

Instructions for authors at [Springer.com](https://www.springer.com) do not include all formatting expectations for *Oecologia* submissions. *Oecologia*'s Editors-in-Chief have combined all of Springer's instructions along with their additional detailed expectations into two user-friendly files; "*Oecologia* Author Instructions – General" and "*Oecologia* Author Instructions – Figures". Please prepare submissions to *Oecologia* according to the instructions in these two files. Submissions that do not follow these guidelines may be returned to authors or their review may be delayed.

Figures (images and artwork such as photographs, graphs and diagrams) are a critical part of most manuscripts. The Editors-in-Chief and their assistants provide a final review of figures prior to accepting a paper for publication in *Oecologia*. Authors can facilitate this process to avoid publication delays.

[General issues](#)

[Figure captions](#)

[Figure details](#)

[Example figures](#)

#### **1. General issues:**

- i. Figures should be necessary to clarify the text and illuminate the results. Figures should not repeat information in tables. Maps and diagrams of experimental design are often unnecessary.
- ii. Useful, but non-essential information can be made available in electronic appendices (Electronic supplementary material, ESM). Note that ESM will be available on-line exactly as it is submitted, so be sure to include manuscript title and author names.
- iii. All figures should be cited in the text and numbered consecutively. Each figure should be submitted on a separate page labeled only with the figure number (preferably in a corner away from the figure). Do not number the pages or lines of figures. All figure legends should be combined onto a separate page that precedes the first figure.
- iv. Make your figure easy to read:
  - a. Use a sans serif (block) font type (e.g. Arial or Helvetica) for all figures. Do NOT use serif fonts like Times New Roman. Do not use bold font. Use a minimal variation of font size within an illustration e.g., do not use 8-pt type on an axis and 20-pt type for the axis label.
  - b. Make symbols intuitive (e.g., if you manipulated light levels use "●" for shaded plots and "○" for open plots). Preferred datapoint symbols are circles, triangles, squares, diamonds. Avoid using symbols for datapoints such as "\*", "+", "-", letters, words, etc. We prefer only open or filled symbols.

- c. Shading of histograms can be effective but ensure that the shades are sufficiently different (>20%) to be easily distinguishable after size reduction.
  - d. We discourage use of 3-dimensional (3D) figures.
- v. *Be consistent.*
  - a. Use similar formatting for similar figures.
  - b. Present information in the same order in the figure as described in the figure legend (from left to right and top to bottom).
  - c. Use the same symbols in different figures to represent the same treatments.
- vi. Use error bars and explain what variance they represent: e.g., 95% confidence intervals (95% CI), standard errors (SE) or standard deviations (SD). Error bars with tops and bottoms ( $\pm$ ) are preferred. If error bars are asymmetric, select shading levels for histograms that maintain visibility of error bars (solid bars often obscure error bars).
- vii. Do not surround an entire figure or figure panel with a box or border.
- viii. Avoid unnecessary “white-space” in figures. This will allow the figure to be reproduced in a larger size in the journal.
  - a. Keep the key entirely within the borders of the main figure.
  - b. Arrange figures to share axes and axes titles wherever possible.
  - c. Axis titles should run parallel to the axis.
  - d. Numeric tick labels should be horizontal.
  - e. Never include a figure title or heading.

## **2. Figure legends (captions):**

- i. Figure legends must be brief, but sufficiently detailed to explain the figure without reference to the text. We prefer that figure legends describe the data presented in the figure but do not include conclusions or interpretations of the data.
- ii. Please include the species name(s) of the study organism(s) in the first legend where they are mentioned. Common names are acceptable for birds and large mammals.
- iii. All elements used in the figure should be identified in the figure legend. Use consistent terms to identify treatments and variables in the legend and in the figure. List the terms in the same order as they appear in the figure(s) – from left to right and top to bottom. Indicate what is plotted, e.g., “Density of plants (mean  $\pm$  SE)...”.
- iv. Statistics should appear in the figure legends unless there is sufficient space in the figure to maintain clarity and avoid crowding. Use lowercase “ $r^2$ ” for

simple linear regressions and uppercase “ $R^2$ ” for multiple regressions. If possible, include sample sizes (n) and the type of statistical test performed in addition to  $P$ -values.

- v. Report exact  $P$ -values whenever possible (i.e.,  $P = 0.068$  rather than  $P > 0.05$ ) but report no more than two digits, regardless of the number of “0”s (e.g.  $P = 0.001632$  and  $P = 0.4471$  should be displayed as  $P = 0.0016$  and  $P = 0.45$  respectively). We prefer the use of “ $P$ ” rather than “p”.
- vi. Please do not use symbols in the figure legends (e.g., —●—, - - ○ - - , □, ■, \*) but describe them with text (e.g. ■ as “filled square”).
- vii. For figures with multiple panels, place the panel label (a, b, etc.) before the text describing the panel, e.g., “Difference in a) pupal weight and b) growth rate... ”.
- viii. Figure legends begin with the term “Fig.” in bold type, followed by the figure number, also in bold type. No punctuation is to be included after the number, nor is any punctuation to be placed at the end of the legend.

### 3. Figure Details:

- i. Size of Figures: Figures in *Oecologia* are usually published in one column width (84 mm) although they may be reproduced as 1.5 or 2 column widths. Check that all lines and lettering within the figures are legible and do not appear pixilated at the expected final size. All lines in the final size of figures should be at least 0.1 mm (0.3 pt) wide. Text in the final size of figures should be 8 to 12 pt font. Submitted figures should not exceed the print area of 174 X 234 mm (approx. 7 X 9.4 inches). The publisher will reduce or enlarge figures as they see fit.
- ii. File formats and resolution of figures: Please use the figure number in the figure filename, e.g. “Fig3.eps”.
  - a. Line Art (black and white graphics with no shading)
    - 1. Do not use faint lines and/or lettering.
    - 2. Vector graphics containing fonts must have fonts embedded in the files.
    - 3. The preferred vector graphics file format is EPS (.eps). Vector graphics created with Sigma Plot (.spw) may be embedded directly into a Word (.doc) or Rich Text Format (.rtf) file. Do not use Excel (.xls) for figures.
    - 4. If a vector graphics program is not used, line drawings should have a minimum resolution of 800 dpi relative to the final figure size.
    - 5. Scanned line drawings should have a minimum resolution of 1200 dpi.

- b. Halftone Art (photographs, drawings or painting with fine shading, etc.)
      - 1. If any magnification is used in the photograph, indicate this by including scale bars within the figure.
      - 2. Halftones should have a minimum resolution of 300 dpi.
      - 3. TIFF (tif) is the preferred file format.
    - c. Combination Art (combination of halftone and line art, e.g., halftones containing line drawing, extensive lettering, color diagrams)
      - 1. Combination artwork should have a minimum resolution of 600 dpi.
  - iii. Color figures are free of charge in the print and online version of *Oecologia*.
  - iv. Axis titles should have the format: “Label (units)” e.g., “Tail length (mm)”. If the y-axis is for a variable: “Label, variable (units)”, e.g., “Leaf decomposition rate,  $k$  ( $d^{-1}$ )”. Axes titles should not be duplicated within a figure unless necessary for clarity.
  - v. Capitalize only the first letter in the first word of a phrase in the axis title, key, etc., unless it is a proper name.
  - vi. Figures with multiple panels:
    - a. Multiple panels of a single figure should be grouped together on a single page.
    - b. Use lowercase Roman letters to identify each panel in a figure, and enclose these with parentheses, e.g., “(a)”, “(b)”. Order panels from left to right within a row and from top to bottom.
    - c. Place panel labels and headers in the same location in all figures, if possible, preferably in the top left-hand corner. The panel labels and headers should not exceed the borders of the figure.
    - d. The panel headers (e.g., “a. 2006”, “b. 2007”) should distinguish the panels and not be a substitute for the y-axis title.
    - e. If panels have an axis in common, arrange the panels to share the common axis. Center one axis label in the bottom or left-hand panel. Do not repeat the same axis labels in each panel.
  - vii. Tick marks:

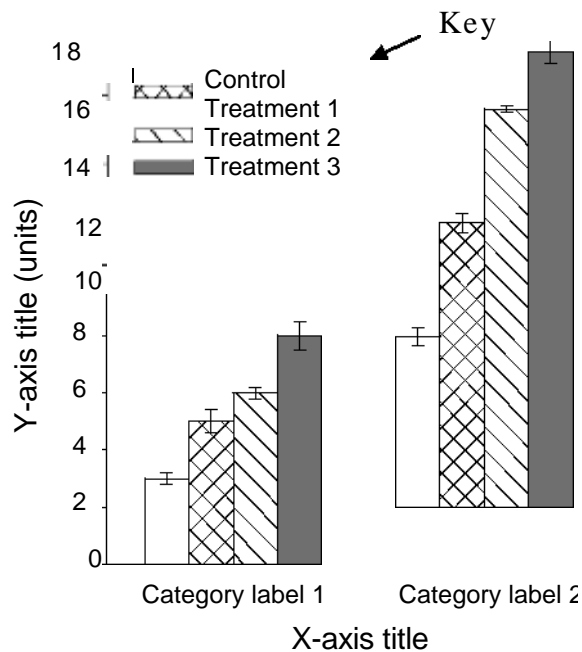
- a. Use only outward-facing or inward-facing tick marks, not both. Be consistent among all figures. Do not use tick marks on the top and right hand axes unless they represent a different scale. Display major tick marks in every panel.
- viii. Key:
- a. Whenever possible, omit the key from the figure and instead, label each line or set of points directly.
  - b. Avoid using a box around the key, unless it is needed to avoid confusion with datapoints.
  - c. Keep the key entirely within the borders of the figure. Ideally, it should not exceed the width of the x-axis nor the height of the y-axis.
- ix. Units:
- a. Follow the Standard International System of Units (SI) for abbreviations (<http://physics.nist.gov/cuu/Units/units.html>)
  - b. Use superscript fonts instead of “per” or “/”: e.g., “Shoot growth ( $\text{mg d}^{-1}$ )” and NOT “Shoot growth ( $\text{mg / d}$ )”. Units may be spelled out in figure legends.
  - c. Avoid complex units. For example, use “ $\text{g m}^{-2}$ ” instead of “ $\text{g 16 m}^{-2}$ ” and “ $\text{juveniles m}^{-2}$ ” instead of “ $\text{juveniles 0.25m}^{-2}$ ”.
  - d. A variety of other issues sometimes arise that can cause confusion. For example,
    1. The units for solar radiation or its photosynthetic fraction (PAR, PhAR) are  $\text{W m}^{-2}$ . In case photosynthetic photon flux density has been measured, this must be termed as such (PFD or PPFD), and the unit is  $\text{m mol m}^{-2} \text{s}^{-1}$  (not Einstein). Hence, PAR can never be in  $\text{m mol photons m}^{-2} \text{s}^{-1}$ .
    2. Concentration ( $\text{g g}^{-1}$  or %) is often confused with content (g per whole plant, leaf, etc).
    3. By convention, biomass is the dried life part of plants, necromass is the attached dead part of plants, and biomass plus necromass is termed phytomass (Intl. Bio. Program terminology).
    4. Production is the accumulation of phytomass. Productivity is production per unit of time, i.e. a rate.
    5. Fractions and ratios: A ratio refers to the relationship between two parts of the same entity. A fraction refers to the relationship of one part to the whole (including that part). When there is a choice, fractions are often more useful and practical (e.g. shoot mass fraction instead of shoot-root ratio).
- x. Logarithmic (and other transformed) scales:
- a. For logarithmic scales, we prefer that the axis labels reflect the original units (e.g. plot Y on a log scale with major tick marks at 1, 10, 100 instead of plotting  $\log(Y)$  on arithmetic, but transformed axes with tick

- marks labeled at 0, 1, 2). In other words, do not use the exponents of the base as the axis labels in the figure.
- b. For data transformed as  $\log(x + \text{constant } k)$  just add the constant into the axis title, e.g. the y-axis title “Ln (mass +1)” should be rewritten as “Mass +1 (g)”.
  - c. Major tick marks (e.g. 1, 10, 100) should be equally spaced apart with minor tick marks (e.g. 2, 3, 4...) spaced to reflect the logarithmic scale. You can abbreviate the major tick mark labels as  $10^0$ ,  $10^1$ ,  $10^2$ , etc.
  - d. A note can be added to the figure legend such as “Note log scale used in panel.”
  - e. Alternatively, you can show back-transformed results. This is often effective with other transformations (e.g., square-root arcsine).

See examples of figures showing poor versus proper formatting on the following pages.

**Once a paper has been accepted for publication in *Oecologia*, authors are invited to send photographs that highlight their work and might be appropriate to be featured on the cover of *Oecologia*. High resolution digital images of the photographs should be sent electronically to Joel Trexler ([trexlerj@fiu.edu](mailto:trexlerj@fiu.edu)), the Editor-in-Chief in charge of choosing *Oecologia* cover photos. Please include a full listing of the photographer who produced the image, including their institution or company and their e-mail address.**

### Parts of a figure:

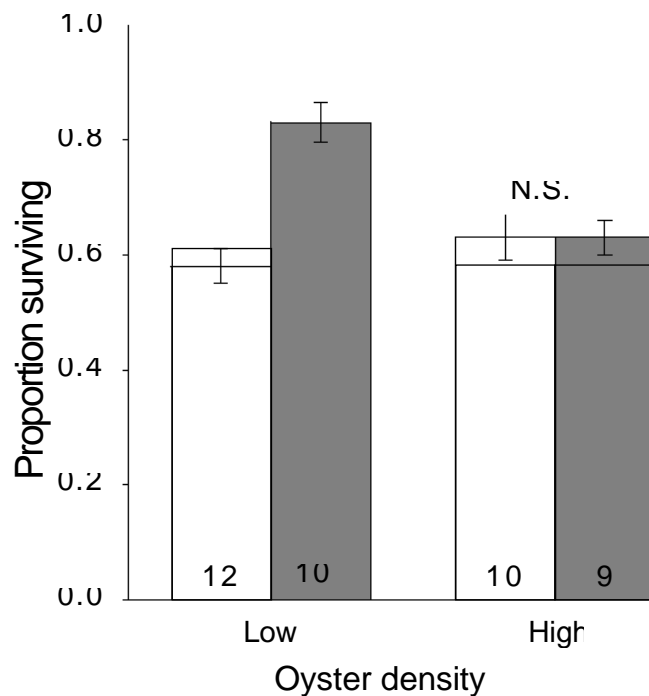


**Fig. 12** Demonstration figure showing Y-axis title response variable for category label 1 and 2 with control, treatment 1, treatment 2 and treatment 3; means  $\pm$  SD, n=16

Figure legend

Example figure legends are shown beside each figure but all figure legends in submitted manuscripts must be assembled onto a separate page preceding the figures.

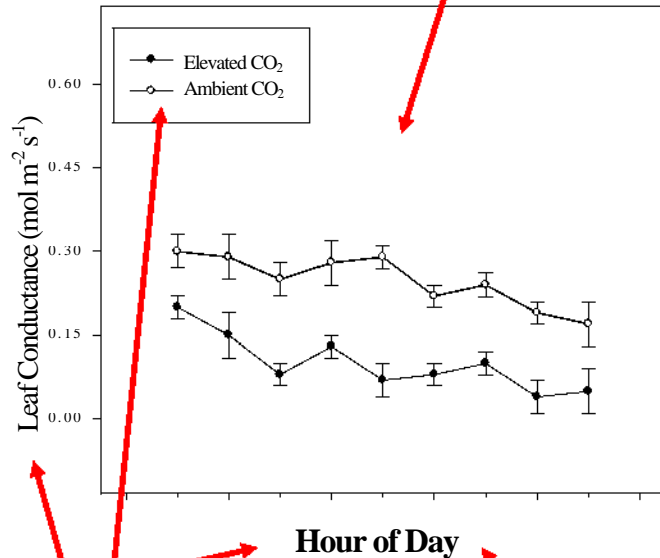
### Properly formatted bar graph:



**Fig. 1** Proportion of adult Eastern oysters, *Crassostrea virginica*, surviving (mean  $\pm$  SE) in low density ( $< 25$  individuals  $m^{-2}$ ) and high density ( $> 75$  individuals  $m^{-2}$ ) populations after one year of growth with predators (no enclosure, open bars) or without predators (enclosure, filled bars). \*\*\*  $P < 0.001$ , N.S. not significant for predator effect. Sample sizes are shown inside bars

### Poorly formatted line graph:

Too much white space  
(axes extend too far beyond data)



Inconsistent font sizes.  
Do not use serif font  
(e.g. Times New Roman)

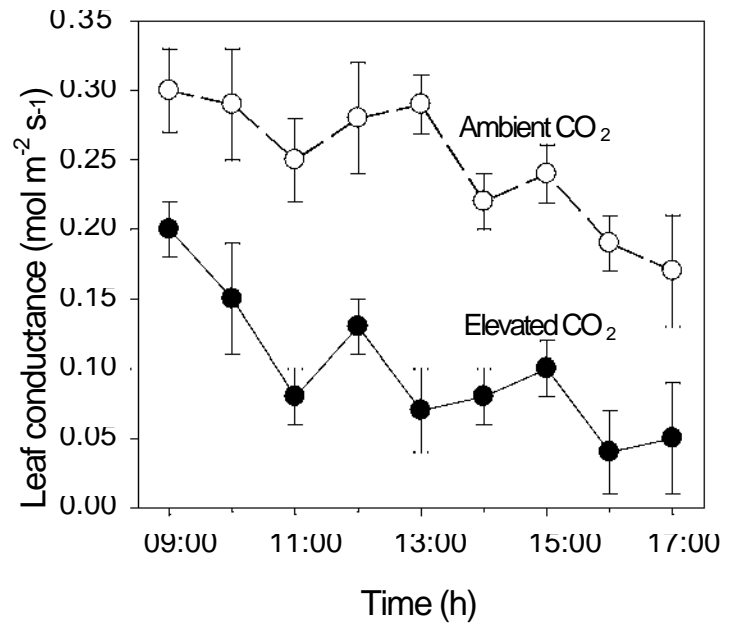
Units needed

**Fig. 2** Daytime leaf conductance under ambient CO<sub>2</sub> (open symbols) or elevated CO<sub>2</sub> (filled symbols) regimes

Datapoints and error bars are not defined

Study species is not identified

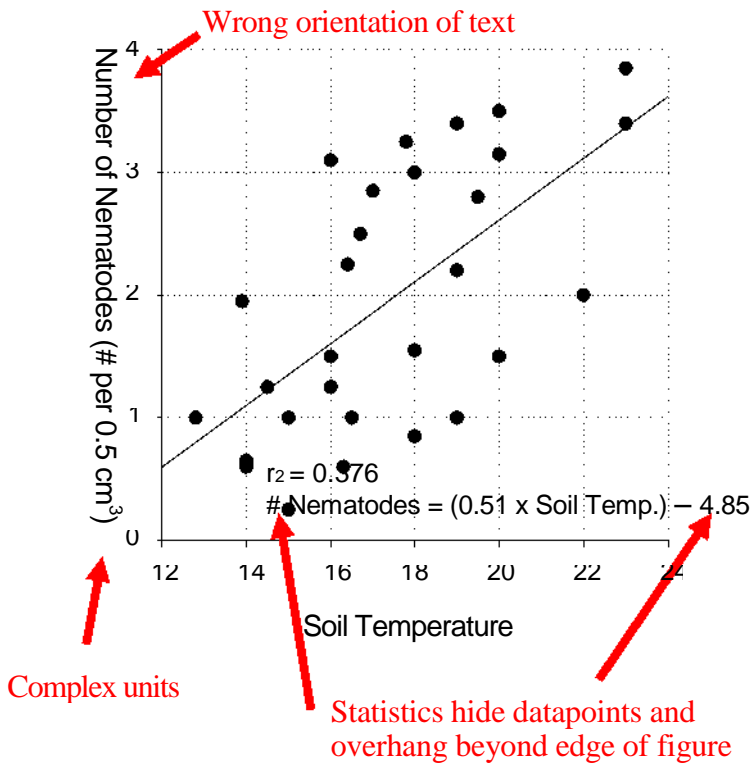
### Properly formatted line graph:



**Fig. 2** Daytime leaf conductance of *Hordeum vulgare* (mean  $\pm$  SE) grown under ambient CO<sub>2</sub> ( $380 \mu\text{mol mol}^{-1}$ , - -○ - -) or elevated CO<sub>2</sub> ( $560 \mu\text{mol mol}^{-1}$ , —●—) regimes (n = 4 per treatment)

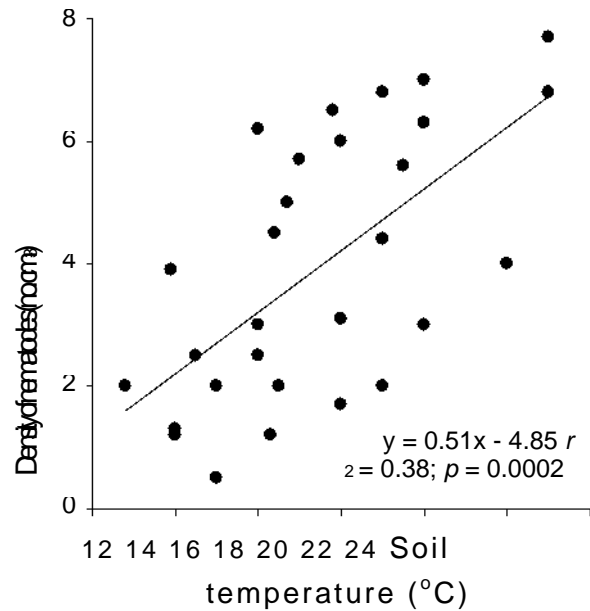


Poorly formatted scatter plot:



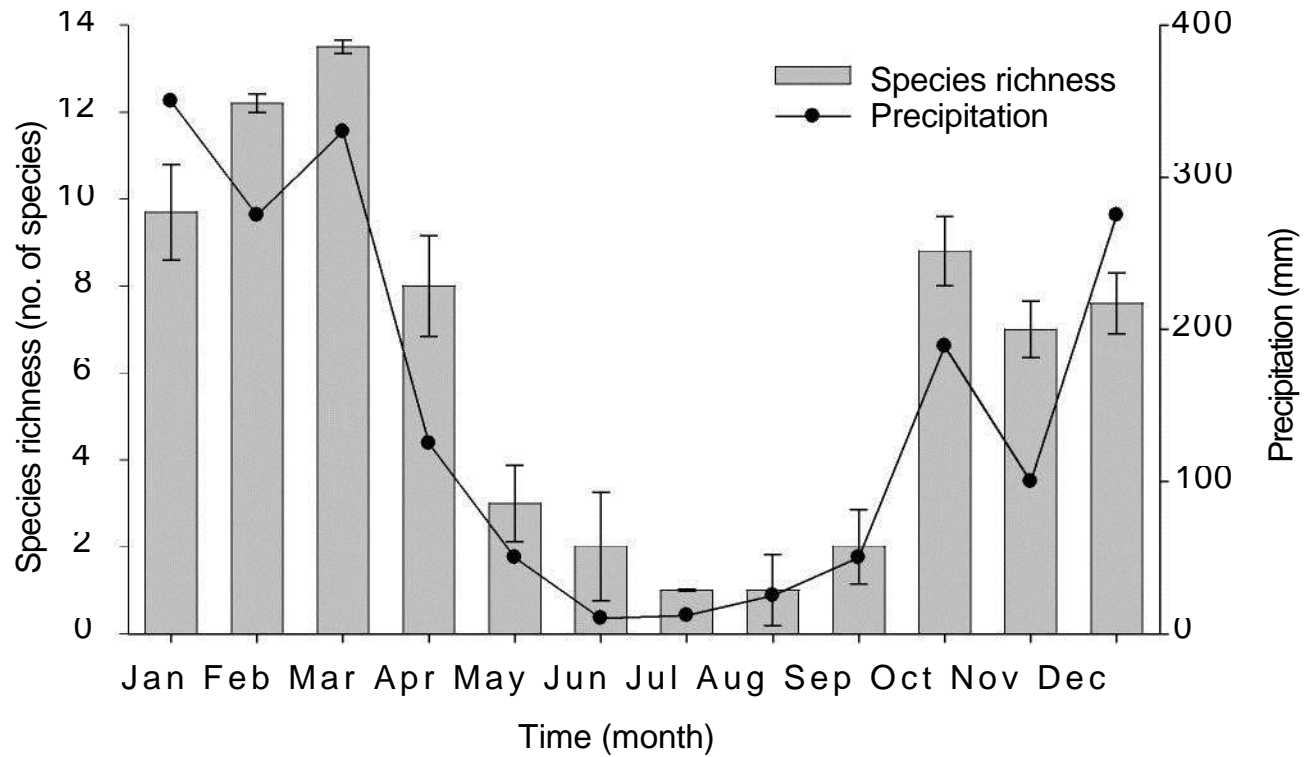
**Fig. 3** Relationship between nematode density and soil temperature at 5 cm depth,  $P = 0.0002$

Properly formatted scatter plot:



**Fig. 3** Relationship between daily mean soil temperature at 5 cm depth and nematode density throughout the growing season,  $n = 29$

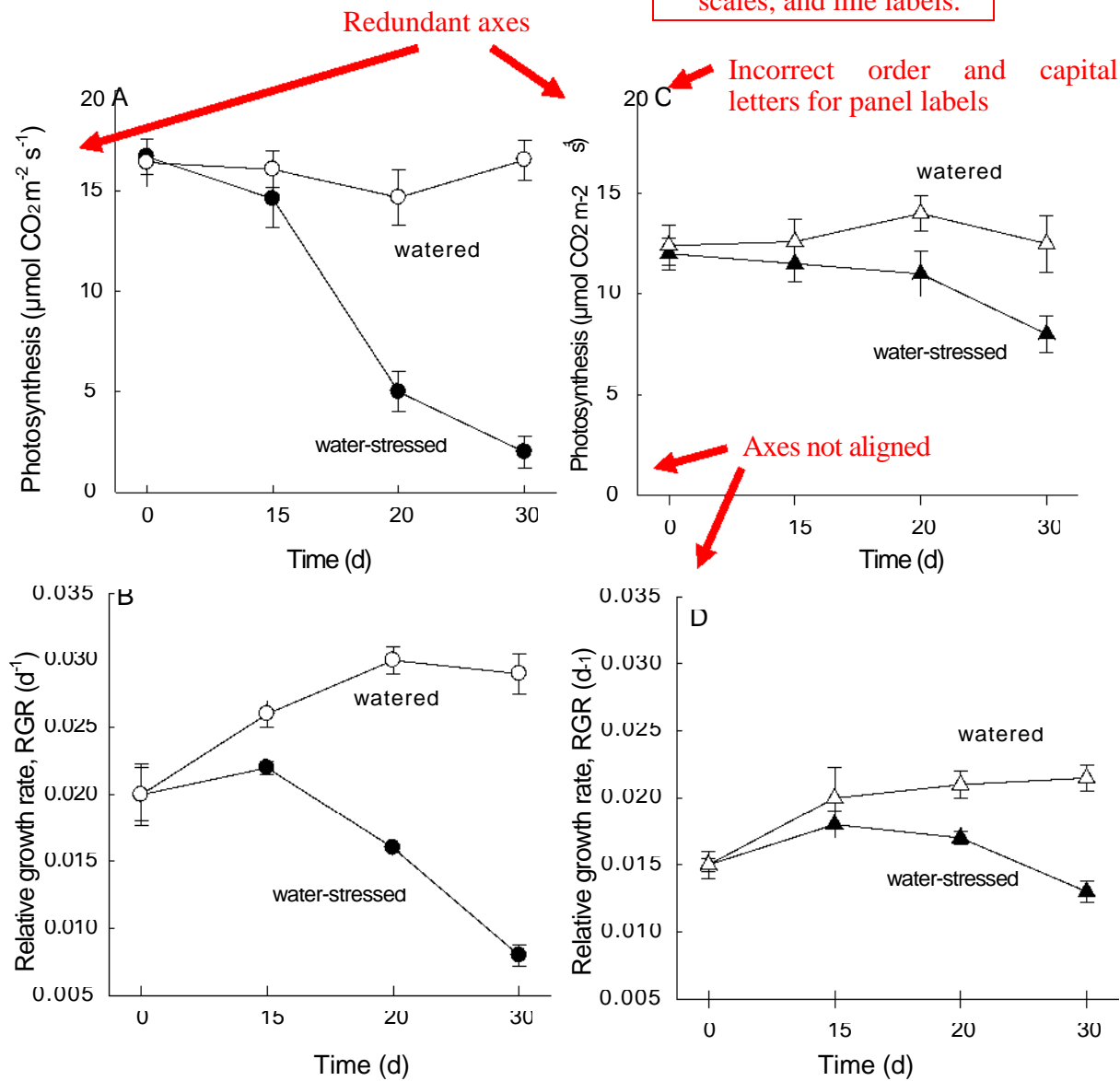
Properly formatted figure with three axes:



**Fig. 4** Anuran species richness (mean  $\pm$  SE) in 25 m<sup>2</sup> plots and monthly precipitation in 2004 in an Atlantic upland forest in southeastern Brazil (n = 10)

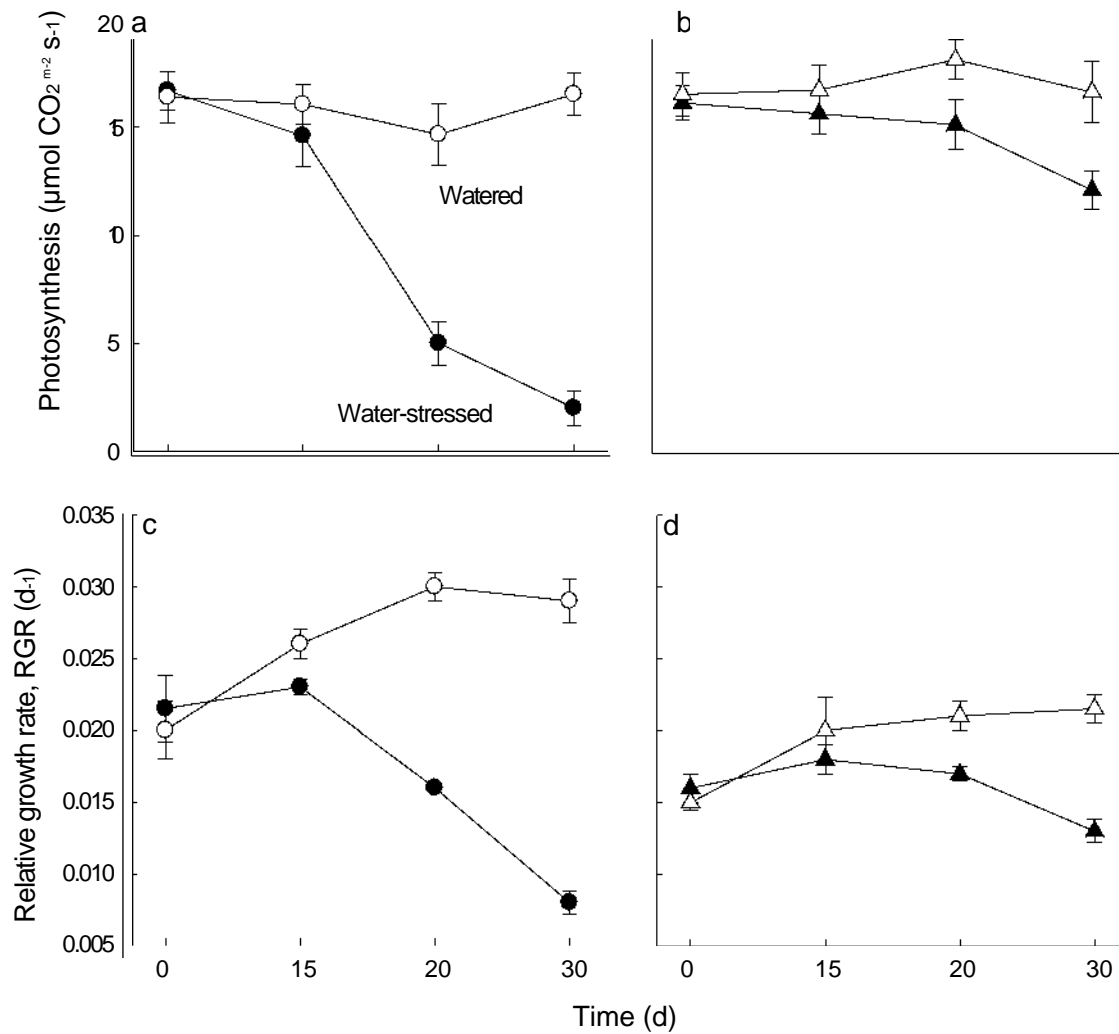
Poorly formatted figure with multiple panels:

Note duplicate axes titles, scales, and line labels.



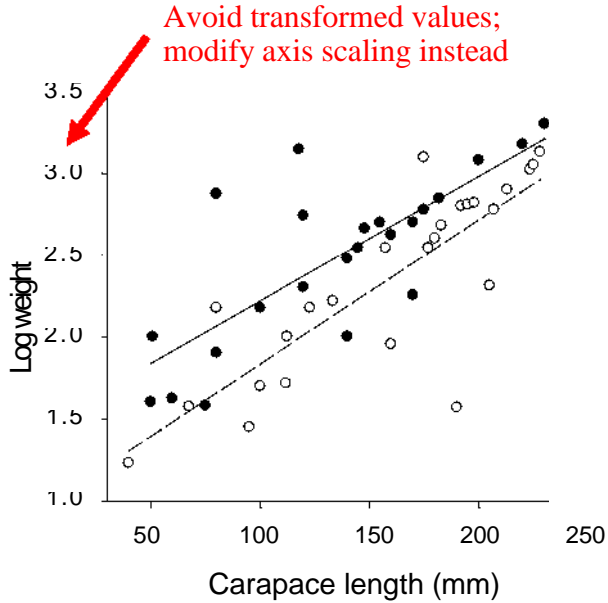
**Fig. 5** Effect of drought on photosynthetic rate and relative growth rate of standard or dwarf *Pinus rigida* that were without water for 0, 15, 20, and 30 days (filled symbols) compared to well-watered plants (open symbols) ( $n = 12$ ). (a) Photosynthetic rate and (b) relative growth rate of standard individuals, (c) photosynthetic rate and (d) relative growth rate of dwarf individuals

**Properly formatted figure with multiple panels:**

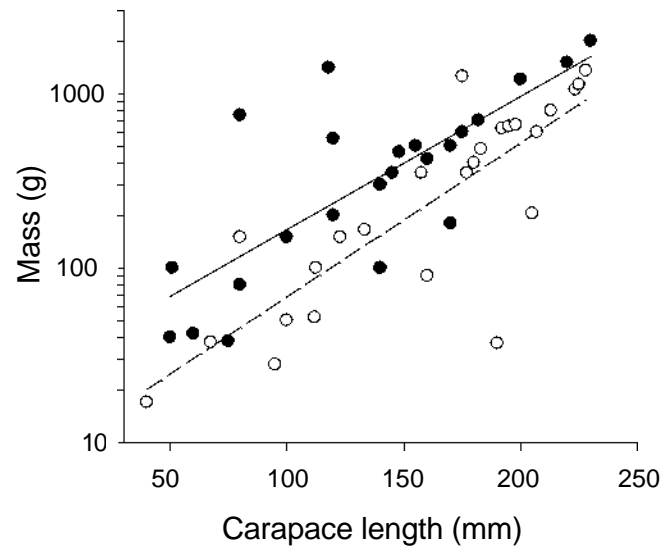


**Fig. 5** Effect of drought on (a,b) photosynthetic rate and (c,d) relative growth rate of standard (circles) and dwarf (triangles) *Pinus rigida* individuals ( $n = 12$ ) that were without water for 0, 15, 20, and 30 days (water-stressed, filled symbols) compared to well-watered plants (watered, open symbols)

Poorly formatted figure with logarithmic scale: Properly formatted figure with log scale:



**Fig. 6** Relationship between carapace length and body weight of red-eared slider in native (open symbols) and introduced habitats (filled symbols). Native habitat:  $\log(\text{wt}) = (0.0082 \times \text{length}) + 0.95$ ;  $r^2 = 0.68$ . Introduced habitat:  $\log(\text{wt}) = (0.0076 \times \text{length}) + 1.46$ ;  $r^2 = 0.59$



**Fig. 6** Relationship between red-eared slider turtle (*Trachemys scripta elegans*) body mass and carapace length in native (○, dashed line) and introduced habitats (●, solid line). Native habitat:  $\log_{10}(\text{mass}) = (0.0082 \times \text{length}) + 0.95$ ;  $r^2 = 0.68$ ;  $P < 0.001$ . Introduced habitat:  $\log(\text{mass}) = (0.0076 \times \text{length}) + 1.46$ ;  $r^2 = 0.59$ ;  $P < 0.001$ . Note log scale used on y-axis