International Plant Sentinel Network

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Guide to Plant Biosecurity in Botanic Gardens and Arboreta

Preventing the introduction and spread of harmful organisms




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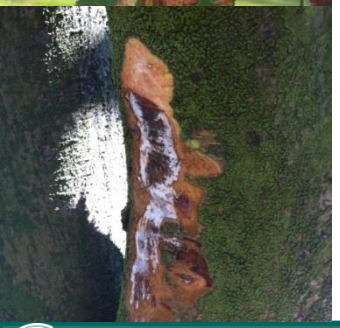
Relevance of Plant Biosecurity



- Pest outbreaks have the potential to not only cause substantial damage within collections, but also spread and threaten susceptible plant species on a national level.
- Biosecurity measures are precautionary steps aimed at reducing the risk of introducing and/or spreading harmful organisms.
- This is particularly important for botanic gardens and arboreta who move plant material on a regular basis (and often between countries) and have valuable, and often rare, plant collections to protect.

Essential Elements for Good Biosecurity

- Managers should identify staff responsible for biosecurity and ensure they have adequate support and resources
- Senior garden staff should work together to ensure that **all areas** of the garden are aware of and engaged with the organisation's biosecurity approach
- New material should be carefully sourced (see slide 4) and handled (slide 6)
- Gardens should have a single point of entry for all new plant material (see slide 4)
- Gardens should have quarantine areas (see slide 7) available for new plant material
- Responsible staff should make sure they are aware of any national/international regulations effecting the movement of plant material - particularly quarantine lists (see IPSN Guidance on Plant Health Governance)

Sourcing Plant Material

Newly arrived plant material is the chief way pests and diseases are introduced into a garden. Ensuring that material is sourced carefully will help minimise the chances of introductions

Source carefully

- Use reputable organisations and commercial companies;
  - Good history; received plant material previously with no issues
  - New companies; do some research, contact staff, visit if possible
- Ensure complete paperwork is received (e.g. Plant Passports* in Europe or other Phytosanitary certificates)
- Where possible buy plants propagated within country
- Think carefully about the type of material and the risks it poses – **see next slide**

*Click here for more information on European Union legislation and Plant Passports

Mitigating Risk for Different Types of Plant Material

High Risk ↓

Wood, timber, bark samples - Can carry nematodes, insects (boring-beetles) and diseases - Wood with bark attached is considered particularly high risk **- Check; under international law (ISPM 15) woody packaging should be marked to show it has been treated appropriately**	**Non-certified seed** - May carry insects externally and pathogens internally **- Inspect both seedlings and (later) young plants** **- Source carefully**	**Dried artefacts** - Low risk to live plants but can cause problems for herbaria, libraries and galleries **- Appropriately treat; e.g. fumigation, heat treatment or rapid freezing**	**Certified seed** - International Seed Testing Association (ISTA) regulated - Unlikely to be pest free but will have very low levels of fungal and bacterial infections **- Careful planting; away from susceptible/unhealthy specimens**
Plants - Pose a significant threat from any source; the wild, commercial, other organisations, in-country or further afield **- Inspect carefully on arrival** **- Quarantine for at least 6 weeks**	**Soil and growing media** - Carry nematodes, flatworms, insects and microorganisms such as fungi bacteria **- Quarantine with any associated plant material for at least 6 weeks**	**Tissue cultures** - Usually considered low risk, but depends on source - May carry latent infections and viruses which are very hard to detect **- Source carefully**	**Dried flowers** - Low risk to live plants but can cause problems for herbaria, libraries and galleries **- Inspect on arrival** **- Source carefully**
Large specimen plants - Harbour many pests and diseases, and are hard to inspect properly - Plants in leaf and with large root balls are particularly high risk **Crucial to source carefully and know where material originated** **- Ideally a rigorous risk assessment should be carried out)** **- Quarantine for at least 6 weeks**	**Wild-sourced seed** - May carry insects externally and pathogens internally **- Thoroughly inspect both seedlings and (later) young plants** **- Where suitable, soak in a surface steriliant such as dilute hydrogen peroxide**	**Reproductive material or storage organs** - E.g. bulbs, fruits, etc. - Common pathway for non-native and quarantine pests and diseases **- Thoroughly inspect on arrival** **- Source carefully**	**Cut flowers** - Dependent on type, source and cultural conditions e.g. tropical flowers such as *Phalaenopsis* have been found to be infested with *Thrips palmi* **- Inspect on arrival** **- Source carefully**

Low Risk ↑

Type of material
- General information
- **Potential mitigation actions**

High risk (red) to Low risk (green)

Plants on Arrival

- Set up a single point of entry for a garden; will also assist with compliance with conventions such as CITES (Convention on International Trade in Endangered Species) and the CBD (Convention on Biological Diversity). Herbaria also benefit from using similar procedures
- Inspect all plants carefully on arrival
- Only accept delivery if happy that plants are free from unwanted organisms
- Check all necessary documentation e.g. if in Europe or sourcing European plants check plant passport number (EC Plant Passport UK/EW 12345)

More information on European Union legislation and Plant Passports:
http://ec.europa.eu/food/plant/plant_health_biosafety/index_en.htm

Quarantine and Isolation Facilities

To reduce the risk of introducing damaging organisms, new plants should be quarantined:

- All plants should be held for a minimum of 6 weeks in an isolated facility (see next slide) upon arrival
- During quarantine plants should be monitored regularly for any signs and symptoms of pest problems
- A quarantine area can range from a bench or bay in a greenhouse to an enclosed area of purpose-built facility
- No matter what size, a quarantine area should meet the requirements in the next slide

Quarantine Area Recommended Essentials

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1. Geographical isolation; separate from the rest of the garden
2. Secure area; reduced access for visitors and (ideally) staff with locked doors, barriers and appropriate signs
3. Controlled drainage; separate from the rest of the garden
4. Separate dedicated tools and equipment – regularly disinfected
5. Facilities for cleaning and disinfection (see next slide)
6. Adequate growing conditions for plants; to allow plants to continue to be cared for
7. Facilities for pesticide application
8. Facilities for incineration and disposal of infected material
9. Plant inspection and regular monitoring for pests and diseases; diagnostic skills, equipment and use of traps such as sticky traps, pheromone traps, light traps, etc.

Clean Hands, Footwear and Equipment

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Hands, footwear and equipment (all tools and machinery) should be kept especially clean when moving in and out of high risk areas (e.g. quarantine zones/ current outbreaks)

A standard disinfectant kit should be made available

Standard Disinfectant Kit

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Water container for ease and to mix with disinfectant

Disinfectant *(ensure you check relevant national guidelines)*

Bucket for cleaning surfaces and large tools such as machinery

Container for disinfectant – to ease appliance to shoes, tools and machinery

Associated consumables; paper towels, gloves, safety glasses

Long handled brush for brushing off soil and debris from shoes/clothes

Hoof pick for cleaning soil and debris off shoes

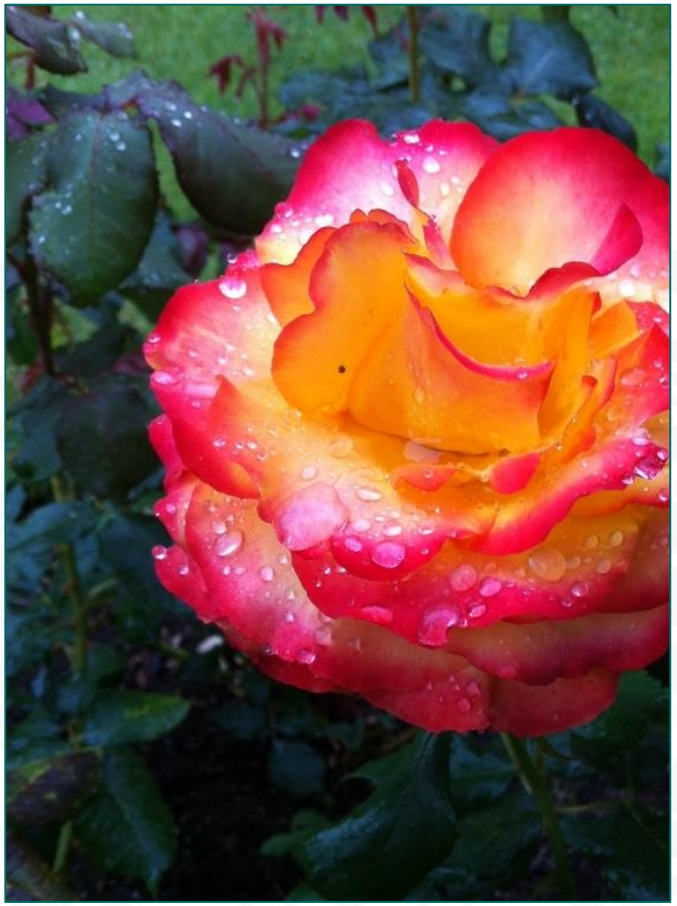
Hand sanitiser

Managing the garden to reduce risk

Husbandry; a healthy plant is less likely to succumb to pests or disease

Important elements include:

- Good soil health; e.g. no compaction, watering, adequate nutrient levels
- Avoiding over-feeding; can lead to susceptible soft-growth
- Spacing; to allow air movement between plants to reduce humidity
- Careful and timely pruning; to reduce disease
- Clearing plant debris; which may harbour disease



Managing the garden to reduce risk

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Infrastructure maintenance:

- Paths; wet and muddy areas can harbour pests disease which can then be easily spread on footwear and machinery
- Signs and fencing; restricts the access of visitors (and staff) to high risk areas reducing the movement of damaging organisms in these areas

Managing the garden to reduce risk

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Irrigation:

- Water sources may harbour plant pathogens
- Mains and borehole water tend to pose less risk than river/pond water
- Locally stored water (e.g. irrigation ponds/tanks) may harbour plant pathogens

Managing the garden to reduce risk

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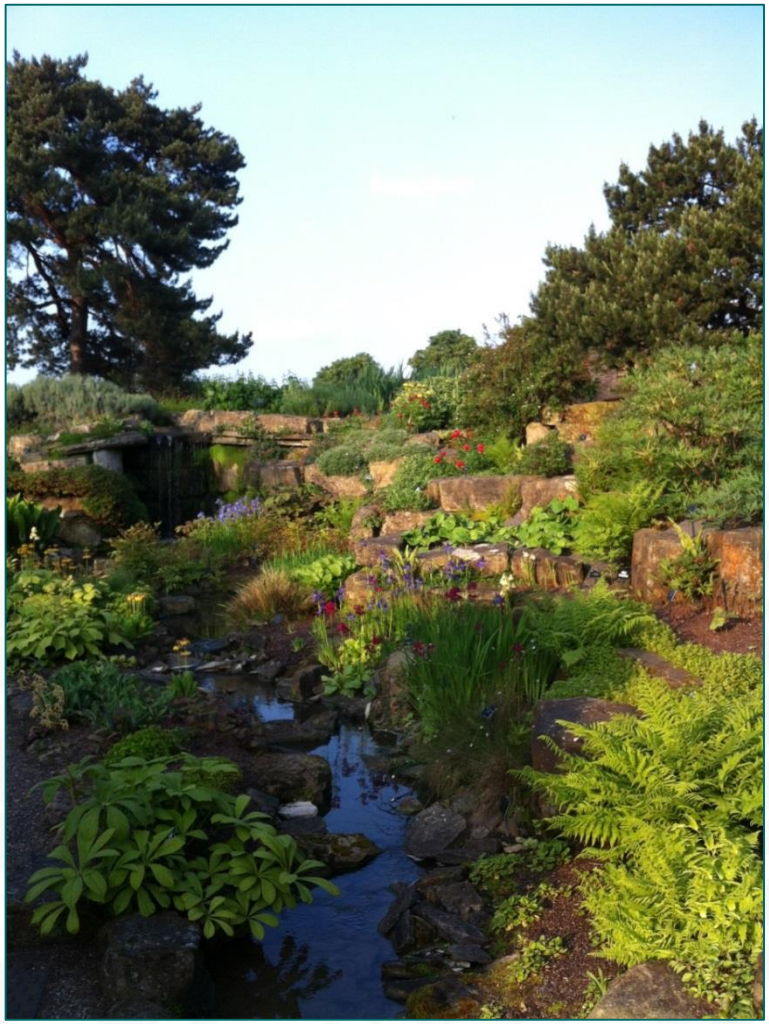
Drainage:

- Plant pathogens may spread in run-off from infected areas
- Check drainage and run off routes to reduce risk
- Good systems also help maintain the general health of plants (slide 11)



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Waste disposal

- All known infected plant material should be burnt to stop spread
- For non-infected material correct composting (e.g. 60˚C for 7 days) will kill most organisms

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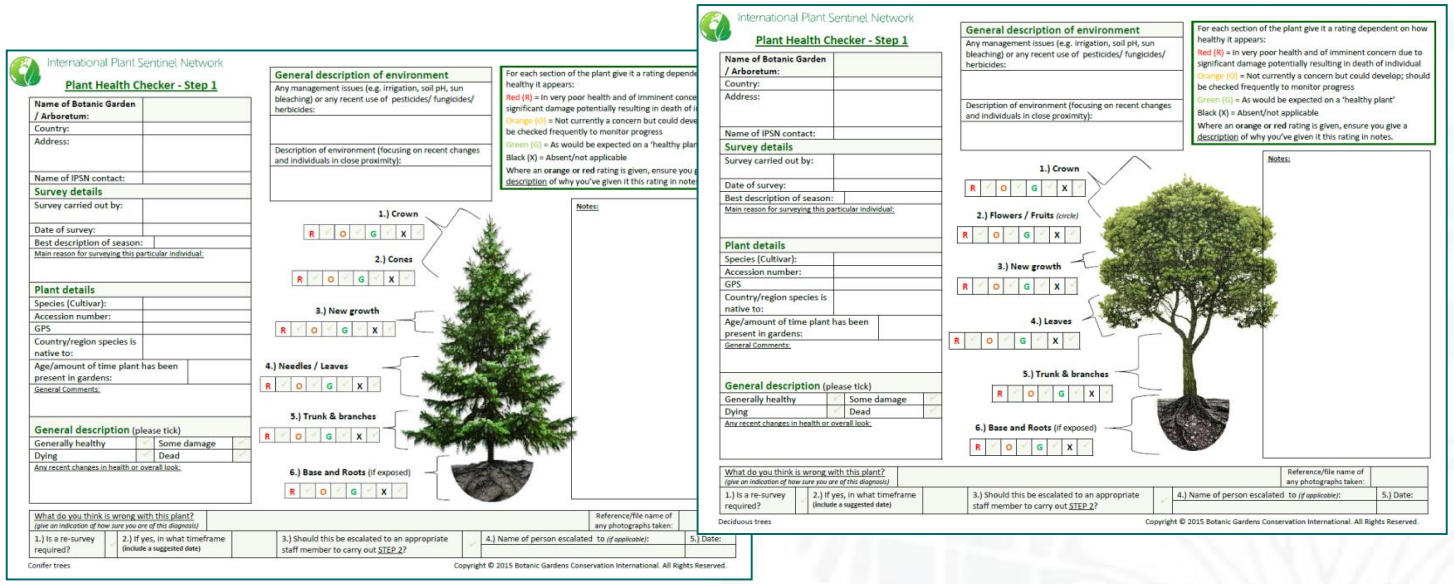
Continuous monitoring will help for the quick identification and subsequent treatment of any outbreaks, which increases the success rate of any management programmes



Any unknown (or known) problems can be recorded and monitored using the IPSN Plant Health Checker

Acknowledgements

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This guide was created in collaboration with:

BGCI's Manual on Planning, Developing and Managing Botanic Gardens

For more information:

http://plantnetwork.org/links/plant-health-links/national-trust-plant-quarantine-biosecurity-guidance-notes/

http://www.forestry.gov.uk/pdf/FC_Biosecurity_Guidance.pdf/$FILE/FC_Biosecurity_Guidance.pdf

International Plant Sentinel Network

An early-warning system for new and emerging plant pests and diseases

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This resource was developed as part of the IPSN. Membership to the IPSN is free and provides access to a host of other resources for the management and identification of plant pests and diseases

Find out more at:

www.plantsentinel.org

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Connecting People • Sharing Knowledge • Saving Plants

Our Mission is to mobilise botanic gardens and engage partners in securing plant diversity for the well-being of people and the planet

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