Effective Digital Photos

first detector training

DAD – Digitally Assisted Diagnostics

Larry Halsey – Jefferson County, Florida
“Our goal is to provide the specialist or clinic diagnostician with necessary and sufficient visual information, accompanied by textual description, to make a quick and accurate identification or diagnosis.”

- from DDIS training materials

What photo to take, and How to take it
Poor photographic techniques contributed to lack of success in many samples.
Digitally Assisted Diagnostics: Getting a Digital Image

Larry Halsey, Julian Beckwith, Gerald Holmes and Jim Stack

Refer to the web-based guide . . .
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A few general rules of thumb

Include enough background to document context, ecological community or milieu, but:

- Avoid cluttered backgrounds. Use a solid, neutral, soft-textured background.
- Compose picture to minimize cropping and digital enlargement.
- Take lots of images, and send the best
- Check and set white balance.
You want lots of light – but diffuse light. Diffuse lighting reduces shadows that mask symptoms.
Too much light, washed out by flash

Wrong light source and wrong side angle

Not enough light, or wrong camera setting

Wrong color quality & light source setting
• Select the camera’s light quality setting for the conditions you’re under: bright natural light, overcast, artificial light or flash. Usually the automatic white balance will give an acceptable image.
• Shoot photos in mid-morning or mid-afternoon to reduce overexposure of plant material.
• Use direct flash in shaded daylight for “fill-in”.
• Use crumpled aluminum foil to reflect light.
• Take photos from various angles.
• Flash of most cameras should not be used when taking macro shots. It tends to “wash out” the image.
Indoors, use as much natural daylight as possible. Mimic natural light by using a mix of incandescent and fluorescent light, and filling in with flash.

Heat from light sources can desiccate samples, so work quickly or use a gooseneck fiber optic illuminator.
Focus is the “sine qua non” of diagnostic photography - “without which, nothing!”
Post-processing can correct for too much or too little light, poor color balance, even poor composition, but it cannot make an out-of-focus image sharp and crisp.
Take time to review your pictures in the field. Make sure your images are useful **before** sending them for diagnosis or ID.
Use manual focusing if the background is “busy.” Items in the background may fool the auto-focus, leaving your foreground subject out-of-focus.
More rules of thumb

• As a rule-of-thumb, use auto-focus for field views and manual for close-ups or when the camera is mounted on a microscope.

• Use the viewfinder, rather than the LCD screen to get sharp focus.

• To focus on your subject, zoom to full telephoto, allow the auto-focus to adjust or use manual focus, and then zoom back (toward the wide-angle end) to compose your image and snap the shutter.
Get close, then closer

When in doubt, move in closer. Use optical zoom, not digital zoom, when you have a choice.
Compose and crop in the camera using macro settings and manual focus. Eliminate cluttered backgrounds.
Hand-held macro for close-ups
Include close-ups of unique morphological features.
These do not tell us anything other than define the setting. Get closer.
Excellent color and focus from a platform scanner (right) may be better than that from a camera (above).
Include a size and a color reference

A standardized color reference in the image allows diagnosticians to mentally register “true colors” and to make color adjustments.
If you use grid or graph paper, make sure you give the size in the text portion of the digital sample…. 10x10/inch in this photo
NPDN provides a rule with RGB reference for your diagnostic photos during first detector training.
What you photograph is more important than how you photograph it.
A few more rules of thumb

• Compose picture to minimize post-processing and cropping. Avoid extraneous detail or cluttered backgrounds.
• Get the problem in context, showing the extent and patterns of damage.
• Take images from several angles and aspects such as top and bottom of infected leaves.
• Medium range shots should focus on the entire plant, then of plant parts. Carefully dig up plants and shake the soil off the roots.
• Avoid cluttered backgrounds and provide better contrast by moving the sample to an area with a solid background.
**disease diagnoses**

- Close-ups, macros and dissecting microscope images of symptoms.
- Take a field view showing distribution and pattern of symptoms.
- Compound microscope images of fungal structures.
- Show a progression of symptoms (range) on the plant.
- NCSU Plant Disease Clinic shows 4 images needed to identify blue mold on tobacco at their webpage “How to Submit a Digital Image of Suspected Blue Mold”.
The NCSU Tobacco Blue Mold page is a good example for hand held images and the process of selecting photo content.
insect identification

• Include head capsule and side view with prolegs of caterpillars; mouthparts, mandibles or proboscis.
• Include the host where you find the pest in either the photo or in text accompanying the image.
• Close-up of ventral, dorsal (top and bottom) and side of insect.
• Images of life stages if available.
• Detail of nature of the damage or injury on plants, livestock, people, structures.
• Images of signs such as webbing, exit holes, frass.
plant identification

• Include plant parts that are key to identification, such as ligules and leaves, stems, flowers and fruit for plant ID.
• Entire plant showing the habit and growth form.
• Close-up of the flower, fruit, upper and lower surface of the leaves to show the color, shape.
• Medium close-up of a branch to show the natural arrangement of flowers, fruits and leaves.
Trifoliate leaves, thorn, flower and seed pod, on 10x10/ inch grid for size reference

Cockspur Coral Tree
_Erythria crista-galli_ L.

10x10 cells in 1 inch grids
Chance of a successful diagnosis is greater if fungal organisms, mites and other very small specimens are photographed with microscope magnification.
Use the “fast and nasty” cellophane tape process such as this from Agriost’s text for preparing diagnostic slides.

Details for mounting digital cameras or RGB video cameras to microscopes are presented in the text materials and elsewhere.
Archive the originals. Then edit to enhance the quality of images as needed, resize, compress and save as JPEGs with a different file names.
Photo Enhancer, uses “enhance by example” that is relatively simple. ACDSee, IrfanView, PhotoImpact, Print Shop Pro are mid-range cost processors with many useful edit features. Adobe PhotoShop is robust, but is often too complex for occasional users, and is more expensive.

Select photo-processing software based on features, cost, ease of use. Consider what your colleagues use. Share experience, techniques.
For me, ACDSee 5.0 is fairly comprehensive, simple, relatively low cost.

Adobe PhotoShop is more robust, powerful, and expensive.
One-button enhance for overexposure and color quality in ACDSee
Crop, enhance, resize and compress

1.17MB → 69KB
Fill out submittal forms completely, and provide text to supplement photos. Attach the 3-5 images to the diagnostic form or to e-mail and send it to the clinic or lab.
Some states require, most encourage users to correctly prepare and quickly send biological samples to plant disease clinic to assist or confirm diagnoses.
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When in doubt, mimic the professionals. Copy photos they take, and how they take them.
Critically review your own images before you send them to your distance diagnostic system. If the images are out of focus, cluttered, poorly lit with colors that don’t look real or taken from too far away to resolve pest or symptom details, 

**don’t expect a positive outcome.** If the pictures don’t have a realistic chance of identifying or diagnosing the pest, 

**don’t clog the system by sending them.**
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