



**BOTANIC
GARDENS**
CONSERVATION
INTERNATIONAL



IPSN
International Plant
Sentinel Network

MANUAL

Taking Photographs for Diagnostic Purposes



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INTRODUCTION

Accurate diagnosis is the foundation of effective plant health management. In living collections—where plant diversity, rarity, and long-term stewardship are central—early and precise identification of pests, pathogens, and physiological disorders is essential. Increasingly, diagnostic laboratories rely not only on physical samples, but also on high-quality photographic evidence submitted by horticultural staff. The clarity, completeness, and relevance of these images can significantly influence the speed and accuracy of diagnostic outcomes.

While it may be tempting to assume that any photograph is helpful, diagnosticians depend on specific visual cues—such as symptom distribution, tissue condition, and environmental context—to distinguish between similar-looking issues. Poorly framed, unfocused, or incomplete images can obscure these details, potentially leading to delays, inconclusive results, or misdiagnosis.

This manual has been developed to guide practitioners in living collections in capturing diagnostic images that meaningfully support laboratory analysis. Think of each set of photographs as a visual narrative: a way of translating what you observe in the field into information a diagnostician can interpret remotely. Effective diagnostic imaging goes beyond documenting damage; it situates the problem within the plant, the planting scheme, and the surrounding environment. By providing a structured series of images—from whole-plant views to close-ups of symptoms—you enable specialists to narrow down potential causes and determine appropriate next steps.

The following sections outline practical techniques and standards for taking diagnostic photographs in horticultural settings. By adopting these practices, you will enhance the quality of submissions to diagnostic services, improve communication with laboratory specialists, and ultimately contribute to more informed and timely plant health management decisions.



I. CHOOSING A CAMERA

The best camera for diagnostic work is not necessarily the most expensive or complex—it is the one that allows you to consistently capture clear, detailed, and accurate images in a range of conditions. For horticulturalists working across gardens, glasshouses, and field collections, practicality, reliability, and image quality are key considerations.

1. Mobile Phones: Convenient and Capable

Modern smartphones have become powerful tools for diagnostic photography. Many newer models offer high-resolution sensors, fast autofocus, and advanced features such as macro modes and image stabilisation. Their portability makes them especially useful for rapid response when issues are first observed.

However, limitations remain. Phones can struggle with very fine detail (such as fungal structures or small insect pests), and automatic processing may sometimes alter colour accuracy—an important factor in diagnosis. When using a mobile phone, ensure that:

- The lens is clean before use
- Focus is locked on the subject (tap-to-focus)
- Digital zoom is avoided in favour of moving closer
- Lighting is adequate and shadows are minimised

For many routine situations, a well-used smartphone will provide sufficiently detailed images for preliminary diagnosis.

1.1 Using Clip-On Macro Lenses with Mobile Phones

To improve fine detail capture, especially for small pests or subtle symptoms, clip-on macro lenses can be fitted to most smartphones. These inexpensive accessories significantly reduce the minimum focusing distance, allowing you to photograph subjects at a much closer range with greater clarity.



I. CHOOSING A CAMERA

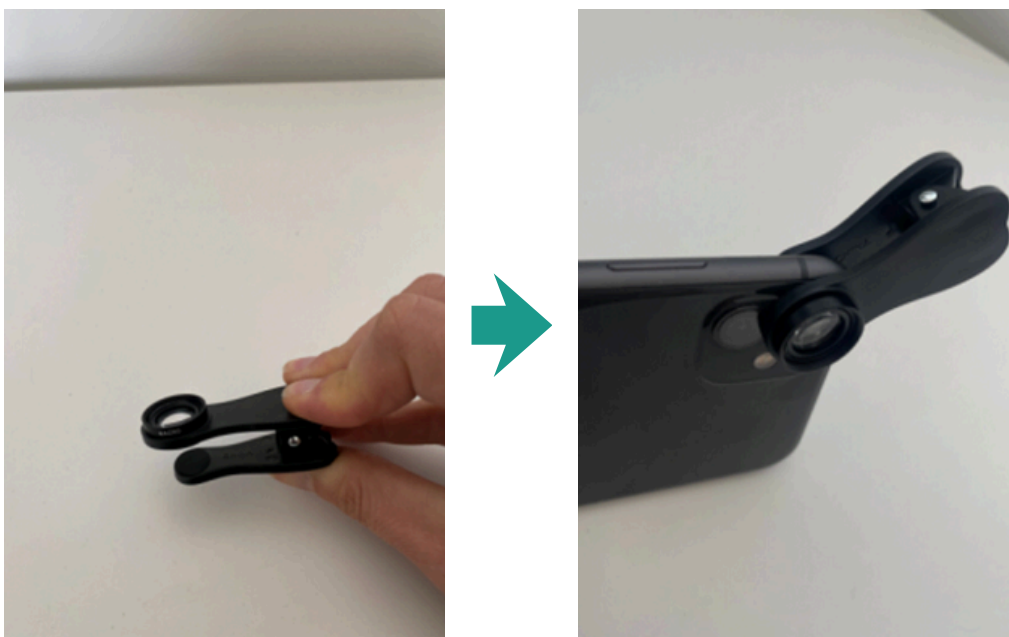
When using a macro lens attachment:

- **Align carefully:** Position the lens directly over your phone's camera lens. Misalignment can cause blurring or dark edges (vignetting).
- **Stabilise the phone:** At very close distances, even slight movement can blur the image. Use both hands, brace against a surface, or consider a small tripod.
- **Control distance:** Macro lenses require you to be very close—often just a few centimetres from the subject. Move slowly toward the subject until it comes into sharp focus.
- **Maximise lighting:** Close-up photography can cast shadows from the phone or your hands. Use natural light where possible or supplement with a small portable light source.
- **Avoid digital zoom:** Let the macro lens provide magnification; digital zoom reduces image quality.
- **Take multiple shots:** Depth of field is very shallow in macro photography, so capture several images at slightly different distances to ensure at least one sharp result.

Macro attachments are particularly useful for documenting:

- Small insects and mites
- Spore structures or fungal growth
- Fine surface textures (e.g., stippling, pustules, or webbing)

While they do not replace professional macro lenses, they greatly enhance the diagnostic value of smartphone images when used correctly.



I. CHOOSING A CAMERA



2. Compact Digital Cameras: A Step Up in Control

Compact (point-and-shoot) cameras offer improved optical zoom and often better image quality than smartphones, particularly in challenging lighting. Many models include dedicated macro modes, allowing closer focusing distances and sharper detail of symptoms such as leaf spots, lesions, or insect presence.

These cameras are generally easy to use while providing more control over exposure and focus than a phone. They are a good middle-ground option for teams that want improved image quality without the complexity of professional equipment.



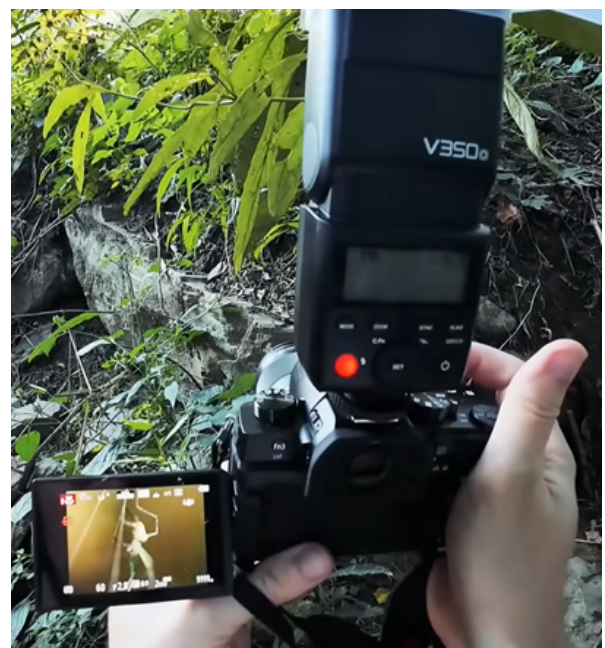
3. DSLR and Mirrorless Cameras: Maximum Detail and Flexibility

Digital single-lens reflex (DSLR) and mirrorless cameras provide the highest level of image quality and control. When paired with appropriate lenses—especially macro lenses—they can capture extremely fine detail essential for identifying subtle symptoms or small organisms.

These systems allow full manual control over focus, aperture, and shutter speed, enabling consistent results across varied environments. However, they require more training to use effectively and may be less practical for quick, opportunistic photography in the field.

Consider these systems if:

- You regularly document complex or high-value plant health issues
- Fine detail is critical for your diagnostic submissions
- You have the capacity to train staff in their use



I. CHOOSING A CAMERA

Key Features to Prioritise

Regardless of the device you choose, certain features are particularly valuable for diagnostic photography:

- Good close-focus (macro) capability
- Accurate colour reproduction
- Sharp autofocus performance
- Image stabilisation for handheld shots
- Sufficient resolution (generally 10 MP or higher)

Practical Considerations

In many horticultural settings, the “best” camera is one that is readily available, quick to deploy, and easy for all staff to use consistently. A high-end camera is of little value if it is rarely used or produces inconsistent results due to complexity.

Where possible, standardise equipment across your team and provide basic training in its use. Consistency in image capture is just as important as image quality when supporting diagnostic laboratories.

By selecting appropriate equipment and understanding its strengths and limitations—including the effective use of macro attachments—you lay the groundwork for producing clear, reliable images that enhance the diagnostic process.

II. CHOOSING THE SUBJECT AND CONTEXT

Choosing the right subject—and capturing it effectively—is central to producing images that support accurate diagnosis. Photographs should do more than simply document an issue; they must clearly represent the problem, highlight key symptoms or damage, and provide enough context for a diagnostician to interpret what they are seeing.

A useful approach is to think in terms of representation, detail, and context. Each set of images should collectively answer three questions:

- What is affected? (plant, species, or area)
- What are the visible symptoms or organisms?
- How extensive or severe is the problem?

Aim to compile a small series of images (typically 3–4) that together tell this story.

General Principles for Diagnostic Subjects

- **Be representative:** Select specimens that clearly show typical symptoms or the pest in question. Avoid atypical or severely degraded material unless it is the only example available.
- **Prioritise clarity:** Choose subjects that are intact, visible, and not obscured by soil, water, or overlapping plant material.
- **Show progression where possible:** If symptoms vary (e.g., early vs. advanced stages), include examples of each.
- **Avoid clutter:** Frame the subject so the diagnostician's attention is drawn directly to the issue.



External symptoms on oak trees. (A) Defoliation, (B, C) dieback, and (D–F) cankers and discoloration on twigs and branches. (Bashiri et al 2024, *Front. Plant Sci.*, 18

II. CHOOSING THE SUBJECT AND CONTEXT

Photographing Whole Insects and Invertebrates

Accurate identification of pests often depends on subtle morphological features, so multiple clear views are essential.

- Capture 3–4 photographs from different angles, including:
 - Top (dorsal view)
 - Side (lateral view)
 - Underside (ventral view), if possible
- Fill the frame with the pest while maintaining sharp focus
- Include a scale reference such as a coin, ruler, or pen where practical
- Ensure good lighting to reveal surface detail and natural colour



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For live or mobile pests:

- Place specimens in a freezer for approximately one hour to immobilise them safely before photographing
- Alternatively, record a short video and extract still images when the subject is in focus and well-positioned



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These steps help ensure that key identifying features—such as body segmentation, wing structure, or mouthparts—are visible.

II. CHOOSING THE SUBJECT AND CONTEXT

Photographing Plant Diseases and Disorders

For plant health issues, it is essential to link close-up symptoms with the overall condition of the plant.

- Capture a series of 3–4 images, including:
 - The whole plant or tree to show distribution and severity
 - Close-up images of symptoms (e.g., lesions, discolouration, deformities)
- Photograph both upper and lower leaf surfaces, as symptoms may differ

If applicable, include:

- Stems, bark, or fruit symptoms
- Roots, especially where rot, deformities, or dieback are suspected

Include the growing environment, such as:

- Soil or compost surface
- Containers or pots
- Surrounding planting area

This combination of perspectives allows diagnosticians to distinguish between issues that may appear similar at close range but differ in distribution or environmental context.



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III. TAKING PHOTOGRAPHS

Once you have selected an appropriate subject, the next step is to capture images that are sharp, clear, and diagnostically useful. Even when using good equipment, poor technique can result in images that lack the detail required for accurate identification. The following guidance focuses on simple but effective practices to improve image quality in horticultural settings.

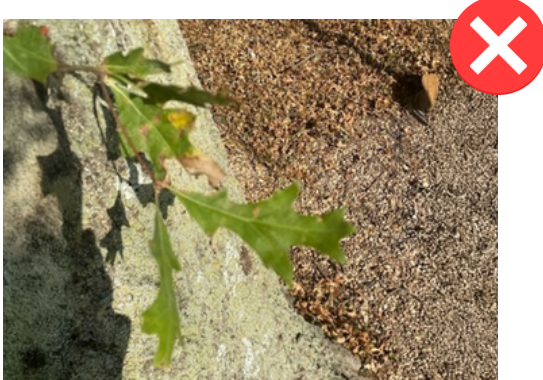
Focus, Distance, and Stability

Achieving sharp focus is one of the most important aspects of diagnostic photography. Many key features—such as insect morphology or subtle plant symptoms—can be lost if the image is even slightly blurred.

- Get as close as possible to the subject while maintaining sharp focus
- Allow the camera to fully focus before taking the image (pause briefly after half-pressing the shutter or tapping the screen)
- Hold the camera steady:
 - Use both hands where possible
 - Brace against a solid surface (e.g., a bench, tree, or knee)
 - Consider using a small tripod for very close work

If your camera struggles to focus:

- Place your hand or an object behind the subject to give the camera a clearer focal point, then remove it before taking the photograph if needed



III. TAKING PHOTOGRAPHS

Background and Composition

A clear, uncluttered background helps ensure that the subject stands out and that fine details are visible.

- Use a contrasting background (e.g., a plain card, your hand, or neutral surface) to highlight the subject
- Avoid busy or similarly coloured backgrounds that may obscure important features
- Frame the subject so it is central and fills most of the image, without cutting off key areas

Lighting and Exposure

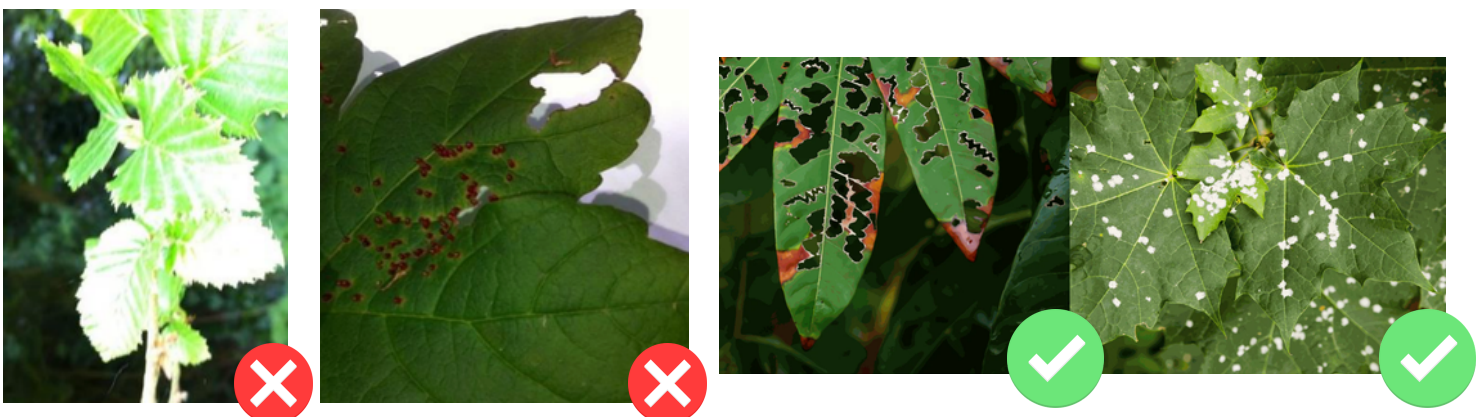
Good lighting is essential for capturing accurate colour and fine detail. Poor lighting can result in shadows, glare, or loss of important features.

- Photograph in good lighting conditions wherever possible
- Minimise harsh shadows that may obscure symptoms or structures
- Avoid overexposure, where bright areas lose detail

Experiment with different light sources:

- Natural light (often best for colour accuracy, especially indirect daylight)
- Indoor lighting (useful in controlled environments, but watch for colour casts)
- Camera flash (can help in low light, but may create glare—adjust angle or distance if needed)

Taking multiple images under slightly different lighting conditions can help ensure at least one usable result.



IV. SUBMITTING PHOTOGRAPHS

Capturing high-quality images is only part of the diagnostic process. To ensure that your photographs can be effectively interpreted, they must be submitted alongside clear, relevant contextual information. A strong submission combines good images with structured supporting details, enabling diagnosticians to make accurate and timely identifications.

By combining well-captured images with clear, structured information, you provide diagnosticians with the tools they need to assess plant health issues effectively. Thoughtful submission practices not only improve diagnostic accuracy but also help reduce delays and the need for follow-up requests.

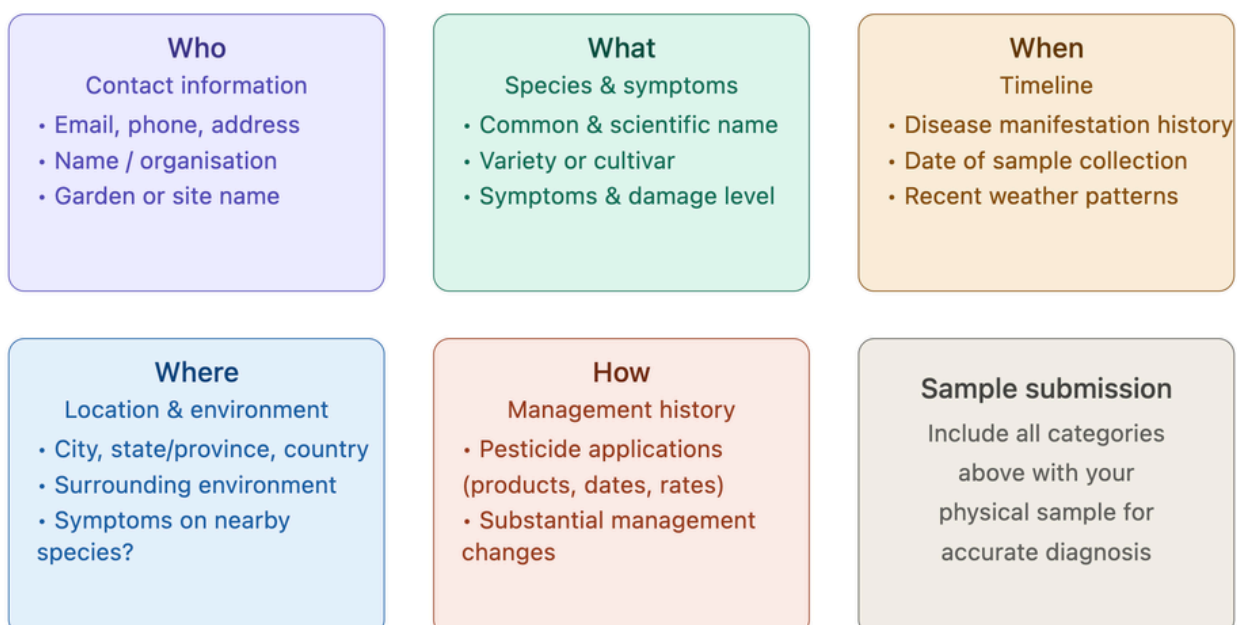
Provide Context with Every Submission

Photographs alone rarely tell the full story. Always include written information to support your images.

At a minimum, aim to address the following:

- Who: Your contact details and site information
- What: Plant species (common and scientific name), variety, and observed symptoms
- When: When symptoms first appeared and any recent environmental conditions
- Where: Location, growing conditions, and whether nearby plants are affected
- How: Recent management practices (e.g., pesticide use, irrigation changes, repotting)

This contextual information allows diagnosticians to interpret what they see in your images more accurately and rule out potential causes.



IV. SUBMITTING PHOTOGRAPHS

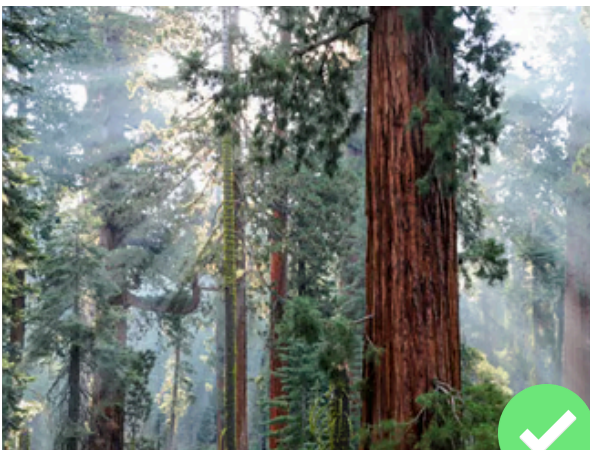
Image Quality and File Considerations

The quality and format of submitted images directly affect their usefulness.

- Submit high-quality photographs. Clear, sharp images allow diagnosticians to zoom in and examine fine detail
- Use the highest resolution available. Avoid sending compressed or reduced-size images where possible
- Manage file size appropriately. Aim to keep files at or under 1 MB while maintaining clarity
- If needed, adjust compression settings carefully to balance quality and size

Avoid:

- Screenshots of images (these reduce quality)
- Images sent through platforms that heavily compress files (unless unavoidable)



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Organising Your Submission

- Include multiple images (3–4 per issue) showing different perspectives
- Ensure images are clearly labeled or described (e.g., “whole plant,” “leaf underside,” “close-up lesion”)
- Match your written notes to the images provided

Final Checks Before Submission

Before sending your photographic sample:

- Review images to confirm they are in focus and well-lit
- Ensure the issue is clearly visible and representative
- Double-check that supporting information is complete and accurate

SUMMARY

Effective plant health diagnosis relies on a combination of clear, well-structured photographs and accurate supporting information. This manual provides guidance to help horticulturalists capture and submit images that enable diagnosticians to identify pests, diseases, and disorders as accurately and efficiently as possible.

At its core, diagnostic photography is about telling a complete visual story. Images should not only show the problem in detail but also place it in context—linking symptoms to the whole plant and its environment. A small set of well-planned photographs is far more valuable than numerous unclear or incomplete images.

Choosing the right equipment is important, but technique matters more than technology. Whether using a mobile phone, compact camera, or DSLR, the key is to produce images that are sharp, well-lit, and focused on the subject. The use of macro capabilities—especially with smartphone attachments—can greatly improve the ability to capture fine detail such as small insects or subtle disease symptoms.

Selecting appropriate subjects is equally critical. Photographs must be representative of the issue, showing typical symptoms or clearly identifiable pests. For plant problems, this means combining whole-plant views with close-ups of affected areas. For insects and invertebrates, multiple angles and scale references are essential to reveal identifying features.

Good photographic technique underpins all successful diagnostic images. Getting close while maintaining focus, stabilising the camera, using simple backgrounds, and working in appropriate lighting conditions all contribute to clearer, more useful images. Taking multiple photographs increases the likelihood of capturing a suitable image.

Finally, images must always be supported by contextual information. Details such as plant identity, location, timing, environmental conditions, and management history are vital for accurate interpretation. High-quality, high-resolution images should be submitted, while ensuring file sizes remain manageable.

By combining representative subjects, careful technique, and clear supporting information, horticulturalists can significantly improve the quality of diagnostic submissions—leading to faster, more reliable outcomes and better-informed plant health management.

CHECKLIST

Use this checklist as a quick reference when capturing and submitting images for plant health diagnostics. Following these steps will help ensure your photographs are clear, representative, and useful for accurate identification.

Before You Start

- Ensure your camera lens is clean.
- Check your device settings (focus, resolution, lighting).
- Use the best available camera, but prioritise ease of use and accessibility.

Choosing the Subject

- Select specimens that clearly represent the problem.
- Avoid heavily damaged or unrepresentative material (unless necessary).
- Include multiple examples if symptoms vary.

What to Photograph

For plant diseases or disorders:

- Whole plant or tree (to show overall condition).
- Close-up of symptoms (spots, lesions, discolouration, deformities).
- Both upper and lower leaf surfaces.
- Stems, bark, fruit, or roots (if relevant).
- Surrounding environment (soil, pot, nearby plants).

For insects and invertebrates:

- Multiple angles (top, side, underside).
- Close-up detail of the whole organism.
- Include a scale reference (coin, ruler, pen).
- Immobilise if needed (e.g., brief freezing) or record video for stills.

Taking the Photograph

- Get as close as possible while keeping the subject in focus.
- Hold the camera steady (use both hands or support).
- Take multiple images to ensure at least one sharp result.
- If focus is difficult, place a hand or object behind the subject.
- Use a plain or contrasting background to highlight detail.
- Shoot in good lighting (prefer natural light where possible).
- Avoid strong shadows and overexposure.
- Try different lighting options if needed (natural, indoor, flash).

CHECKLIST

Image Quality

- Ensure images are sharp, well-lit, and true to colour.
- Avoid digital zoom; move closer instead.
- Review images on-site and retake if necessary

Submitting Your Images

- Include clear written information with every submission (Who, What, When, Where, How).
- Provide 3–4 images per issue showing different perspectives.
- Use the highest resolution possible.
- Keep file sizes at or under 1 MB while maintaining quality.
- Label or describe images clearly.
- Ensure images and notes match and are easy to interpret.

Final Check

- Is the problem clearly visible and representative?
- Are the images sharp and in focus?
- Have you provided enough context for diagnosis?

REFERENCES

- For more information:

Plant Diagnostic Lab Forms, Alabama Cooperative Extension System

<https://www.aces.edu/blog/topics/counties-statewide/plant-diagnostic-lab-forms/>

Taking good photos for a report, Agriculture Victoria

<https://agriculture.vic.gov.au/biosecurity/pest-insects-and-mites/report-an-unusual-plant-insect-pest-or-disease/how-to-get-good-photos-for-a-report>



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