Chapter 6. Figures

Many of the descriptions and basic concepts, key natural trends, key discoveries, and some of the conclusions are presented in figures. As you prepare your article, consider whether a figure is appropriate.

- Can a difficult prose explanation be better described with a figure?
- Does your figure show more than could be said in a few well-chosen words? A figure is not always better.

Readers often study tables and figures before they read the text. Therefore, each figure should be able to stand alone, complete and informative in itself.

Figures are often the best means of presenting scientific data. Poorly rendered figures or figures that merely repeat information given in the text, however, can confuse the reader or clutter the manuscript; thus, each figure should serve its purpose well or be omitted. Figures encompass at least four substantially different kinds of illustrations in black and white, shades of gray, color, or some combination:

- Graphs (line, bar, pie, etc.).
- Line drawings or maps.
- Photographs and micrographs.
- Animated illustrations, which are shown in stop-motion frames.

Line or bar graphs are the most common figures in ASA, CSSA, and SSSA journals, followed by line drawings, micrographs, and standard photographs. Color may be used at no extra charge for online publications.

Graphs and charts improve the general presentation of a technical publication by reporting data in an easily comprehensible manner. They are generally used to show trends rather than the detailed information in a table.

The style of the graphs and charts and the size and appearance of letters and numbers should be consistent within a paper.

Whenever possible, figures should be horizontal. This format takes up less space in the article. Do not draw a box around line-art figures. Multipanel figures should be labeled (uppercase, A, B, C, etc.; or lowercase a, b, c, etc.) and combined into one file.

COLOR FIGURE POLICY

To allow greater accessibility to our sciences by color-blinded individuals, we require the following guidelines be implemented when generating color figures. This policy is effective as of April 1, 2022.

- Avoid unnecessary color: Grayscale generally provides a more faithful representation when a single quantity is being displayed.
- Avoid troublesome color combinations: greens, reds, browns, and oranges.
- Use green/magenta color combinations instead of green/red combinations.
- Use separate monochrome images for the different color channels if no suitable color combination can be found.
- For line drawings that require color, use redundant coding by adding different textures, shapes, or line types to the colors across figures.

See the online "ACA, CSSA, SSSA Editorial Policies" page for additional resources for creating illustrations.

FILE FORMATS

For ASA, CSSA, and SSSA publications, high-resolution JPEG, PDF, EPS, or TIF (TIFF) files are the preferred file types. Images should have a minimum resolution of 300 dpi. For EPS files, be sure all fonts are embedded; all lines should be at least 0.5 point. Figure art submitted as PDFs should be distilled using Adobe Acrobat Distiller's "Press Quality" setting. For photographs, use high-resolution TIF or JPEG files.

FIGURE QUALITY AND ACCURACY

Because authors are the only ones working with the original graphics file, corrections are the sole responsibility of the author. Authors should not submit figures under the assumption that minor errors will be corrected by someone else at a later stage.

In biplots, PCA plots, multi-dimensional scaling plots, or any other plots based on a singular value decomposition or spectral decomposition (eigenvalue analysis) of a multivariate data matrix, it is important to make sure that both axes are equally scaled exactly, i.e. the aspect ratio is 1:1. This means that the distance in metric units (e.g., millimeters) between two tick marks on the horizontal axis is exactly the same as the distance between the equivalent pair of tick marks on the vertical axis. Also see Malik, W., Piepho, H.P. (2018), Biplots: Do not stretch them! *Crop Science*, 58, 1061–1069.

Clearly label all figures in the file name (e.g., Figure1.pdf). (If the paper is submitted for double-anonymous review, be sure to omit the author's name within the file name.)

FIGURE SIZE

The final size of the published figure depends to some extent on where it will appear. For journals, a single column is approximately 8.5 cm (3.5 inches, or 20 picas) wide, and full-page width is approximately 17.8 cm (7 inches, or 42 picas). For books, check with the book editor for the optimum size. Figures can be placed lengthwise on a page, but this is not the ideal layout.

Figures that fit within a single journal column's width are an economical use of space. Avoid creating figures that have unnecessary white space. Figures do not have to fill the allotted one or two columns; that is, reduction is based on content, not on a width of exactly one or two columns.

FONT SIZE AND TYPE

Use these recommended fonts where possible: Arial, Helvetica, Calibri, Times New Roman, Symbol.

All figure elements, including letters, numbers, and symbols, must be legible at their final size. In general, authors should make the figure type size large enough so that it is at least 8 points after reduction. No type should be less than 6 points. As an example, for a 16-cm-wide figure, choose 16-point type, so that when the figure is reduced to fit in a single journal column, the type is reduced to 8-point size.

STYLE

For text within a figure, we suggest using either sentence-style capitalization (only the first word has an initial capital) or title capitalization (each major word has an initial capital). Use only lowercase for units of measure.

Position decimal points correctly, at the base of the numbers and in a size large enough to stand reduction. Decimal points should be in proportion to the numbers they accompany. Do not use commas in place of decimal points.

Be sure that the overall style in the figures follows journal standards. For example, if you use Mg ha^{-1} in the text, do not use Mg/ha in the figures.

In addition:

- Define all abbreviations in the caption, even if they appear in the overall abbreviations list.
- Italicize variables.
- Check the spelling of all text in each figure.

THE GRAPHIC ELEMENTS

Axis scale. Do not crowd the interval marks on axis scales. Fewer may be better. Rarely, if ever, rule in the coordinates grid—not even in light lines or dots. (Light lines may break up, and light dotted lines may disappear entirely.)

In-figure legend. Include a legend to identify symbols, lines, and patterns. (A legend is a list of correspondence between the patterns and symbols and their meaning.) Put the legend inside the figure box, preferably above or to the right of the figure.

Fill patterns and shading. If you need to shade parts of your figure, keep in mind that the spaces between the elements of that shading will be reduced when the figure is reduced. Many patterns built into computer programs become solid black when reduced to 50% of the original size. Search for patterns, or create your own, that will not condense to black.

For bar graph patterns, use solid black, solid white, black diagonal lines, sharp cross-hatching, a sharp dot screen, or a random dot pattern. Dot patterns must be fairly coarse to reproduce well. Light grays and fine, light dots are likely to become muddy or blotchy or even disappear altogether in reproduction. Shades of gray may turn into indistinguishable muddy blacks.

Choose symbols and patterns of similar weight and tone to avoid making one set of data look inherently more important than another.

Lines. Every line in a figure should have meaning and purpose, so authors should avoid using decorative borders, shadows, and other three-dimensional effects. Lines should be of consistent weight and sufficiently heavy (at least 0.5 point) to ensure a high-quality reproduction.

Three-Dimensional Graphs. Use three-dimensional graphs only to represent three dimensions of data. If there are no data for the *z* axis, do not use three-dimensional formatting.

PHOTOGRAPHS

Submit photographs as high-resolution TIF or JPEG files. Indicate the scale, or at least provide a reference point to indicate relative size. For micrographs, indicate the power at which the image was taken, either in the caption or on the figure itself.

If photographs are taken in a series, maintain the same height and angle of the camera, the same distance from the subject, and the same angle of the sun. (A picture taken 3 m from the subject at 0800 h will appear quite different from one taken of the same subject from 6 m at 1700 h.)

Selection

Make sure that the photograph shows something unique, interesting, and clearly identifiable. Use photographs only if they show something essential to your point.

Combinations

When two or more photographs are to be combined into one figure, each part of a composite figure should be clearly identified on the figure by uppercase (A, B, C, etc.) or lowercase letters (a, b, c, etc.). Use the same letters to identify the parts in the caption and in text citations.

Letters, numbers, arrows, scales, and other marks that appear in a light area of the photo should be black. If they appear in a dark area, they should be white, or placed on a white circular or square background. Sufficient contrast is also essential for size bars used in micrographs.

Permissions

If a person or named product is shown in the photograph, the author is responsible for obtaining written permission for use of the photograph from the person or the manufacturer of the product. A copy of the release must be forwarded to headquarters after acceptance; ASA, CSSA, and SSSA are not responsible for any claims that may result from using the figure. For more information on permissions, see Chapter 10.

CAPTIONS

Number figures in the order they are cited in the text. For submission, it is good to include the caption with the actual figures as well as in the manuscript so that reviewers do not have to hunt through the manuscript to understand the figures. See Chapter 1 and individual journal instructions for details on figure and table placement.

A figure caption should be brief but sufficiently detailed to stand on its own. Identify curves or symbols in a legend within the figure itself, not in the caption. Define abbreviations in the caption. Do not write separate captions for the parts of a compound figure. Use sentence-style capitalization for figure captions, capitalizing the first word and all proper nouns.

In both captions and in-text citations, spell out the full word "Figure." Use uppercase or lowercase labels for figure citations ("Figure 1A, Figure 1A–C, Figure 2B,D" OR "Figure 1a, Figure 1a–c, Figure 2b,d") to match the case used in the figure.

Do not be too brief in your caption. A caption that states only “Analysis of data” or “Results of Experiment 2,” for example, is not sufficient.