DESCRIPTION

The Editors of Crop Protection especially welcome papers describing an interdisciplinary approach showing how different control strategies can be integrated into practical pest management programs, covering high and low input agricultural systems worldwide. Crop Protection particularly emphasizes the practical aspects of control in the field and for protected crops, and includes work which may lead in the near future to more effective control. The journal does not duplicate the many existing excellent biological science journals, which deal mainly with the more fundamental aspects of plant pathology, applied zoology and weed science. Crop Protection covers all practical aspects of pest, disease and weed control, including the following topics:

Abiotic damage Agronomic control methods Assessment of pest and disease damage Molecular methods for the detection and assessment of pests and diseases Biological control Biorational pesticides Control of animal pests of world crops Control of diseases of crop plants caused by microorganisms Control of weeds and integrated management Economic and social considerations Effects of plant growth regulators Environmental benefits of reduced pesticide use Environmental effects of pesticides Epidemiology of pests and diseases in relation to control GM Crops, and genetic engineering applications Importance and control of postharvest crop losses Integrated control Interrelationships and compatibility among different control strategies Invasive species as they relate to implications for crop protection Pesticide application methods Pest management Plant bioms: for pest and disease control Resistance management Sampling and monitoring schemes for diseases, nematodes, pests and weeds.

The editors of Crop Protection invite workers concerned with pest, disease and weed control to submit suitable contributions on any topic falling within the aims and scope of the journal.

AUDIENCE

Research workers, project planners, commercial producers.

IMPACT FACTOR

2017: 1.920 © Clarivate Analytics Journal Citation Reports 2018
ABSTRACTING AND INDEXING

Review of Plant Pathology
EMBiology
Elsevier BIOBASE
Agricultural Engineering Abstracts
Biotechnology Research Abstracts
Chemical Abstracts
Helminthological Abstracts
Horticultural Abstracts
Plant Breeding Abstracts
Field Crop Abstracts
Review of Applied Entomology
Irrigation and Drainage Abstracts
Soils and Fertilizers
Engineering Village - GEOBASE
Current Contents/Agriculture, Biology & Environmental Sciences
Index to Scientific Reviews
Index to South African Periodicals
Risk Abstracts
Science Citation Index
Scopus
AGRICOLA

EDITORIAL BOARD

Chair Editor
S.N. Wegulo, Dept. of Plant Pathology, University of Nebraska at Lincoln, Lincoln, USA
Crop pathogens such as fungi; oomycetes; bacteria; viruses; other microbes and nematodes.

Editors
J. Correll, University of Arkansas, Fayetteville, Arkansas, USA
Crop pathogens such as fungi, oomycetes, bacteria, viruses, other microbes.
J.V. Cross, East Malling Research, East Malling, Kent, UK
Pesticide applications, entomology, integrated pest management, tropical pest management. Invertebrate crop pests including insects, mites and molluscs. Vertebrate crop pests including mammals and birds. Pesticides and crop protection agents application technology (spraying methodology)
L Korsten, University of Pretoria, Pretoria, South Africa
Food Safety, Food security, Postharvest pathology, biological control, Plant pathology, citrus black spot, Penicillium, water quality, food borne pathogens, plant pathogens, microbial ecology, phytosanitary issues
F.P.F. Reay-Jones, Clemson University, Florence, South Carolina, USA
Invertebrate crop pests including insects, mites and molluscs. Vertebrate crop pests including mammals and birds. Knowledge and technology transfer in crop protection. Integrated Pest Management in Field Crop Systems
C. Zhang, Chinese Academy of Agricultural Sciences, Beijing, China
Weed Biology and Management, Herbicide Resistance and Management, Herbicide Application.

Associate Editor
M. T. Rahman, Dept. of Primary Industries and Regional Development (DPIRD), Government of Western Australia, South Perth, Australia
Insect Biology & Ecology, Behavior, Population Demography, Insecticide Toxicology, Integrated Pest Management, Insecticide Resistance Management, Biological Control, Post-Harvest Disinfection

Statistical Consultant:
C. Ritz, University of Copenhagen, Frederiksberg C, Denmark

Editorial Board:
X. Chen, Washington State University, Pullman, Washington, USA
Epidemiology and control of rusts, including cultural, chemical, and disease resistance; disease forecasting models; virulence, population structures, and functional genomics; genetics and molecular mapping of disease resistance genes; molecular mechanisms of plant-pathogen interactions.

**C.A. Edwards**, The Ohio State University, Columbus, Ohio, USA
Applied soil ecology and ecotoxicology

**W. Elmer**, Connecticut Agricultural Experiment Station (CAES), New Haven, Connecticut, USA
Management of Fusarium diseases; biological control on Soilborne plant pathogens; mineral nutrition effects on Soilborne plant pathogens.

**L. Gatehouse**, HortResearch Palmerston North, Palmerston North, New Zealand
Molecular Biology, particularly of insects and plants. This covers straight molecular biology and extends to plant and some insect transgenesis together with the expression and analysis of the expression of introduced genes. I have some experience of Biochemistry but do not consider myself an expert. I have a blind spot with Statistics and am most definately not an expert. I have worked with insect viruses, insect symbionts and insect cell lines for baculovirus expression and other studies. Most of my work has been in the field of Plant Insect interactions looking at this from both sides and usually with a focus on crop protection.

**D.P. Giga**, Bulawayo, Zimbabwe
Stored Products Entomology (crop storage)

**L. Godfrey**, University of California, Davis, Davis, California, USA
Entomology, crop response, integrated pest management, cotton, rice, field crops

**A.R. Hardy**, Central Science Laboratory, York, UK
Entomology, Soilborne pathogens, soil solarization, soil disinfestation.

**W.D. Hutchison**, University of Minnesota, St Paul, Minnesota, USA
Biological Control and Integrated Management of Arthropod Pests

**K. Jabran**, Düzce University, Düzce, Turkey
Weed ecology, weed control, integrated weed management, weed control in major field crops, allopolyph for weed control, invasive weeds and climate change

**W.J. Janisiewicz**, U.S. Department of Agriculture (USDA), Kearneysville, West Virginia, USA
Soil-borne, pathogens, soil solarization, soil disinfestation.

**J. Katan**, Hebrew University of Jerusalem, Rehovot, Israel
Abiotic (water, heat and mechanical) and biotic (soil-borne fungi, oomycetes and bacterial pathogens) stresses affecting crop establishment; Integrated Pest Management

**S. Liu**, Nat. Pingtung University of Sci. & Tech., Pingtung Hsien, Taiwan
Crop eco-physiological adaptation to arid environment; field crops management; ecosystem sustainable designing and the role of human being in restoring and conserving the structure and function of integrated ecosystem especially in the arid and semiarid regions in northwest of China and other similar regions in the world.

**G Mahajan**, Punjab Agricultural University, Ludhiana, India
Pesticides and their application; entomology ; integrated pest/ crop management (IPM); crops esp Cotton; control of vectors of human diseases eg malaria but that has only to do with farmers' health and not crop protection.

**G.A. Matthews**, Imperial College London, Ascot, UK
Crop economics; production economics; farm management; risk management; insect management; weed management; resistance management; transgenic crops; biotechnology; agricultural sustainability metrics.

**S.E. Naranjo**, USDA-ARS, Arid-Land Agricultural Research Center, Maricopa, , Arizona, USA
IPM of arthropod pests, Insect biological control, insect population ecology, sampling and economic thresholds, risk assessment in GM crops

**R.E.L. Naylor**, University of Aberdeen, Aberdeen, Scotland, UK
A. Ortega-Beltran, International Institute of Tropical Agriculture, Ibadan, Oyo State, Nigeria
Biocution of Aspergillus fungi; Screening for disease resistance; Tropical crops; Cereal crops; Integrated management strategies; Fungal population biology

**K. W. Seebold**, Valent U.S.A. LLC, Lexington, Kentucky, USA
Soilborne plant pathogens – ecology and epidemiology (cotton and vegetable crops) Fungicide resistance and resistance management Integrated pest management Mycology Epidemiology and management of plant disease
P.C. Stevenson, University of Greenwich, Chatham, UK
Natural Products Chemistry; Bioactive compounds from plants; Botanical Insecticides; Chemical Ecology; Pollination Biology

J.C. Streibig, University of Copenhagen, Taastrup, Denmark
Weed science and vegetation management.

M.E. Tobin, U.S. Department of Agriculture (USDA), Fort Collins, Colorado, USA
human-wildlife conflicts, wildlife crop damage, wildlife damage control

P. Trematerra, Università degli Studi del Molise, Campobasso, Italy
Applied entomology; integrated pest management; insect crop pests; stored product pests; pheromones and application technology; stored products protection.

A. van der Meulen, Queensland Government, TooWoomba, Queensland, Australia

J. van der Waals, University of Pretoria, Pretoria, South Africa

D. Wright, Imperial College London, Ascot, UK
Entomology Plant nematology Integrated Pest Management Biological control Biopesticides Pheromones Multitrophic interactions
GUIDE FOR AUTHORS

Your Paper Your Way
We now differentiate between the requirements for new and revised submissions. You may choose to submit your manuscript as a single Word or PDF file to be used in the refereeing process. Only when your paper is at the revision stage, will you be requested to put your paper in to a 'correct format' for acceptance and provide the items required for the publication of your article.

To find out more, please visit the Preparation section below.

INTRODUCTION
The Editors of Crop Protection especially welcome papers describing an interdisciplinary approach showing how different control strategies can be integrated into practical pest management programmes, covering high and low input agricultural systems worldwide. Crop Protection particularly emphasizes the practical aspects of control in the field and for protected crops, and includes work which may lead in the near future to more effective control. The journal does not duplicate the many existing excellent biological science journals, which deal mainly with the more fundamental aspects of plant pathology, applied zoology and weed science. Crop Protection covers all practical aspects of pest, disease and weed control, including the following topics:

Abiotic damage
Agronomic control methods
Assessment of pest and disease damage
Biological control
Biorational pesticides
Control of animal pests of crops
Control of diseases of crop plants caused by microorganisms
Control of weeds and integrated management
Economic and social considerations
Effects of plant growth regulators
Environmental benefits of reduced pesticide use
Environmental effects of pesticides
Epidemiology of pests and diseases in relation to control
Food safety
GM Crops, and genetic engineering applications
Importance and control of postharvest crop losses
Integrated control
Interrelationships and compatibility among different control strategies
Invasive species as they relate to implications for crop protection
Pesticide application methods
Pest management
Resistance management
Sampling and monitoring schemes for diseases, nematodes, pests and weeds.

The editors of Crop Protection invite workers concerned with pest disease and weed control to submit suitable contributions on any topic falling within the aims and scope of the journal.

Types of paper
Contributions falling into the following categories will be considered for publication:

- Perspectives in Crop Protection articles - The editors and members of the editorial board will invite commentary/insight papers on topical issues. Authors should contact the Editors-in-Chief with potential ideas. New data will not be published in commentary papers, but one table or figure to illustrate key points may be included (e.g., pesticide use or crop yield trends). The papers should range from 2000-3000 words or 6-8 double-line spaced manuscript pages (including references cited). The articles will be peer-reviewed with emphasis given to rapid publication.
- State of the art Review articles - Authors should contact the relevant Editor-in-Chief with proposals before submitting.
- Original high-quality Research papers - Preferably no more than 20 double-line spaced manuscript pages, including tables and illustrations.
• Short communications - These should not exceed 6-8 double-line spaced manuscript pages excluding references and legends. Results reported must be based on repeated trials or experiments. Submissions should include a short Abstract not exceeding 10% of the length of the communication and which summarizes briefly the main findings of the work to be reported. The bulk of the text may be in a continuous form but generally will follow the usual format that does not require numbered sections such as Introduction, Materials and Methods, Results, and Discussion. However, a Cover page, Abstract and a list of Keywords are required at the beginning of the communication and Acknowledgements and References at the end. These components are to be prepared in the same format as used for full-length research papers. Occasionally authors may use sub-titles of their own choice to highlight sections of the text.
• Correspondence - Authors should contact the relevant Editor-in-Chief with a proposal before submitting. Correspondence should focus on the scientific basis for comment or disagreement with a recently published article in the Crop Protection journal, and be a maximum of 4-5 pages with double-line spacing, and a limited number of relevant citations. Correspondence will be peer-reviewed, but processed in a timely manner. Upon receipt of a correspondence that is critical of a previous article in Crop Protection, the author(s) of the previous article will also be invited to submit a rebuttal article; both the original letter and rebuttal letter will be published in the same issue.
• Crop Protection also publishes, book reviews, conference reports and a calendar of forthcoming events. Please contact one of the Editors-in-Chief.

For all article formats, also review recent published examples.

Submission checklist
You can use this list to carry out a final check of your submission before you send it to the journal for review. Please check the relevant section in this Guide for Authors for more details.

Ensure that the following items are present:

One author has been designated as the corresponding author with contact details:
• E-mail address
• Full postal address

All necessary files have been uploaded:
Manuscript:
• Include keywords
• All figures (include relevant captions)
• All tables (including titles, description, footnotes)
• Ensure all figure and table citations in the text match the files provided
• Indicate clearly if color should be used for any figures in print

Graphical Abstracts / Highlights files (where applicable)
Supplemental files (where applicable)

Further considerations
• Manuscript has been 'spell checked' and 'grammar checked'
• All references mentioned in the Reference List are cited in the text, and vice versa
• Permission has been obtained for use of copyrighted material from other sources (including the Internet)
• A competing interests statement is provided, even if the authors have no competing interests to declare
• Journal policies detailed in this guide have been reviewed
• Referee suggestions and contact details provided, based on journal requirements

For further information, visit our Support Center.

BEFORE YOU BEGIN
Ethics in publishing
Please see our information pages on Ethics in publishing and Ethical guidelines for journal publication.
**Declaration of interest**
All authors must disclose any financial and personal relationships with other people or organizations that could inappropriately influence (bias) their work. Examples of potential competing interests include employment, consultancies, stock ownership, honoraria, paid expert testimony, patent applications/registrations, and grants or other funding. Authors must disclose any interests in two places: 1. A summary declaration of interest statement in the title page file (if double-blind) or the manuscript file (if single-blind). If there are no interests to declare then please state this: 'Declarations of interest: none'. This summary statement will be ultimately published if the article is accepted. 2. Detailed disclosures as part of a separate Declaration of Interest form, which forms part of the journal's official records. It is important for potential interests to be declared in both places and that the information matches. More information.

**Submission declaration and verification**
Submission of an article implies that the work described has not been published previously (except in the form of an abstract, a published lecture or academic thesis, see 'Multiple, redundant or concurrent publication' for more information), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. To verify originality, your article may be checked by the originality detection service Crossref Similarity Check.

**Preprints**
Please note that preprints can be shared anywhere at any time, in line with Elsevier's sharing policy. Sharing your preprints e.g. on a preprint server will not count as prior publication (see 'Multiple, redundant or concurrent publication' for more information).

**Use of inclusive language**
Inclusive language acknowledges diversity, conveys respect to all people, is sensitive to differences, and promotes equal opportunities. Articles should make no assumptions about the beliefs or commitments of any reader, should contain nothing which might imply that one individual is superior to another on the grounds of race, sex, culture or any other characteristic, and should use inclusive language throughout. Authors should ensure that writing is free from bias, for instance by using 'he or she', 'his/her' instead of 'he' or 'his', and by making use of job titles that are free of stereotyping (e.g. 'chairperson' instead of 'chairman' and 'flight attendant' instead of 'stewardess').

**Changes to authorship**
Authors are expected to consider carefully the list and order of authors before submitting their manuscript and provide the definitive list of authors at the time of the original submission. Any addition, deletion or rearrangement of author names in the authorship list should be made only before the manuscript has been accepted and only if approved by the journal Editor. To request such a change, the Editor must receive the following from the corresponding author: (a) the reason for the change in author list and (b) written confirmation (e-mail, letter) from all authors that they agree with the addition, removal or rearrangement. In the case of addition or removal of authors, this includes confirmation from the author being added or removed. Only in exceptional circumstances will the Editor consider the addition, deletion or rearrangement of authors after the manuscript has been accepted. While the Editor considers the request, publication of the manuscript will be suspended. If the manuscript has already been published in an online issue, any requests approved by the Editor will result in a corrigendum.

**Article transfer service**
This journal is part of our Article Transfer Service. This means that if the Editor feels your article is more suitable in one of our other participating journals, then you may be asked to consider transferring the article to one of those. If you agree, your article will be transferred automatically on your behalf with no need to reformat. Please note that your article will be reviewed again by the new journal. More information.

**Copyright**
Upon acceptance of an article, authors will be asked to complete a 'Journal Publishing Agreement' (see more information on this). An e-mail will be sent to the corresponding author confirming receipt of the manuscript together with a 'Journal Publishing Agreement' form or a link to the online version of this agreement.
Subscribers may reproduce tables of contents or prepare lists of articles including abstracts for internal circulation within their institutions. *Permission* of the Publisher is required for resale or distribution outside the institution and for all other derivative works, including compilations and translations. If excerpts from other copyrighted works are included, the author(s) must obtain written permission from the copyright owners and credit the source(s) in the article. Elsevier has *preprinted forms* for use by authors in these cases.

For gold open access articles: Upon acceptance of an article, authors will be asked to complete an 'Exclusive License Agreement' (*more information*). Permitted third party reuse of gold open access articles is determined by the author's choice of *user license*.

**Author rights**
As an author you (or your employer or institution) have certain rights to reuse your work. *More information*.

*Elsevier supports responsible sharing*
Find out how you can *share your research* published in Elsevier journals.

**Role of the funding source**
You are requested to identify who provided financial support for the conduct of the research and/or preparation of the article and to briefly describe the role of the sponsor(s), if any, in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication. If the funding source(s) had no such involvement then this should be stated.

*Funding body agreements and policies*
Elsevier has established a number of agreements with funding bodies which allow authors to comply with their funder's open access policies. Some funding bodies will reimburse the author for the gold open access publication fee. Details of *existing agreements* are available online.

**Open access**
This journal offers authors a choice in publishing their research:

**Subscription**
- Articles are made available to subscribers as well as developing countries and patient groups through our *universal access programs*.
- No open access publication fee payable by authors.
- The Author is entitled to post the *accepted manuscript* in their institution’s repository and make this public after an embargo period (known as green Open Access). The *published journal article* cannot be shared publicly, for example on ResearchGate or Academia.edu, to ensure the sustainability of peer-reviewed research in journal publications. The embargo period for this journal can be found below.

**Gold open access**
- Articles are freely available to both subscribers and the wider public with permitted reuse.
- A gold open access publication fee is payable by authors or on their behalf, e.g. by their research funder or institution.

Regardless of how you choose to publish your article, the journal will apply the same peer review criteria and acceptance standards.

For gold open access articles, permitted third party (re)use is defined by the following *Creative Commons user licenses*:

*Creative Commons Attribution (CC BY)*
Lets others distribute and copy the article, create extracts, abstracts, and other revised versions, adaptations or derivative works of or from an article (such as a translation), include in a collective work (such as an anthology), text or data mine the article, even for commercial purposes, as long as they credit the author(s), do not represent the author as endorsing their adaptation of the article, and do not modify the article in such a way as to damage the author's honor or reputation.

*Creative Commons Attribution-NonCommercial-NoDerivs (CC BY-NC-ND)*
For non-commercial purposes, lets others distribute and copy the article, and to include in a collective work (such as an anthology), as long as they credit the author(s) and provided they do not alter or modify the article.
The gold open access publication fee for this journal is **USD 2600**, excluding taxes. Learn more about Elsevier’s pricing policy: [https://www.elsevier.com/openaccesspricing](https://www.elsevier.com/openaccesspricing).

**Green open access**
Authors can share their research in a variety of different ways and Elsevier has a number of green open access options available. We recommend authors see our [green open access page](https://www.elsevier.com/greenopenaccess) for further information. Authors can also self-archive their manuscripts immediately and enable public access from their institution's repository after an embargo period. This is the version that has been accepted for publication and which typically includes author-incorporated changes suggested during submission, peer review and in editor-author communications. Embargo period: For subscription articles, an appropriate amount of time is needed for journals to deliver value to subscribing customers before an article becomes freely available to the public. This is the embargo period and it begins from the date the article is formally published online in its final and fully citable form. [Find out more.](https://www.elsevier.com/greenopenaccess)

This journal has an embargo period of 24 months.

**Elsevier Researcher Academy**
Researcher Academy is a free e-learning platform designed to support early and mid-career researchers throughout their research journey. The "Learn" environment at Researcher Academy offers several interactive modules, webinars, downloadable guides and resources to guide you through the process of writing for research and going through peer review. Feel free to use these free resources to improve your submission and navigate the publication process with ease.

**Language (usage and editing services)**
Please write your text in good English (American or British usage is accepted, but not a mixture of these). Authors who feel their English language manuscript may require editing to eliminate possible grammatical or spelling errors and to conform to correct scientific English may wish to use the [English Language Editing service](https://www.elsevier.com/wps/find/authorservice.cws_home) available from Elsevier's WebShop.

**Submission**
Submission to this journal proceeds totally online and you will be guided stepwise through the creation and uploading of your files. The system automatically converts source files to a single PDF file of the article, which is used in the peer-review process. Please note that even though manuscript source files are converted to PDF files at submission for the review process, these source files are needed for further processing after acceptance. All correspondence, including notification of the Editor's decision and requests for revision, takes place by e-mail removing the need for a paper trail.

Papers will be assigned to the Editors by subject:

Prof. J. Correll - Crop pathogens such as fungi, oomycetes, bacteria, viruses, other microbes

Prof. J.V. Cross - Invertebrate crop pests including insects, mites and molluscs. Vertebrate crop pests including mammals and birds, pesticides and crop protection agents application technology (spraying methodology)

Assoc.Prof. F.P.F. Reay-Jones - Invertebrate crop pests including insects, mites and molluscs. Vertebrate crop pests including mammals and birds. Knowledge and technology transfer in crop protection

Prof. J.C. Streibig - Weed science and vegetation management

Prof. S.N. Wegulo - Crop pathogens such as fungi, oomycetes, bacteria, viruses, other microbes and nematodes

Papers in agricultural economics and vertebrate control will be handled by one of the above Editors.
Repeat experiments. Repeat experiments. Manuscripts that report original research should not be submitted unless experiments have been conducted at least twice or, in the case of field experiments, relate to two seasons. In most cases, three or more replications will be necessary for appropriate statistical analysis. In exceptional circumstances, studies that do not meet these criteria may be acceptable, but the relevant Editor-in-Chief should be consulted prior to submission.

Submit your article
Please submit your article via http://ees.elsevier.com/cropro/

Referees
Please submit, with the manuscript, the names, addresses and e-mail addresses of 4 potential referees. Note that the editor retains the sole right to decide whether or not the suggested reviewers are used.

Additional information
Review process
All contributions are reviewed by two or more referees to ensure both accuracy and relevance, and revisions to the manuscript may thus be required. On acceptance, contributions are subject to editorial amendment to suit house style. When a manuscript is returned for revision prior to final acceptance, the revised version must be submitted as soon as possible after the author's receipt of the referee's reports. Revised manuscripts returned after four months will be considered as new submissions subject to full re-review.

PREPARATION
NEW SUBMISSIONS
Submission to this journal proceeds totally online and you will be guided stepwise through the creation and uploading of your files. The system automatically converts your files to a single PDF file, which is used in the peer-review process. As part of the Your Paper Your Way service, you may choose to submit your manuscript as a single file to be used in the refereeing process. This can be a PDF file or a Word document, in any format or layout that can be used by referees to evaluate your manuscript. It should contain high enough quality figures for refereeing. If you prefer to do so, you may still provide all or some of the source files at the initial submission. Please note that individual figure files larger than 10 MB must be uploaded separately.

References
There are no strict requirements on reference formatting at submission. References can be in any style or format as long as the style is consistent. Where applicable, author(s) name(s), journal title/book title, chapter title/article title, year of publication, volume number/book chapter and the article number or pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct.

Formatting requirements
There are no strict formatting requirements but all manuscripts must contain the essential elements needed to convey your manuscript, for example Abstract, Keywords, Introduction, Materials and Methods, Results, Conclusions, Artwork and Tables with Captions. If your article includes any Videos and/or other Supplementary material, this should be included in your initial submission for peer review purposes. Divide the article into clearly defined sections.

Please ensure the text of your paper is double-spaced and has consecutive line numbering - this is an essential peer review requirement.

Figures and tables embedded in text
Please ensure the figures and the tables included in the single file are placed next to the relevant text in the manuscript, rather than at the bottom or the top of the file. The corresponding caption should be placed directly below the figure or table.
Peer review
This journal operates a single blind review process. All contributions will be initially assessed by the editor for suitability for the journal. Papers deemed suitable are then typically sent to a minimum of two independent expert reviewers to assess the scientific quality of the paper. The Editor is responsible for the final decision regarding acceptance or rejection of articles. The Editor's decision is final. More information on types of peer review.

REVISED SUBMISSIONS
Use of word processing software
Regardless of the file format of the original submission, at revision you must provide us with an editable file of the entire article. Keep the layout of the text as simple as possible. Most formatting codes will be removed and replaced on processing the article. The electronic text should be prepared in a way very similar to that of conventional manuscripts (see also the Guide to Publishing with Elsevier). See also the section on Electronic artwork.

To avoid unnecessary errors you are strongly advised to use the 'spell-check' and 'grammar-check' functions of your word processor.

Line numbering, page numbering, and double line spacing are mandatory for submissions.

Article structure
Subdivision - numbered sections
Divide your article into clearly defined and numbered sections. Subsections should be numbered 1.1 (then 1.1.1, 1.1.2, ...), 1.2, etc. (the abstract is not included in section numbering). Use this numbering also for internal cross-referencing: do not just refer to 'the text'. Any subsection may be given a brief heading. Each heading should appear on its own separate line.

Introduction
State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.

Material and methods
Provide sufficient details to allow the work to be reproduced by an independent researcher. Methods that are already published should be summarized, and indicated by a reference. If quoting directly from a previously published method, use quotation marks and also cite the source. Any modifications to existing methods should also be described.

Results
Results should be clear and concise.

Discussion
This should explore the significance of the results of the work, not repeat them. A combined Results and Discussion section is often appropriate. Avoid extensive citations and discussion of published literature.

Conclusions
The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion section.

Appendices
If there is more than one appendix, they should be identified as A, B, etc. Formulae and equations in appendices should be given separate numbering: Eq. (A.1), Eq. (A.2), etc.; in a subsequent appendix, Eq. (B.1) and so on. Similarly for tables and figures: Table A.1; Fig. A.1, etc.

Essential title page information
• Title. Concise and informative. Titles are often used in information-retrieval systems. Avoid abbreviations and formulae where possible.
• Author names and affiliations. Please clearly indicate the given name(s) and family name(s) of each author and check that all names are accurately spelled. You can add your name between parentheses in your own script behind the English transliteration. Present the authors' affiliation addresses (where the actual work was done) below the names. Indicate all affiliations with a lower-case superscript letter immediately after the author's name and in front of the appropriate address. Provide the full postal address of each affiliation, including the country name and, if available, the e-mail address of each author.
• **Corresponding author.** Clearly indicate who will handle correspondence at all stages of refereeing and publication, also post-publication. This responsibility includes answering any future queries about Methodology and Materials. **Ensure that the e-mail address is given and that contact details are kept up to date by the corresponding author.**

• **Present/permanent address.** If an author has moved since the work described in the article was done, or was visiting at the time, a 'Present address' (or 'Permanent address') may be indicated as a footnote to that author's name. The address at which the author actually did the work must be retained as the main, affiliation address. Superscript Arabic numerals are used for such footnotes.

**Abstract**
A concise and factual abstract is required. The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separately from the article, so it must be able to stand alone. For this reason, References should be avoided, but if essential, then cite the author(s) and year(s). Also, non-standard or uncommon abbreviations should be avoided, but if essential they must be defined at their first mention in the abstract itself.

**Graphical abstract**
Although a graphical abstract is optional, its use is encouraged as it draws more attention to the online article. The graphical abstract should summarize the contents of the article in a concise, pictorial form designed to capture the attention of a wide readership. Graphical abstracts should be submitted as a separate file in the online submission system. Image size: Please provide an image with a minimum of 531 × 1328 pixels (h × w) or proportionally more. The image should be readable at a size of 5 × 13 cm using a regular screen resolution of 96 dpi. Preferred file types: TIFF, EPS, PDF or MS Office files. You can view Example Graphical Abstracts on our information site.

Authors can make use of Elsevier’s Illustration Services to ensure the best presentation of their images and in accordance with all technical requirements.

**Highlights**
Highlights are mandatory for this journal. They consist of a short collection of bullet points that convey the core findings of the article and should be submitted in a separate editable file in the online submission system. Please use 'Highlights' in the file name and include 3 to 5 bullet points (maximum 85 characters, including spaces, per bullet point). You can view example Highlights on our information site.

**Keywords**
Immediately after the abstract, provide a maximum of 6 keywords, using American spelling and avoiding general and plural terms and multiple concepts (avoid, for example, 'and', 'of'). Be sparing with abbreviations: only abbreviations firmly established in the field may be eligible. These keywords will be used for indexing purposes.

**Abbreviations**
Define abbreviations that are not standard in this field in a footnote to be placed on the first page of the article. Such abbreviations that are unavoidable in the abstract must be defined at their first mention there, as well as in the footnote. Ensure consistency of abbreviations throughout the article.

**Acknowledgements**
Collate acknowledgements in a separate section at the end of the article before the references and do not, therefore, include them on the title page, as a footnote to the title or otherwise. List here those individuals who provided help during the research (e.g., providing language help, writing assistance or proof reading the article, etc.).

**Formatting of funding sources**
List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, please include the following sentence:
This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Nomenclature and Units
Follow internationally accepted rules and conventions: use the international system of units (SI). If other units are mentioned, please give their equivalent in SI.

Authors and Editor(s) are, by general agreement, obliged to accept the rules governing biological nomenclature, as laid down in the International Code of Botanical Nomenclature, the International Code of Nomenclature of Bacteria, and the International Code of Zoological Nomenclature.

All biota should be identified by their scientific names. The species naming authority should be included with full Latin name at first mention in the abstract and in the body of the paper.

All biocides and other organic compounds must be identified by their Geneva names when first used in the text. Active ingredients of all formulations should be likewise identified.

For chemical nomenclature, the conventions of the International Union of Pure and Applied Chemistry and the official recommendations of the IUPAC-IUB Combined Commission on Biochemical Nomenclature should be followed where the compound is novel. For compounds more than two years old please use the approved name as given in the Pesticide Manual.

Application of pesticides. Full details must be given of techniques used to apply pesticides (e.g. type of equipment, type of nozzle, pressure, volume of spray, etc.) and of the amount of active ingredient applied per unit area.

Math formulae
Present simple formulae in the line of normal text where possible. In principle, variables are to be presented in italics.
Number consecutively any equations that have to be displayed separate from the text (if referred to explicitly in the text).
Subscripts and superscripts should be clear.
Greek letters and other non-Roman or handwritten symbols should be explained in the margin where they are first used. Take special care to show clearly the difference between zero (0) and the letter O, and between one (1) and the letter l.
Give the meaning of all symbols immediately after the equation in which they are first used. For simple fractions use the solidus (/) instead of a horizontal line.
Equations should be numbered serially at the right-hand side in parentheses. In general only equations explicitly referred to in the text need be numbered.
The use of fractional powers instead of root signs is recommended. Also powers of e are often more conveniently denoted by exp.
Levels of statistical significance which can be mentioned without further explanation are: *P <0.05, **P <0.01 and ***P <0.001.
In chemical formulae, valence of ions should be given as, e.g., Ca$^{2+}$, not as Ca$^{++}$. Isotope numbers should precede the symbols, e.g., $^{18}$O.

Footnotes
Footnotes should be used sparingly. Number them consecutively throughout the article. Many word processors build footnotes into the text, and this feature may be used. Should this not be the case, indicate the position of footnotes in the text and present the footnotes themselves separately at the end of the article.

Electronic artwork
General points
• Make sure you use uniform lettering and sizing of your original artwork.
• Preferred fonts: Arial (or Helvetica), Times New Roman (or Times), Symbol, Courier.
• Number the illustrations according to their sequence in the text.
• Use a logical naming convention for your artwork files.
• Indicate per figure if it is a single, 1.5 or 2-column fitting image.
• For Word submissions only, you may still provide figures and their captions, and tables within a single file at the revision stage.
• Please note that individual figure files larger than 10 MB must be provided in separate source files. A detailed guide on electronic artwork is available. **You are urged to visit this site; some excerpts from the detailed information are given here.**

**Formats**

Regardless of the application used, when your electronic artwork is finalized, please 'save as' or convert the images to one of the following formats (note the resolution requirements for line drawings, halftones, and line/halftone combinations given below):

- EPS (or PDF): Vector drawings. Embed the font or save the text as 'graphics'.
- TIFF (or JPEG): Color or grayscale photographs (halftones): always use a minimum of 300 dpi.
- TIFF (or JPEG): Bitmapped line drawings: use a minimum of 1000 dpi.
- TIFF (or JPEG): Combinations bitmapped line/halftone (color or grayscale): a minimum of 500 dpi is required.

**Please do not:**

- Supply files that are optimized for screen use (e.g., GIF, BMP, PICT, WPG); the resolution is too low.
- Supply files that are too low in resolution.
- Submit graphics that are disproportionately large for the content.

**Color artwork**

Please make sure that artwork files are in an acceptable format (TIFF (or JPEG), EPS (or PDF), or MS Office files) and with the correct resolution. If, together with your accepted article, you submit usable color figures then Elsevier will ensure, at no additional charge, that these figures will appear in color online (e.g., ScienceDirect and other sites) regardless of whether or not these illustrations are reproduced in color in the printed version. **For color reproduction in print, you will receive information regarding the costs from Elsevier after receipt of your accepted article.** Please indicate your preference for color: in print or online only. Further information on the preparation of electronic artwork.

**Figure captions**

Ensure that each illustration has a caption. A caption should comprise a brief title (not on the figure itself) and a description of the illustration. Keep text in the illustrations themselves to a minimum but explain all symbols and abbreviations used.

**Tables**

Please submit tables as editable text and not as images. Tables can be placed either next to the relevant text in the article, or on separate page(s) at the end. Number tables consecutively in accordance with their appearance in the text and place any table notes below the table body. Be sparing in the use of tables and ensure that the data presented in them do not duplicate results described elsewhere in the article. Please avoid using vertical rules and shading in table cells.

**References**

**Citation in text**

Please ensure that every reference cited in the text is also present in the reference list (and vice versa). Any references cited in the abstract must be given in full. Unpublished results and personal communications are not recommended in the reference list, but may be mentioned in the text. If these references are included in the reference list they should follow the standard reference style of the journal and should include a substitution of the publication date with either 'Unpublished results' or 'Personal communication'. Citation of a reference as 'in press' implies that the item has been accepted for publication.

**Reference links**

Increased discoverability of research and high quality peer review are ensured by online links to the sources cited. In order to allow us to create links to abstracting and indexing services, such as Scopus, CrossRef and PubMed, please ensure that data provided in the references are correct. Please note that incorrect surnames, journal/book titles, publication year and pagination may prevent link creation. When copying references, please be careful as they may already contain errors. Use of the DOI is highly encouraged.

A DOI is guaranteed never to change, so you can use it as a permanent link to any electronic article. An example of a citation using DOI for an article not yet in an issue is: VanDecar J.C., Russo R.M., James D.E., Ambeh W.B., Franke M. (2003). Aseismic continuation of the Lesser Antilles slab beneath northeastern Venezuela. Journal of Geophysical Research, https://doi.org/10.1029/2001JB000884. Please note the format of such citations should be in the same style as all other references in the paper.
Web references
As a minimum, the full URL should be given and the date when the reference was last accessed. Any further information, if known (DOI, author names, dates, reference to a source publication, etc.), should also be given. Web references can be listed separately (e.g., after the reference list) under a different heading if desired, or can be included in the reference list.

Data references
This journal encourages you to cite underlying or relevant datasets in your manuscript by citing them in your text and including a data reference in your Reference List. Data references should include the following elements: author name(s), dataset title, data repository, version (where available), year, and global persistent identifier. Add [dataset] immediately before the reference so we can properly identify it as a data reference. The [dataset] identifier will not appear in your published article.

References in a special issue
Please ensure that the words 'this issue' are added to any references in the list (and any citations in the text) to other articles in the same Special Issue.

Reference management software
Most Elsevier journals have their reference template available in many of the most popular reference management software products. These include all products that support Citation Style Language styles, such as Mendeley and Zotero, as well as EndNote. Using the word processor plug-ins from these products, authors only need to select the appropriate journal template when preparing their article, after which citations and bibliographies will be automatically formatted in the journal's style. If no template is yet available for this journal, please follow the format of the sample references and citations as shown in this Guide. If you use reference management software, please ensure that you remove all field codes before submitting the electronic manuscript. More information on how to remove field codes.

Users of Mendeley Desktop can easily install the reference style for this journal by clicking the following link:
http://open.mendeley.com/use-citation-style/crop-protection
When preparing your manuscript, you will then be able to select this style using the Mendeley plug-ins for Microsoft Word or LibreOffice.

Reference formatting
There are no strict requirements on reference formatting at submission. References can be in any style or format as long as the style is consistent. Where applicable, author(s) name(s), journal title/book title, chapter title/article title, year of publication, volume number/book chapter and the article number or pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct. If you do wish to format the references yourself they should be arranged according to the following examples:

Reference style
Text: All citations in the text should refer to:
1. Single author: the author's name (without initials, unless there is ambiguity) and the year of publication;
2. Two authors: both authors' names and the year of publication;
3. Three or more authors: first author's name followed by 'et al.' and the year of publication.
Citations may be made directly (or parenthetically). Groups of references can be listed either first alphabetically, then chronologically, or vice versa.
Examples: 'as demonstrated (Allan, 2000a, 2000b, 1999; Allan and Jones, 1999).... Or, as demonstrated (Jones, 1999; Allan, 2000).... Kramer et al. (2010) have recently shown ...'
List: References should be arranged first alphabetically and then further sorted chronologically if necessary. More than one reference from the same author(s) in the same year must be identified by the letters 'a', 'b', 'c', etc., placed after the year of publication.
Examples:
Reference to a journal publication:
Reference to a journal publication with an article number:
Reference to a book:

Reference to a chapter in an edited book:

Reference to a website:

Reference to a dataset:

Journal abbreviations source
Journal names should be abbreviated according to the List of Title Word Abbreviations.

Video
Elsevier accepts video material and animation sequences to support and enhance your scientific research. Authors who have video or animation files that they wish to submit with their article are strongly encouraged to include links to these within the body of the article. This can be done in the same way as a figure or table by referring to the video or animation content and noting in the body text where it should be placed. All submitted files should be properly labeled so that they directly relate to the video file's content. In order to ensure that your video or animation material is directly usable, please provide the file in one of our recommended file formats with a preferred maximum size of 150 MB per file, 1 GB in total. Video and animation files supplied will be published online in the electronic version of your article in Elsevier Web products, including ScienceDirect. Please supply 'stills' with your files: you can choose any frame from the video or animation or make a separate image. These will be used instead of standard icons and will personalize the link to your video data. For more detailed instructions please visit our video instruction pages. Note: since video and animation cannot be embedded in the print version of the journal, please provide text for both the electronic and the print version for the portions of the article that refer to this content.

Data visualization
Include interactive data visualizations in your publication and let your readers interact and engage more closely with your research. Follow the instructions here to find out about available data visualization options and how to include them with your article.

Supplementary material
Supplementary material such as applications, images and sound clips, can be published with your article to enhance it. Submitted supplementary items are published exactly as they are received (Excel or PowerPoint files will appear as such online). Please submit your material together with the article and supply a concise, descriptive caption for each supplementary file. If you wish to make changes to supplementary material during any stage of the process, please make sure to provide an updated file. Do not annotate any corrections on a previous version. Please switch off the 'Track Changes' option in Microsoft Office files as these will appear in the published version.

Research data
This journal encourages and enables you to share data that supports your research publication where appropriate, and enables you to interlink the data with your published articles. Research data refers to the results of observations or experimentation that validate research findings. To facilitate reproducibility and data reuse, this journal also encourages you to share your software, code, models, algorithms, protocols, methods and other useful materials related to the project.

Below are a number of ways in which you can associate data with your article or make a statement about the availability of your data when submitting your manuscript. If you are sharing data in one of these ways, you are encouraged to cite the data in your manuscript and reference list. Please refer to the "References" section for more information about data citation. For more information on depositing, sharing and using research data and other relevant research materials, visit the research data page.
Data linking
If you have made your research data available in a data repository, you can link your article directly to the dataset. Elsevier collaborates with a number of repositories to link articles on ScienceDirect with relevant repositories, giving readers access to underlying data that gives them a better understanding of the research described.

There are different ways to link your datasets to your article. When available, you can directly link your dataset to your article by providing the relevant information in the submission system. For more information, visit the database linking page.

For supported data repositories a repository banner will automatically appear next to your published article on ScienceDirect.

In addition, you can link to relevant data or entities through identifiers within the text of your manuscript, using the following format: Database: xxxx (e.g., TAIR: AT1G01020; CCDC: 734053; PDB: 1XFN).

Mendeley Data
This journal supports Mendeley Data, enabling you to deposit any research data (including raw and processed data, video, code, software, algorithms, protocols, and methods) associated with your manuscript in a free-to-use, open access repository. During the submission process, after uploading your manuscript, you will have the opportunity to upload your relevant datasets directly to Mendeley Data. The datasets will be listed and directly accessible to readers next to your published article online.

For more information, visit the Mendeley Data for journals page.

Data in Brief
You have the option of converting any or all parts of your supplementary or additional raw data into one or multiple data articles, a new kind of article that houses and describes your data. Data articles ensure that your data is actively reviewed, curated, formatted, indexed, given a DOI and publicly available to all upon publication. You are encouraged to submit your article for Data in Brief as an additional item alongside the revised version of your manuscript. If your research article is accepted, your data article will automatically be transferred over to Data in Brief where it will be editorially reviewed and published in the open access data journal, Data in Brief. Please note an open access fee of 500 USD is payable for publication in Data in Brief. Full details can be found on the Data in Brief website. Please use this template to write your Data in Brief.

MethodsX
You have the option of converting relevant protocols and methods into one or multiple MethodsX articles, a new kind of article that describes the details of customized research methods. Many researchers spend a significant amount of time on developing methods to fit their specific needs or setting, but often without getting credit for this part of their work. MethodsX, an open access journal, now publishes this information in order to make it searchable, peer reviewed, citable and reproducible. Authors are encouraged to submit their MethodsX article as an additional item alongside the revised version of their manuscript. If your research article is accepted, your methods article will automatically be transferred over to MethodsX where it will be editorially reviewed. Please note an open access fee is payable for publication in MethodsX. Full details can be found on the MethodsX website. Please use this template to prepare your MethodsX article.

Data statement
To foster transparency, we encourage you to state the availability of your data in your submission. This may be a requirement of your funding body or institution. If your data is unavailable to access or unsuitable to post, you will have the opportunity to indicate why during the submission process, for example by stating that the research data is confidential. The statement will appear with your published article on ScienceDirect. For more information, visit the Data Statement page.

AFTER ACCEPTANCE
**Online proof correction**

Corresponding authors will receive an e-mail with a link to our online proofing system, allowing annotation and correction of proofs online. The environment is similar to MS Word: in addition to editing text, you can also comment on figures/tables and answer questions from the Copy Editor. Web-based proofing provides a faster and less error-prone process by allowing you to directly type your corrections, eliminating the potential introduction of errors.

If preferred, you can still choose to annotate and upload your edits on the PDF version. All instructions for proofing will be given in the e-mail we send to authors, including alternative methods to the online version and PDF.

We will do everything possible to get your article published quickly and accurately. Please use this proof only for checking the typesetting, editing, completeness and correctness of the text, tables and figures. Significant changes to the article as accepted for publication will only be considered at this stage with permission from the Editor. It is important to ensure that all corrections are sent back to us in one communication. Please check carefully before replying, as inclusion of any subsequent corrections cannot be guaranteed. Proofreading is solely your responsibility.

**Offprints**

The corresponding author will, at no cost, receive a customized Share Link providing 50 days free access to the final published version of the article on ScienceDirect. The Share Link can be used for sharing the article via any communication channel, including email and social media. For an extra charge, paper offprints can be ordered via the offprint order form which is sent once the article is accepted for publication. Both corresponding and co-authors may order offprints at any time via Elsevier's Webshop. Corresponding authors who have published their article gold open access do not receive a Share Link as their final published version of the article is available open access on ScienceDirect and can be shared through the article DOI link.

**AUTHOR INQUIRIES**

Visit the Elsevier Support Center to find the answers you need. Here you will find everything from Frequently Asked Questions to ways to get in touch.

You can also check the status of your submitted article or find out when your accepted article will be published.

© Copyright 2018 Elsevier | https://www.elsevier.com