



THE UNIVERSITY OF GEORGIA

**COOPERATIVE
EXTENSION**

College of Agricultural and Environmental Sciences
College of Family and Consumer Sciences

Digital Photography for Horticulture Professionals

Part I General Photography



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Digital Photography for Horticulture Professionals

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Part I: General Photography

Digital cameras have gone a long way to replace conventional photographic cameras. Images generated with digital cameras have wide applications in commercial and home settings. They can be used for crop record keeping, producing a brochure, cataloging, creating a web site, document vendor shipments, or for crop problem identification.

Certain aspects of digital photography are very similar to conventional photography, such as the basic components for capturing pictures. There are other aspects, however, that differ; for example, the “substance” on which digital images are captured is not photographic film but a silicon chip. Once digital images are generated, they can easily be manipulated, edited and enhanced on a computer using various software programs. This makes digital images (and digital cameras) very versatile.

This publication series is designed to help you learn the basics of how to compose photos, overcome locations with less than optimal light conditions, and become acquainted with the terminology used in digital photography. They are also designed to teach you how to enhance and manipulate (edit) images and insert them into documents using a software program. We recommend that you become familiar with your digital camera — know how to adjust various settings — as this will make the information presented here more meaningful.

The key to mastering most photographic techniques is to practice. Digital cameras lend themselves readily to practice and testing, since you do not have the added cost of film or prints.

Light and Color

Light and color are fundamental to quality photography. Understanding the nature of light and how the camera senses it is a first step in photography. Image sensors in digital cameras are designed to produce colors that match those in the original scene. There’s a lot of variation among sensors, however, and with the software programs that process raw images into final

photographs. The results depend, in part, on the accuracy with which the image is exposed and the match between the color balance of the sensor and the color balance of the light illuminating the subject.

With film cameras, photographers can use a wide variety of films, since each film type has its own unique characteristics best suited for a particular lighting/colors combination. With digital cameras, you don’t have the same choice offered by film cameras. The “film” in the form of an image sensor is built into your camera.

COLOR BALANCE. Although light from the sun or from a light bulb appears white, it not only contains a mixture of all colors, it contains these colors in varying proportions. Light from the midday sun, for example, contains more blue wavelengths compared to light from a sunrise or an incandescent lamp. To produce what appears to the eye to be normal or accurate color balance, the image captured must contain the colors in the original scene. These colors are affected by the color of the light source.

One way to describe the color of a light source is by its color temperature. The color temperature scale ranges from the lower color temperatures of reddish light to the higher color temperatures of bluish light. Daylight contains proportionately more light toward the blue end of the spectrum. Incandescent light contains more toward the red end. Also, artificial light sources have different color temperatures — an incandescent light bulb generates a warmer light than a fluorescent light. Normally our eyes compensate for different lighting conditions, but when you’re taking a still picture with a digital camera, the camera has to find the “white point” (the assumption that a white object must appear white) to correct other colors cast by the same light.

Most digital cameras offer a number of **Color Balance** or **White Balance** settings, some for specific lighting conditions. Also, most cameras feature automatic white balance, which means that the camera looks at the overall color of the image

best-fit white balance. These systems, however, are often fooled (especially if you are taking a photograph dominated by one color, green for example). Most cameras also allow you to override the automatic white balance by choosing a white balance manually — typically daylight, cloudy, fluorescent incandescent, etc.

COLOR BALANCE AND TIME OF DAY. In photography, there is a color of light called “daylight.” This type of light occurs, however, at a specific time of day. Over the course of the day, the light can change from a warm red at sunrise to a cold blue at noon, and then back to a warm red or orange at sunset. “Daylight” on the color temperature scale is really set for midday sun between 10 a.m. and 2 p.m. During these hours, colors appear clear, bright and accurately rendered in the photo.

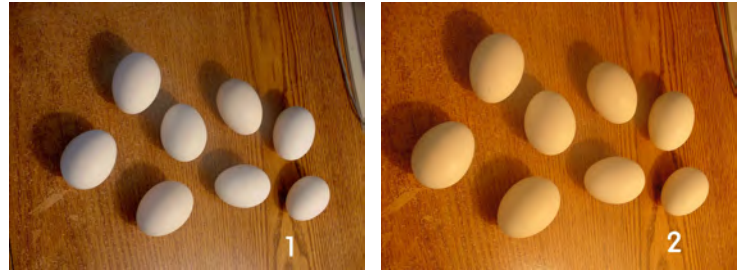
Before and after midday, light from the sun is modified by the extra distance it travels through the Earth’s atmosphere. Some of the blue light is filtered out, leaving the light with a more reddish cast than at midday. This is easily seen very early or late in the day when the light is often more red-orange in tone. The change in color will affect your pictures with a strong reddish cast, which can be very good for photographs.

FLASH. In low light environments such as indoors, supplemental light is almost always necessary. This is achieved with the **Flash** feature of the camera.

FLASH RANGE. The effective distance the flash can illuminate the subject is called “flash range.” Most digital cameras that have built-in flash are effective to about 12 to 15 feet. Light from the flash will bounce back off the light-colored objects closest to it (2). The people behind are in shadow.

Flash is useful when photographing dark-colored objects, such as blue or purple under low light conditions, or under fluorescent lighting indoors. Blue- and purple-colored flowers are good examples of this. (See photos on page 5.)

EXPOSURE VALUE (EV). Exposure can be altered by using EV exposure adjustment control. This lets you set your camera’s light meter to under-expose or over-expose a photograph. Changing the EV adjustment has an effect similar to changing the film speed or ISO setting (see **Film Speed**). By adjusting the EV control, you are causing the light meter in your camera to become slightly more or less sensitive to light, so the silicon chip is exposed properly. EV adjustments are made in “stops.” Decreasing one



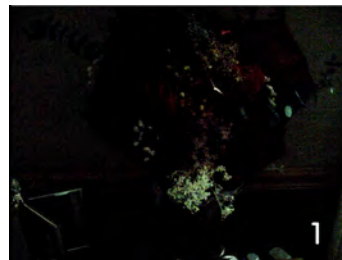
Notice the difference in color of the white eggs when photographed indoors (1) or outdoors (2). This is due to the difference in color temperatures of the fluorescent lights used indoors and daylight.



Midday light on a sunny day will produce colors that appear natural and accurately rendered.



Early morning (1) and late afternoon (2) light outdoors will produce a warmer, more reddish color balance than you will get at midday.



No flash (1), low flash (2). Without flash, there is not enough light for a good picture. Insufficient light resulted in too dark a picture.

stop of exposure will allow twice as much light to enter the camera, while increasing one stop will let half as much light in. The stops are indicated in “+/-” signs: +1 means the camera is more sensitive to light, while -1 means the camera is less sensitive to light.

For example, one of the rules of photography is that bright landscapes (like snow) will force your camera’s light meter into slightly under-exposing your pictures. By lowering the EV control of your camera one stop (-1 setting), the snowy landscape will not come out too bright.

EXPOSURE AND DEPTH OF FIELD. One of the most important creative tools in photography is how you expose the image. The photograph can be directly influenced with the help of the interplay between aperture size and exposure time. For example, the smaller the aperture becomes and the less light enters through the lens, the greater the depth over which the camera records a sharp image. The technical term for this is “depth of field,” as it determines the point from which and up to which the images are captured in focus.

A photograph that shows the area close to the camera and things far away all in good focus is said to have a “large depth of field.” A narrow depth of field is when only a thin section of the scene — from 5 to 10 feet away from the lens, for example — is in focus.

FILM SPEED. Film speed is described by the ISO number (ISO, International Standards Organization) and it signifies the film’s sensitivity to light. Even in digital cameras, the photosensitivity or speed is stated in ISO. In film cameras, once a roll of film is inserted, all photographs on that roll are taken with that film’s ISO. In digital cameras, the film speed can be changed virtually from shot to shot.

A “fast” film is very sensitive and does not need much light to create a picture. A “slow” film is not as sensitive and needs more light to capture an image. An example of fast film would be ISO 800 or greater, while a slow film would be ISO 100 or less. The film speed is given as ISO 100, 200, 400, 800 or 1600. Each of these numbers is double the lower rating. Each speed rating of film is roughly twice as sensitive to light as the one before it. An ISO 200 film requires half as much light for proper exposure as an ISO 100 film. ISO settings are particularly useful when you are trying to capture an activity process, or motion.



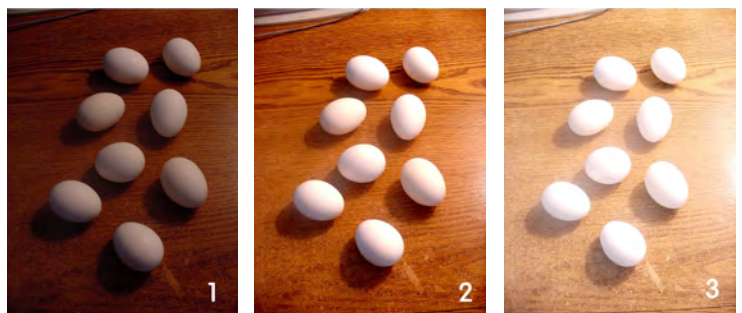
Auto flash (1), high flash (2). Auto flash gave too much light and washed out the colors. Manually selected high flash offered overall best brightness, contrast and color saturation.



Manual flash (1), light-colored nearby objects can affect the effective focal point and flash distance. Be sure you use the right flash setting. Correct depth (2).



Blue and purple flowers taken with flash.



Negative EV (-2.0)

Standard EV (0.0)

Positive EV (+2.0)

At standard EV, the eggs are in good contrast with the background (2). Decreasing the EV two stops makes the eggs appear too dark (1); increasing the EV two stops makes the eggs appear too bright (3).



EV settings also should be used when taking photographs in dark places. At a standard EV 0.0, the image of the cave appears too dark (1). Increasing EV to +2.0, thus making the camera more sensitive to light, corrects the problem (2).



EV settings should be adjusted when taking photographs of highly contrasting colors (consider reducing EV, 1) or objects that are in high contrast with the background (consider increasing EV, 2).



ISO 200: The photograph conveys motion by the blurred planting by the side of the road, but the forest on the left is clearly defined.



A faster ISO 400 captured the splashes of water and "froze" them in mid-air.

Direction of Light

TOP-LIGHTING. Light that comes from above (top-lighting) can occur outdoors at noon. In a greenhouse, shadows may form due to multiple overhead objects (such as hanging baskets) and greenhouse structures. A subject in such a shadow may lose dark colors (photos at top, right column). Simple moving away from the shadow and into the light corrects the problem.

SIDE-LIGHTING. Light that falls mainly on one side of the subject (side-lighting) increases the sense of texture and volume, because such cross-lighting casts shadows visible from the camera's position that emphasize surface details. Landscape photographers often prefer to work early in the morning or late in the day because the position of the sun low in the sky side-lights scenes and adds interesting surface textures.

BACK-LIGHTING. Light that comes from behind the subject (back-lighting) puts the side of the subject that is facing the camera in shade. Automatic exposure tends to make backlit objects too dark. You can add exposure to lighten the picture, especially those parts that are in shade.

Composition of Photographs

Composition in photography not only plays a major role in the quality of the photograph, but it also conveys information, tells the "story" in the picture. Composition has often been called "the strongest way of seeing." Composition is about arranging the elements of a scene in your camera's viewfinder so they form something visually interesting to look at, something that will hold the attention of the viewer.

Every time you raise a camera to your eye, you are composing a picture. The very act of deciding where to point it is based on a conscious or subconscious decision about what you want to include in the picture.

There are also many compositional "rules" you can use to help you take more interesting pictures, and the more pictures you take, the better your natural sense of composition will become.



Left: Mid-morning cross light creates a dramatic pattern of shadows across this landscape planting.

Right: Backlight can be used to create a dramatic image, as in this photo of leather leaf fern.



Light behind the object throws it into shadows, so try to take a picture with the sun facing the object.



POINT OF INTEREST (Intent). Identify a primary point of interest before taking the picture. When you have determined which area is the most important to you, you can compose to emphasize it. Take photographs with a specific object in mind. For example, the three photographs of essentially the same plant, Oxalis, can be used for three different purposes.

PROCESS AND DYNAMICS. Photographs of events and processes with people can be composed in such a way as to convey feeling of dynamics.

FOCAL POINT. Pictures usually have a focal point, a place with more of the interest. Making sure that this focal point is positioned in the center of the photograph ensures balance and draws the eye.

LINE AND PROGRESSION. Lines are valuable tools in a photographer's palette when it comes to adding depth and dynamics to a picture. In addition to creating a strong sense of direction, they also carry the eye through the scene so it takes in everything along the way.

Where the lines lead in the distance is called "infinity." Including the infinity point in the picture adds a strong sense of depth, scale and perspective, and it brings the composition to a conclusion.

SCALE AND DEPTH. Choice of scale is a prime factor in composition because it sets the frame of reference. One way of capturing the large expanses of space or large objects is by providing a sense of scale in your photographs. The easiest way to do that is to include someone in the photograph. Everyone can relate to the size of a person. Other objects also can be used, as long as they are relative to the viewer.

Photographs are two-dimensional, although the world around us is a three-dimensional one. To better enhance the two-dimensional aspect of the medium and introduce some depth, include foreground and/or background information into your picture.

CONTRAST. Contrast in photographic composition is an effective way to direct the viewer's attention to the center of interest. Positioning subject elements to create contrast gives them added emphasis.

There are two types of tonal contrast, one related to black-and-white photography and the other related to color photography.

In black-and-white photography, contrast is the difference in subject tones from white-to-gray-to-black or from the lightest tone to the darkest tone. In color photography, different colors create contrast.



To portray Oxalis in the garden, this picture was taken so the plant was framed with other complementing foliage and flowers as well as decorative stones. This photo can be used to illustrate plant habit, size, texture and appearance. It also demonstrates use of Oxalis in the landscape and shows successful combinations with other plants. This photo can be used in a landscape portfolio.



Left: For a catalog, the picture focused on the foliage and emphasized leaf shape and size, color and texture. If a plant is used for its flowers, take a close picture of them. **Right:** Close-up photo of the Oxalis foliage is suitable for a slide presentation. The purpose is to display texture, shape and color.



Process and Dynamics: Notice the way the picture frames women placing poinsettia plants in sleeves. The foreground shows a "sea" of color, which creates instant interest and provides the entry point. In the middle, plant handlers are captured in different steps of the process, while in the background, the eye rests on the finished product.



Dynamics: The composition is changed from one that lacks interest to a dynamic one by taking the picture from a different vantage point in the room. Not only does it show more people attending this meeting, but it shows the speaker engaged in conversation with the audience. The position of the speaker sitting among the audience members (right) compared to standing in front of them conveys the impression of an earnest two-way discussion and infinitely more dynamics.

Focal Point: 1. 'Santa Maria' in Columbus, Ohio, is the focal point in this picture, framed by the dock in the foreground, the buildings and the sky in the background.

2. Although this photograph tries to convey the feel that the old ship is ready to set sail again, the drama is lost because the main object is slightly off-center.



Focal Point: In this greenhouse full of ferns, the eye wanders around the frame because the focal point – the open space between the lines – is off-center.



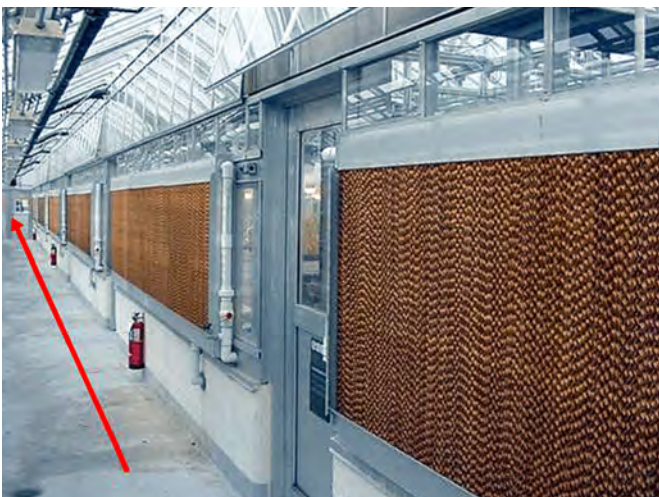
Focal Point: The eye finds a balanced entryway through the centered archway.



Line and Progression: Horizontal lines divide the scene in layers and produce a restful effect by echoing the horizon. The eye travels from left to right and upward through the scene.



Line and Progression: Diagonal lines are more energetic because they contrast strongly with horizontal and vertical elements and carry the eye through the whole scene. By suggesting perspective, they also add depth.



Infinity Point: Correctly positioned infinity point (arrow in the picture).



Line and Progression: Vertical lines are more active because they give a picture tension and a strong sense of vertical direction – like the trunks of trees reaching for the sky.



Infinity Point: Off-image infinity point (arrow runs outside of the picture).



Scale and Depth: The size of a plug is shown by comparison to a human hand.



Scale and Depth: Image depth is significant because of the poinsettia blooms in front of the children as well as behind them.



Scale and Depth: The loss of dimension is particularly obvious in this closeup of a flat of impatiens. Not only is there no interest in the foreground, there is no back-ground either. The eye just goes over the white blooms and gets lost in the crisscross pattern of the greenhouse structure above.



Scale and Depth: By including two objects, a vehicle and a worker, the larger size of this retention pond is made apparent.



Scale and Depth: Depth in this photograph is achieved by the rhomboidal shape of the centrally positioned arboretum field.

A high-quality black-and-white image can be used as background, especially after the contrast and brightness of the image are adjusted with photo editing software. The close-up photograph of lavender foliage (second row of photos from top, right column) with its fine and soft texture was used on the cover of a brochure about herbs.

Colors with opposite characteristics contrast strongly when placed together. Each color accentuates the qualities of the other and makes color images stand out dramatically. Cold colors (green, blue) and warm colors (yellow, orange) almost always contrast. Cold colors recede while warm colors advance. Light colors contrast against dark ones, and a bold color offsets a weak color.

CLOSE-UPS. When you photograph small objects, the minimum focusing distance of your lens determines how close you can get to the subject. The closer you can get to the subject, the larger it will be in the final image. A tiny coin surrounded by a large background is not what you are trying to achieve. You are trying to get a large coin surrounded by a small background. For many pictures, zooming your lens in on the subject will be sufficient. Macro mode, however, allows you to get a lot closer to the subject, making it much larger in the final image. If you cannot get close enough to an object to fill the image area, you could crop out the unwanted areas using photo editing software.

The lighting on small objects is just as important as it is for normal-size subjects. Objects need to be illuminated properly to bring out details and colors well. You can light a subject in several ways, depending on your objectives. A flat object needs to be illuminated evenly; an object with low relief such as a coin needs to be cross-lit to bring out details; some objects might look better with diffuse lighting, such as exists on a cloudy day. Electronic flash can freeze action and increase depth of field.



In black-and-white photography, low contrast conveys a sense of softness (1), while high contrast conveys a sense of hardness (2).



Photograph of lavender used as background for publication cover.



A single bright red flower photographed against a green background. Cold colors (green, blue) and warm colors (yellow, orange, red) almost always contrast. Cold colors recede while warm colors advance.



1



2



3

Contrast

1. A light subject will have more impact if placed against a dark background and *vice versa*. The spider on the leaf would stand out more if the leaf were darker. The picture was taken in direct sunlight at noon; it would have been better if the light were diffuse.
2. The boy's hair is almost identical to the color of the wheat field surrounding him. In this case, low contrast and low color ruin the good composition.
3. Low contrast and high color of the poinsettia blooms achieve the desired effect.

Close-Ups

1. Sunlight coming from the side is reflected off the shiny surface of the whole berry, while the mashed pulp and seeds are in focus. This photograph was used as an illustration in plant propagation text.
2. This succulent plant was photographed with a diffuse ambient light, which created a uniform pattern of shaded areas (between the leaves) and bright areas (at the leaf tips).
3. When taking macro close-ups, especially at distances fewer than 3 feet, use the LCD monitor to compose the image. If you do not, you will not be able to preview depth of field. Also, since the viewfinder is offset from the lens, the area seen in the viewfinder will differ from the area included in the image. Electronic viewfinders overcome this problem.



1



2



3

PHOTOGRAPHING FLAT OBJECTS. Flat objects such as posters, prints or pages from books require soft, even light over their surfaces, and the camera's image sensor must be exactly parallel to the object to prevent "keystoning." Even then, most lenses will curve otherwise straight lines at the periphery of the image because they are not designed for copying and are not perfectly rectilinear.

TROUBLESHOOTING. Digital cameras may lose focus accuracy if the batteries are low. They also can lose focus accuracy if cold or if the light is not sufficient.

Conclusion

In conclusion, digital cameras can find wide application for horticulture professionals. Images generated with them can be used in commercial and home settings. They can be used for crop record keeping; producing brochures, catalogs and web sites; documenting vendor shipments; or identifying crop problems.

The first of the three-part publication series showed you the importance of light in photography, color balance, image exposure, composition, and how to overcome locations with less than optimal light conditions. The second part of the series will acquaint you with the terminology used in digital photography and how to enhance and manipulate (edit) images and insert them into documents using popular software programs. The last in the series deals with how to take digital images for crop problem identification. We recommend that you read all three to get a more thorough understanding of digital imagery.

To find these publications, check with your local county extension office or go to

<http://www.caes.uga.edu/publications/>



This image not taken "square on." Keystoning is the curvature that appears toward the edges of the image. Keeping the lens parallel to the object will help minimize the problem.



Photograph is out of focus.

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