short space of time to allow the felled trees to be checked for further signs of infestation that may indicate the need to fell additional trees.

- The removal of host plants will be the responsibility of the occupier or other person in charge of the premises. Contact information for the Arboricultural Association with their register of qualified tree surgeons and ConFor (Confederation of Forestry Industries) will be provided to enable landowners to identify qualified operatives to carry out removal work. In exceptional circumstances, the removal of trees and shrubs may be carried out by the PHSI or FC.
 - In the case of private householders, officials may agree to organise the felling and removal of host trees and shrubs, with responsibility for payment of costs remaining with the occupier or other person in charge, or for it to be undertaken by the relevant local authority which will be responsible for determining whether to accept responsibility for the costs of the work or seek to recover the costs. Exceptionally, officials may, in the interests of speed, arrange for the work to be carried out and bear the cost, where possible seeking recovery after the event.
- 5.44. The radius of the areas described may be adjusted to reflect the density of potential and favoured hosts and the number of beetles, larvae and exit holes that have been found. In exceptional cases where the IMT concludes that felling is inappropriate, for example at sites of historical importance, an alternative eradication measure may be applied offering the same level of protection against the spread of the specified organism, for example, using wire meshing of an appropriate size on the lower parts of trees suspected to be infested, to capture emerging adults and stop their spread (Adachi, 1990, Roselli *et al.*, 2013).
- 5.45. Plants and hedgerows should be cut as close as possible to ground level. The cut surfaces of the stumps should be examined for signs of *Anoplophora* activity. If signs are found, the stumps should be ground down to a level where no further signs of infestation are present, alternatively stumps should

be dug up and removed and disposed of appropriately. In situations where the removal of stumps could cause unacceptable damage, wire mesh may be used to cover the stumps to prevent the escape of any remaining beetles, and to prevent any re-infestation. The IMT will provide advice on a case by case basis.

- 5.46. All lower parts of felled trunks, stumps and roots should be cut into sections of a size that can be easily handled, turned over and examined by inspectors before disposal. The outside of the logs and cut ends must be examined for any signs of *Anoplophora* damage. This could include exit holes, frass, cracks in the bark caused by tunnelling or oviposition scars. Damage that is considered to have potentially been caused by *A. chinensis* should be checked by cutting thin slivers of wood away from the surface to reveal whether there is any tunnelling below, and/or by splitting the wood open with a hand axe. An alternative to cutting open suspect logs in the field is to transfer them to a laboratory or other facility set up to carry out this task (e.g. a welfare/office unit). If this option is taken, logs need to be transported in securely contained conditions and the laboratory/alternative facility needs to be licensed to hold such materials. Although time consuming this may yield valuable information on the outbreak including, for example, the extent and age of the outbreak.
- 5.47. The possibility of using foliar insecticide treatments will be considered by the IMT for trees or shrubs within the infested zone if the outbreak is discovered during the potential adult flight period. They could help to prevent further spread of *A. chinensis* in the year that the outbreak is first discovered. However, they are likely only to be beneficial for heavy infestations of the beetle, where there is a high likelihood of further spread, as treatments have the potential to act as repellents to adult beetles.
- Prior to any insecticides being used, the risk posed by the insecticides to people and the environment will be assessed. If their negative impact to people and the environment is considered high, they should not be used.
 - Any applications should be made following the advice on the product label and be in accordance with HSE guidance. In some cases, there may be a requirement to carry out a Local Environment Risk Assessment for Pesticides (LERAP) depending on the product used and the situation of the finding.
 - If there is a finding within a Site of Special Scientific Interest (SSSI), Natural England should be contacted to assess the threat of the pesticide application to the site.

5.48. After the clearance of trees in the infested area (including within hedgerow environments), a minimum of six *Acer* spp., sentinel or trap trees (Eyre and Haack, 2017) of a minimum trunk diameter of 2 cm will be planted within the area to attract and monitor for *A. chinensis*. These should be planted in the ground as close as possible to the locations where the infested trees were found, ideally on publicly owned or managed land but always with the prior consent of the person in charge of the land. The sentinel trees will be inspected for signs of infestation a minimum of twice a year, i.e. the start and end of each summer, but ideally more regularly over the summer period. If signs or symptoms of *A chinensis* infestation are seen the affected trees will be destructively sampled.

Disposal Plan

5.49. During the anticipated *Anoplophora* flight period in the UK (1st June until 30th October) which is based on emergence data from the USA (USDA-APHIS 2008) and Hebei and Beijing, China (Li and Wu 1993), all felled trees and parts of trees from the infested area should be destroyed/processed as soon as possible after they have been inspected, and within a maximum of one week. The options for destruction/processing are:

- Chipping to dimensions of not more than 15 mm in thickness and width (experimental evidence from the USA suggests that *Anoplophora* juveniles will not survive in this material). This would be the most appropriate method of disinfecting shrubs, small trees and branches.
- It may be possible to leave the chipped material in situ but away from footpaths etc. (e.g. where large areas are infected) under an Environment Agency T6 exemption [T6 waste exemption: treating waste wood and waste plant matter by chipping, shredding, cutting or pulverising - GOV.UK \(www.gov.uk\)](http://www.gov.uk) which currently permits a maximum of 500 tonnes over a seven day period (check the Environment Agency for current details, similarly for burning).
- The D8 exemption allows burning plant tissue waste, wood packaging and packing material waste at a port when a Plant Health Notice has been issued, to prevent the spread of plant pests and diseases [D8 waste exemption: burning waste at a port under a Plant Health Notice - GOV.UK \(www.gov.uk\)](http://www.gov.uk) and currently permits a maximum of 10 tonnes in any 24 hour period.

- A commercial incinerator could be an option. NB: it may not be practical to burn whole trees or large sections, other than those with small diameters e.g. branch wood moved under containment to a location known and approved by the PHSI or FC. For example, material with no visible signs of infestation could be indelibly marked, then moved to a new location in sealed *Anoplophora* proof containers (e.g. steel shipping containers) and dealt with once conditions are too cool to permit adult activity.
- 5.50. Between 1st November and the 31st May, unprocessed logs may be indelibly marked then moved out of the infested area under official notice if they are going to a site where they will be processed by one of the following methods before the following flight season:
- Wood chipping – chipping to dimensions of not more than 15 mm in thickness and width.
 - Burning or incineration.
- 5.51. Other methods of disposal, such as deep burial of non-hazardous waste at a local authority approved landfill site, or use as biomass, may be considered on a case by case basis.
- 5.52. In cases where a local authority has the necessary equipment and facilities to carry out the removal and destruction of host material in amenity areas, arrangements may be explored with the authority concerned for the disposal of material from other sources such as private dwellings and commercial premises.
- 5.53. Any disposal of waste material must be done in accordance with the relevant legislation. Growers need to obtain permission for exemptions from the Agricultural Waste Regulations from the Environment Agency. No charges are made for these exemptions. Further information on activities that require a permit and those which require the registration of an exemption can be found on the EA website at <https://www.gov.uk/topic/environmental-management/environmental-permits>.
- 5.54. Landowners need to ensure that any clearance complies with Habitat Regulations. If needed, permissions can be sought to undertake emergency activities e.g. felling. Further information may be obtained from Natural England or the FC (the latter being the lead authority for all forestry activity).

Replanting

- 5.55. No host plants will be planted in the demarcated area during the outbreak, except for trap trees (sentinel trees).
- 5.56. The potential host range for *A. chinensis* is large with many plant species susceptible to feeding damage. However there are a number of plants that could be used in the demarcated area that are less favourable hosts i.e. those that do not support a full life cycle and includes: *Fraxinus* spp. (ash); *Carya* spp.(hickory); *Castanea sativa* (sweet chestnut); *Camellia* spp., *Euonymus europaeus* (spindle); *Ilex* spp.(holly); *Sambucus* (elder); *Syringa* (lilac); *Juglans* spp. (walnut); some *Quercus* spp. (oak) including *Q. petraea*, *Tilia* spp.(lime) including *Tilia cordata*, *Tilia x europaea* and *Tilia platyphyllos* and some softwoods (Sjöman *et al.*, 2014).

6. Criteria for declaring eradication/change of policy

- 6.1. Eradication of an outbreak can be declared if no pest is detected during annual surveys for a period covering at least two lifecycles of *A. chinensis*, after the last infested material was detected and destroyed. i.e. six years in the UK.

7. Evaluation and review of the Contingency plan

- 7.1. This pest specific contingency plan should be reviewed regularly to consider changes in legislation, control procedures, pesticides, sampling and diagnosis methods, and any other relevant amendments.
- 7.2. Lessons should be identified during and after any outbreak of *A. chinensis* or other pest, including what went well and what did not. These should be included in any review of the contingency plan leading to continuous improvement of the plan and response to outbreaks.

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