A Plant Health Early Warning System
Supported by Botanic Gardens and Arboreta

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Prevention is Better than Cure...

Increased threat

Unknown to science or not pests in native regions

Protection Measures e.g. Pest Risk Analysis (PRAs)

Monitored for damage

Plants outside their native regions

SENTINEL PLANTS

EARLY WARNING
The main aim is to identify ‘unknowns’

Other research opportunities to inform Plant Health include:

- Increase understanding
- Identify potential biocontrols
- Identify new pest-host associations
- Indicating the susceptibility of hosts
- Aid in integrated management tools
The Power of Botanic Gardens & BGCI

- Over 3,000 botanic gardens worldwide
- Estimated 30-40% of known plants
- Presence of non-native species
- Knowledge staff with a wealth of experience/expertise

Establishing the basis for an International Plant Sentinel Network as an early-warning system for future pest threats

• International Network and Collaboration
Establishing the basis for an International Plant Sentinel Network as an early-warning system for future pest threats

• International Network and Collaboration
• Developing and Sharing Best practice
Surveying Materials and Guidance

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**General Description of Environment**

For each section of the plant gap, it is important to consider the following factors:

- **Soil and climate:** Important for growth and health.
- **Insects and disease:** Potential threats to the plant.
- **Location:** Impact on growth and health.

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**Plant Health Checker - Step 1**

1. **Observation**:
   - **Crown**: Healthy, dense, and full.
   - **Trunk & Branches**: No signs of girdling or breakage.
   - **Leaves**: Fresh and green.

2. **Description**:
   - **Crown**: Healthy, dense, and full.
   - **Trunk & Branches**: No signs of girdling or breakage.
   - **Leaves**: Fresh and green.

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**IPSN Plant Health Checker**

- **4. Needles**: This may not be typical as needles may be light green/yellow banding.
- **7. General Observations**:
  - **Single bands**: Brown/red bands for leaf blight.
  - **Multiple bands**: All banding included on this page are examples of Dothistroma needle blight damage.

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**Surveying Techniques**

- **Insect mines**: Tunnels forming patterns made by leaf mining insects.
Training Materials and Resources
Workshops & training

Huntington Library, Art Collections and Botanical Gardens, U.S.

Royal Botanic Gardens Kew, UK

Shenzhen Fairy Lake Botanical Garden (CAS), China
Establishing the basis for an International Plant Sentinel Network as an early-warning system for future pest threats

- International Network and Collaboration
- Developing and Sharing Best practice
- Ensuring a long-term future
1. Research coordination and evidence gathering to address knowledge gaps to support risk analysis activities

2. Raising awareness of plant health issues amongst BG&A (first detection)

3. Developing capability and capacity in botanic gardens and arboreta to support surveillance
Collecting Data - Targeted Surveys

IPSN Fact Sheet for Agapanthus gall midge

**Purpose of study**
1. To determine the worldwide distribution of the Agapanthus gall midge.
2. To collect information on the biology and lifecycle of the pest.

**Research questions:**
- Are Agapanthus plants in your collection affected by the Agapanthus gall midge?
- How severe are the symptoms?
- During which months of the year are active larvae present?
- Which species of Agapanthus are affected?

**Brief description:**
The Agapanthus gall midge is an undescribed pest affecting Agapanthus plants that belongs to the Cecidomyiidae family of flies. The midge can cause the bud to be deformed and distorted and often fail to open. For help comparing this issue, please refer to the corresponding IPSN Fact Sheet for Agapanthus gall midge.

**Survey details:**
- **Survey carried out by:** [Surveyor name]
- **Date of survey:** [Date]
- **Best description of pest:** The Agapanthus gall midge is an undescribed pest affecting Agapanthus plants that belongs to the Cecidomyiidae family of flies. The midge can cause the bud to be deformed and distorted and often fail to open. For help comparing this issue, please refer to the corresponding IPSN Fact Sheet for Agapanthus gall midge.

**Research questions:**
- Are Agapanthus plants in your collection affected by the Agapanthus gall midge? Survey brown buds and keep a record. Include images of brown buds and notes on which species of Agapanthus are affected.
- Which species of Agapanthus are affected?
- During which months of the year are active larvae present? Complete survey details as above.

**Images of pests, signs and symptoms:**
- **Symptoms:**
  - The Agapanthus gall midge is an undescribed pest affecting Agapanthus plants that belongs to the Cecidomyiidae family of flies. The midge can cause the bud to be deformed and distorted and often fail to open.
  - Infestation has been observed at very early stages of flowering, when the flower head sheath had not yet opened. When infested, the flower head develops between the stems of the developing buds inside the sheath, rather than inside the bud. Infestation at this stage can cause the flower head to abort completely.
  - Infestation is often observed in the winter months and is most severe in the spring months.

- **Lifestyle:**
  - There is limited knowledge of the lifecycle of the Agapanthus gall midge, but it is understood that it is quite similar to other Cecidomyiidae flies. The pests are found on the buds of Agapanthus and the larvae develop inside the sheath, rather than inside the bud. Infestation at this stage can cause the flower head to abort completely.

- **Observations in the UK indicate that the midge can have multiple generations during the Agapanthus season.** Active larvae were found from early April to early October in 2015.

**Figures:**
- **Figure 1:** Symptoms of Agapanthus gall midge infestation. Severity from low to high (left to right). Severity in the corresponding Plant Health Checklist is rated: 1 (no visible symptoms), 2, 3, 4, 5, 6, 7, 8, 9, 10 (all buds affected, flower heads completely aborted).
- **Figure 2:** Infestation has been observed at very early stages of flowering, when the flower head sheath had not yet opened. When infested, the flower head develops between the stems of the developing buds inside the sheath, rather than inside the bud. Infestation at this stage can cause the flower head to abort completely.
- **Figure 3:** Agapanthus gall midge adult (dead) and larvae with scale bar.
International Plant Sentinel Network

Thank you for listening

#TreeHealth16

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