

**NT PLANT QUARANTINE & BIOSECURITY GUIDANCE NOTE****NUMBER 5 – MANAGING GARDENS TO REDUCE  
THE RISK OF PESTS & DISEASES**

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**Background**

It is vital that our gardens are managed in a way that creates an environment that is unfavourable for pests and diseases should they appear. The following measures will help reduce the risk of gardens and plant collections becoming infected and the subsequent spread of pests and diseases from infected gardens via our visitors. These guidelines supplement the National Trust's new biosecurity measures (e.g. sourcing plants and quarantine) aimed at excluding pests and diseases from our gardens.

**1.0 Husbandry**

- A healthy plant is one that is less likely to succumb to disease, therefore, try to match a plant to its preferred location, soil type and watering regime.
- Application at planting of a mycorrhizal fungi planting treatment, such as "Root Grow" (available from PlantWorks), may aid establishment and encourage growth.
- Wherever possible, avoid previously infected areas.
  - For some pathogens such as *Phytophthora ramorum*, this is essential because plants can become infected by spores remaining in the soil.
  - Where there is a need to replant an area with the same plant e.g. a rose bed, try to minimise the effects of rose decline by using a mycorrhizal fungi planting treatment or invigorate the bed with organic matter.
- Lower leaves in contact with soil are at risk of picking up disease from the soil, therefore, when planting take measures to prevent lower leaves coming into contact with soil either by:
  - removing the lower leaves or
  - Mulching around the plant to prevent soil splashing on to leaves with for example composted bark chips (composted to cook out any pests and diseases) or with coir discs.

**1.1 Nutrition**

- Plant growth and soils should be monitored for nutrient deficiencies.
- Fertilisers or foliar feeds should be applied to correct significant deficiencies but taking care to avoid over-use that can lead to soft growth which is more susceptible to infection.

**1.2 Spacing**

- When planting shrubs, in particular, space them as widely as possible to ensure good air movement so that humidity is reduced.

### 1.3 Pruning

- For shrubs, adopt a programme of 'formative' pruning to remove dead and disease branches and to keep plants "in check". This is especially relevant to plants, such as rhododendron which can become invasive.
- Example of best practice:
  - Tatton Park have kept their rhododendrons compact and vigorous by a strict pruning regime, which has had the added benefits of preventing uncontrolled colonisation, increasing general air movement and reducing humidity.
  - Staff prune the side of plant away from public view one year, and then to prune the side facing public view the next year when the other side has leafed-up.
  - Experience has shown that 'rough-barked' rhododendrons respond better to pruning than 'smooth-barked' species.

### 1.4 Fallen leaves and plant debris

- Whilst fallen leaves are often beneficial because they produce a leaf mould and are thought to encourage mycorrhizal fungi, for specific plants, collect and burn all fallen leaves because they can harbour harmful pests and diseases.

Examples include:

- Horse chestnuts (*Aesculus hippocastanum*) - The horse chestnut leaf mining moth (*Cameraria ochridella*) (see further information here: [http://intranet/intranet/horse-chesnut leaf mining moth cameraria ohridella .doc](http://intranet/intranet/horse-chesnut%20leaf%20mining%20moth%20cameraria%20ohridella.doc) )
- Winter's bark (*Drimys winteri*) - *Phytophthora kernoviae*
- Camellias (*Camellia* spp.) – Camellia flower blight (*Ciborinia camelliae*)
- Peaches (*Prunus persica*) – Peach leaf curl (*Taphrina deformans*).

### 1.5 *Rhododendron ponticum*

A separate section on wild *Rhododendron ponticum* is included because it harbours and spreads two pathogens, *Phytophthora ramorum* and *Phytophthora kernoviae*, which pose a serious risk to many ornamental plants and trees in National Trust gardens.

The following recommendation is relevant to **all** gardens, not just to those currently affected by these diseases. In fact, it is probably more important to those gardens that are currently not affected by either disease.

- Preferably, all gardens should develop a programme for the complete removal of wild *R. ponticum*.
- Consult with your Garden Adviser and Curator, and survey the garden to identify and map all areas of wild *Rhododendron ponticum*. **Note: this is vital because there are important collections of *R. ponticum* cultivars and hybrids which must be marked clearly so as to exclude them from any clearance programme.**

- Woodland sites may qualify for some support under various grant schemes e.g. Forestry Commission Woodland Improvement Grant in England and Wales and the Better Woodland for Wales in Wales.
- All re-growth will need to be controlled.
- If complete removal of wild *R. ponticum* is not possible,
  - Clear all wild *R. ponticum* away from the trunks of susceptible trees, especially from beech. Make sure that no foliage or branches are touching the tree by clearing a radius of at least 2 m around the trunk.
  - Prune any remaining areas of *R. ponticum* e.g. hedges or windbreaks immediately after flowering to prevent seed production.
  - Any seedlings should be either physically removed each winter or are trimmed to ground level.

The Forestry Commission publish guidance on methods of clearance of *R. ponticum* (see link below).

## 1.6 Hygiene

Pests and pathogens are readily spread around a garden on soil and plant debris attached to footwear, tools (e.g. pruning knives, secateurs, saws etc.) or on tractors and other vehicles or machinery. The following measures will help to prevent this:

- General “non-outbreak” situations:
  - Regularly wash all organic matter from footwear e.g. at the end of each day, and back in the yard.
  - Regularly clean and disinfect tools.
  - For any contractors conducting major landscaping work, tree felling etc., require that their vehicles and equipment are clean before they enter the garden.
- In on-going outbreaks of pests or diseases, the risk is higher and the measures should be increased
  - Wash all organic matter from footwear and disinfect at the outbreak area and before moving to uninfected areas of the garden.
  - Consider using dedicated tools in outbreak areas or clean and disinfect them at the outbreak area and before moving to uninfected areas of the garden.
  - Require contractors conducting major landscaping work, tree felling etc., to clean their vehicles and equipment before entering and before leaving the garden.
  - Where clearance work has obviously contaminated paths, they should be swept clean of all soil and plant debris, and should be disinfected.
- Disinfectant
  - “Jet 5” is recommended for general purpose.
  - “Cleankill Sanitising Spray” is recommended specifically against pathogens such as *Phytophthora ramorum* that produce difficult to kill thick-walled resting spores; “Jet 5” is recommended when disinfecting paths following clearance work associated with *P. ramorum*.

## 2.0 Infrastructure

### 2.1 Paths

- Wet, muddy areas are likely to harbour diseases such as *Phytophthora* and *Pythium*, and people walking through such areas will pick up the pathogens on their footwear.
  - Keep the surface of paths in a state of good repair, in particular to avoid puddling of water. If this is not possible, it may be necessary to restrict access in wet conditions.
  - Ensure that the path camber deflects rain water to gullies and drains, and regularly inspect the gullies/drains to ensure that they are clear.
  - Alternatively, consider raising the height of the bed above that of the adjacent path
- Practice a regular programme of clearing leaves, other plant debris and soil from paths
  - Generally, leaves can be blown onto borders.
  - In known outbreak areas (e.g. *Phytophthora ramorum*) and for some plants (e.g. horse chestnuts), leaves should be collected and destroyed.
- Wherever possible, try to ensure that there is a gap between plants in the border and the adjacent path to minimise debris falling on paths.

### 2.2 Fencing/signs

- Where necessary erect signs and fencing to restrict access to high risk areas, such as those with a known pest or disease problem, areas under development or areas known to suffer from waterlogging.

## 3.0 Water

### 3.1 Irrigation

- Use a source of water that is free from pests and diseases.
- Mains and bore hole water will be clean but may not be an option due to cost or abstraction limitations.
- If water collected on-site is used, it should be treated in some way to destroy pathogens. Methods include:
  - Slow sand filtration – this has been proved to be completely effective at removing pathogens such as *Phytophthora* species (including *P. ramorum*) from water. However, it is expensive (around £10k) and is most likely to be appropriate to nurseries. An excellent system is in operation at Killerton.
  - Alternative cheaper systems include ultra-violet light, chlorination or ozone.
- Water should be tested at least annually to check for pathogens. Spring and autumn are the best times to test. For example, Defra's Central Science Laboratory will provide and test bait bags at a cost of around £80 + VAT per sample.

## 3.2 Drainage

Pathogens, such as *Phytophthora* and *Pythium* are spread in water, therefore, poor drainage or flooding can lead to infection and plant death.

- Regularly maintain any existing drainage system to ensure that it works effectively.
- For gardens that are prone to flooding or flash flooding, consider ways to keep the flood water from valued plants:
  - Deflect flood water along gullies.
  - Use large lawns to act as 'flood plains' to catch act as temporary stores of water during floods/heavy down pours.
- General access and public events can lead to soil compaction and poor drainage – try to site paths/events away from vulnerable areas, and repair promptly any damaged areas after an event.
- For sites where there is a risk of farm fertilisers washing into gardens, consider entering into an upstream catchment management agreement to prevent the problem.

## 4.0 Waste disposal

- All organic waste (e.g. dead plants, prunings, fallen leaves, other plant debris etc.) must be disposed of safely because of the potential that it harbours pests and pathogens, which can spread into gardens either in water or on the wind.
- Ideally, plant waste should be collected and kept secure prior to disposal.
  - Non-diseased waste may be collected temporarily in an uncovered site, which preferably should be sited well away from public access, any glasshouses and important garden plants, and should be both downhill and down wind of the garden (to prevent water running from the storage area into the garden or debris blowing on to the garden).
  - Diseased plant waste should be collected and covered securely e.g. in a covered skip until disposal.
- Acceptable methods of disposal include composting, burning and deep burial at an approved landfill site.

## 4.1 Composting

- If done correctly, composting will also kill most pests and pathogens.
- Methods include:
  - "Hot composting" See Appendix 1/link to intranet page for a protocol that has been developed and used successfully at NT Nyman's.
  - "In vessel composting" using a machine such as "The Rocket" (available from Accelerate Composting Limited; cost £6k; <http://www.quickcompost.co.uk/>) or a "Jura 270" and "Scotty's hot box" (available from SmartSoil Limited; cost less than £1k; <http://www.smartsoil.co.uk>).
- An Environment Agency exemption, allows composting of up to 1,000 cubic metres at any one time. There is no minimum size, which means that all compost sites need to be registered. There is currently no charge for the compost exemption.

- Ensure every compost site has a Paragraph 12 exemption from the Environmental Permitting Regulations. This is a legal requirement and further information and links to the Environment Agency guidance and forms are available on the intranet - see [http://intranet/intranet/i-con-feature/i-env-feature/i-env-waste\\_feature/i-env-wmchecklist.htm](http://intranet/intranet/i-con-feature/i-env-feature/i-env-waste_feature/i-env-wmchecklist.htm)
- The Environment Agency also prescribes the base needed for the composting area, which is dependent on the types of materials being composted. These requirements are set out on the guidance page linked to from the intranet site above.
- Note: These regulations will be changing in October 2009, with the limits for an exemption reducing to 40 tonnes per site. A separate exemption exists for using the compost, and this will allow up to 200 tonnes of compost to be kept on site prior to spreading on land (with a limit of 50 tonnes per hectare per year.) The new exemptions will be chargeable and time limited, however, the Trust is negotiating a blanket exemption for Trust sites. More guidance will follow in the autumn 2009.

#### 4.2 Burning

- Burning either *in situ* (under an Environment Agency exemption, which allows a total quantity not exceeding 10 tonnes to be burned in any period of 24 hours) or at a commercial incinerator.
- The Trust holds an exemption for burning on site (see the [conditions of paragraph 30 exemption.](#))

#### 4.3 Deep burial

- Deep burial as non-hazardous waste at a local authority approved landfill site.  
**Note:** burial on Trust land is **NOT** permitted.

### 5.0 Monitoring

- Garden staff (gardeners, volunteers) should receive basic training in the main pests and diseases of plants relevant to their garden.
- The general condition and health of plants should be monitored regular so as to spot problems early and enable prompt remedial action to be taken.
- Report all suspicious symptoms to your Garden Adviser - remember that it is a legal requirement to notify all suspect findings of quarantine pests and pathogens to Defra.

### 6.0 Links for further information

- Central Science Laboratory – water testing. CSL provide and test bait bags to test water for the presence of *Phytophthora* spp. at a cost of around £80 + VAT per sample. Also CSL can test water samples for the presence of bacterial pathogens and results are typically available in 5-10 days. Water samples should consist of 500ml taken sub-surface from tanks or lagoons or mid-flow from taps or hoses. Samples should be kept cool and dark, and be sent by courier to arrive at CSL by 9.30am. Testing will be done same day as receipt.  
<http://www.csl.gov.uk/contactUs/>

- Forestry Commission – Practical Guide – Managing and controlling invasive rhododendron. Available as a downloadable pdf from [http://www.forestry.gov.uk/website/publications.nsf/searchpub/?SearchView&Query=\(rhododendron\)&SearchOrder=4&SearchMax=0&SearchWV=TRUE&SearchThesaurus=TRUE](http://www.forestry.gov.uk/website/publications.nsf/searchpub/?SearchView&Query=(rhododendron)&SearchOrder=4&SearchMax=0&SearchWV=TRUE&SearchThesaurus=TRUE)
- Source for *Rootgrow*, UK-provenance mycorrhizal product :- PlantWorks UK, 1-19 Innovation Buildings, Kent Science Park, Sittingbourne, Kent ME9 8HL; Tel 01795 411527; FAX 01795 411529; e-mail and website: [info@plantworksuk.co.uk](mailto:info@plantworksuk.co.uk); [www.friendlyfungi.co.uk](http://www.friendlyfungi.co.uk)

## Appendices

Appendix 1 - Hot Composting at Nymans  
Appendix 2 - Photo Supplement



## Appendix 1

### Hot Composting at Nymans

At Nymans Garden we turn our weeds, grass clippings, pruned branches and discarded plants into hot compost. Our compost is weed-free, rich in organic matter and easy to work with- a fantastic use for garden rubbish!

This is how we do it:

- We collect and store two types of garden waste: woody (branches and hedge cuttings) and green (weeds, grass clippings and herbaceous material).
- When we have enough waste we make hot compost in a large load. Woody waste is chipped into a large hot compost bay and watered. A layer of green waste is added, followed by another layer of woodchips and the process is repeated until all the material has been used. The ideal ratio is 1 part green to 2 parts woody.
- The heap is regularly irrigated and will hold 50% water when finished.
- The hot compost heap is covered to maintain the correct moisture level and left to break down.
- After 4-5 days the composting process has started. Bacteria and fungi start to decompose the woody and green material and this generates intense levels of heat.
- The decomposition heats the compost heap to temperatures as high as 80°C. This creates amazing amounts of steam and kills any weed seeds in the compost.
- After 6-8 weeks the heap is turned into an empty compost bay using a loader tractor. Turning mixes the heap and distributes heat- speeding up the composting process.
- Once the compost has been turned 3 times it is ready to use, approximately 6 months after first being made.
- Our compost is used as mulch and a soil improver. When dug into the ground it adds bulk to the soil and increase the retention of water and nutrients. We hope to use our compost for propagation in the future.
- We make two other types of compost: leaf mould and bracken. Stored leaves break down to a dark crumbly compost which is good for trees, shrubs and potting bulbs. Bracken compost rots down to a dark, slightly acidic substance with similar qualities to peat. It's particularly good for Rhododendrons and our Chilean plants.



## Appendix 2

### Photo Supplement



Planting – avoid previously infected areas and mulch to prevent plant picking up infection from the soil



Prune to keep plants vigorous and avoid garden becoming overgrown



Implement a programme of clearance of *Rhododendron ponticum*



For specific pests, collect and destroy infested fallen leaves



Use clean water for irrigation



Hygiene – clean footwear



Hygiene – clean contractors equipment



Paths – try to keep plants from overhanging paths to reduce the chances of them picking up and spreading infection



Paths – maintain to avoid puddling



Have a regular programme of sweeping/blowing to keep paths free from fallen leaves and other plant debris



Signs – erect signs to inform visitors of work and to restrict access from infected areas



Restrict visitor access from infected areas





Waste – don't leave waste lying around



Waste – keep waste secure prior to disposal e.g. in a covered skip



Waste disposal - composting



Waste disposal - burning



Keep up to date with the latest information.



Monitor health of plants regularly

## Conservation Directorate Guidance Note Information

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