



Guidance

Plant Biosecurity

Number 4 – Managing Gardens to Reduce Pests and Diseases

Recommended practice

Overview	This document provides advice on adapting garden management practices to reduce the risks of spreading pests and disease. This document provides recommended practice only.
Target Audience	This guidance applies to staff, volunteers and those managing volunteers

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 Trust's other biosecurity guidance (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.
- 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.
- When planting take measures to prevent lower leaves coming into contact with soil since this increases the risk of picking up disease. Therefore, where necessary:
 - remove the lower leaves or
 - Mulch around the plant to prevent between soil and leaves with, for example, composted bark chips 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 as this 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 pruning to remove dead and diseased growth and produce an open branch structure.
- 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.
 - Experience has shown that 'rough-barked' rhododendrons respond better to pruning than 'smooth-barked' species.

1.4 Fallen leaves and plant debris

- Fallen leaves are often beneficial because they produce a leaf mould and are thought to encourage mycorrhizal fungi. However, for specific plants, fallen leaves can harbour harmful pests and diseases as should be collected and burnt. Examples include:
 - Horse chestnuts (*Aesculus hippocastanum*) - The horse chestnut leaf mining moth (*Cameraria ochridella*)
 - 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 *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 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.

- Unless exceptional circumstances dictate, gardens should develop a programme for the complete removal of *R. ponticum*.
- Consult with your Garden Consultant and survey the garden to identify and map areas of *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 *R. ponticum* is not possible,
 - Clear all *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 physically removed each winter.

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
 - “Hortisept Pro” 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; “Hortisept Pro” 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 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 borehole 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 and composting

- All organic waste (e.g. dead plants, prunings, fallen leaves and other plant debris) 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. It 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 and produce a valuable material for mulching or soil improvement.

For up to date information and legislation on composting and disposal of plant waste go to intranet page on composting garden matter:

http://intranet/intranet/conservation_environment/i-env-feature/env-waste_feature/env-compost_garden.htm

Appendices

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.

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

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