

Journal: **TREES**

Article Title: **ESTIMATING NUTRIENT UPTAKE BY MATURE TREE ROOTS...**

Article No.: **s00468-007-0160-0**



PDF Proofs

To download your proof, please click on the link below:

- **PDF proof:** [468_2007_160_Author.pdf](#) (539kb)

To Correct your proof online, please click on the link below:

- **Online Proof Corrections**
[Supports Internet Explorer version 5.0 and above, partially supports Mozilla firefox]

To view your Correction, Click on the link below

- [468_2007_160_Author](#)

Supporting Documents

- **Edited Manuscript:** [468_2007_160_DeltaPDF.pdf](#) (217kb)

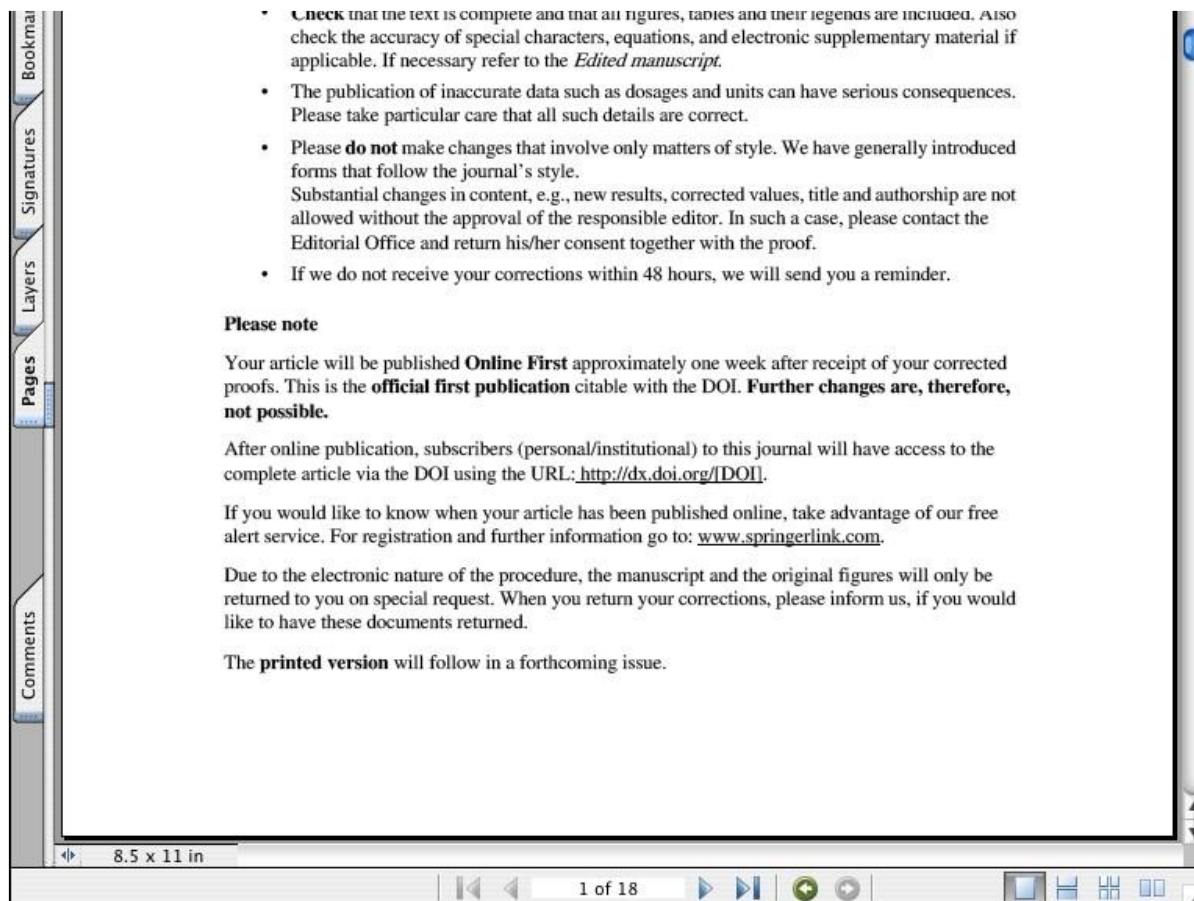
■ In case of any queries, please contact the Production Editor: spr_corrections@sps.co.in

NOTE: You'll need the **FREE Acrobat Reader**  **Acrobat®** to view these PDF files.

Dear Dr/Prof. RuthD. Yanai,


Here are the proofs of your article.

- You can submit your corrections **online** or by **fax**.
- For **online** submission please insert your corrections in the online correction form. Always indicate the line number to which the correction refers.
- For **fax** submission, please ensure that your corrections are clearly legible. Use a fine black pen and write the correction in the margin, not too close to the edge of the page.
- Together with the proof please return the cover sheet (including the *Copyright Transfer Statement*) and the *Offprint Order Form*. They can either be scanned and sent electronically or sent by fax.
- Remember to note the journal title, article number, and your name when sending your response via e-mail, fax or regular mail.
- **Check** the metadata sheet to make sure that the header information, especially author names and the corresponding affiliations are correctly shown.
- **Check** the questions that may have arisen during copy editing and insert your answers/ corrections.
- **Check** that the text is complete and that all figures, tables and their legends are included. Also check the accuracy of special characters, equations, and electronic supplementary material if applicable. If necessary refer to the *Edited manuscript*.
- The publication of inaccurate data such as dosages and units can have serious consequences. Please take particular care that all such details are correct.
- Please **do not** make changes that involve only matters of style. We have generally introduced forms that follow the journal's style. Substantial changes in content, e.g., new results, corrected values, title and authorship are not allowed without the approval of the responsible editor. In such a case, please contact the Editorial Office and return his/her consent together with the proof.



468_2007_160_Author.pdf

Bookmarks
Signatures
Layers
Pages
Comments

Fax to: +44 870 622 1325 (UK) or +44 870 762 8807 (UK)  **Springer**

From: Springer Correction Team
6&7, 5th Street, Radhakrishnan Salai, Chennai, Tamil Nadu, India – 600004

Re: Trees DOI:10.1007/s00468-007-0160-0
Estimating nutrient uptake by mature tree roots under field conditions: challenges and opportunities

Authors: MelissaS. Lucash · DaveM. Eissenstat · J.Devereux Joslin · KarisJ. McFarlane · RuthD. Yanai

I. Permission to publish

Dear Springer Correction Team,
I have checked the proofs of my article and

☐ I have no corrections. The article is ready to be published without changes.
☐ I have a few corrections. I am enclosing the following pages:
☐ I have made many corrections. Enclosed is the complete article.

II. Offprint order

☐ Offprint order enclosed ☐ I do not wish to order offprints

Remarks:

Date / signature _____

III. Copyright Transfer Statement (sign only if not submitted previously)

The copyright to this article is transferred to Springer-Verlag (respective to owner if other than Springer and for U.S. government employees: to the extent transferable) effective if and when the article is accepted for publication. The author warrants that his/her contribution is original and that he/she has full power to make this grant. The author signs for and accepts responsibility for releasing this material on behalf of any and all co-authors. The copyright transfer

Original order enclosed

I do not wish to order originals

Remarks:

Date / signature _____

III. Copyright Transfer Statement (sign only if not submitted previously)

The copyright to this article is transferred to **Springer-Verlag** (respective to owner if other than Springer and for U.S. government employees: to the extent transferable) effective if and when the article is accepted for publication. The author warrants that his/her contribution is original and that he/she has full power to make this grant. The author signs for and accepts responsibility for releasing this material on behalf of any and all co-authors. The copyright transfer covers the exclusive right to reproduce and distribute the article, including reprints, translations, photographic reproductions, microform, electronic form (offline, online) or any other reproductions of similar nature.

An author may self-archive an author-created version of his/her article on his/her own website and his/her institution's repository, including his/her final version; however he/she may not use the publisher's PDF version which is posted on www.springerlink.com. Furthermore, the author may only post his/her version provided acknowledgement is given to the original source of publication and a link is inserted to the published article on Springer's website. The link must be accompanied by the following text: "The original publication is available at www.springerlink.com."

The author is requested to use the appropriate DOI for the article (go to the Linking Options in the article, then to OpenURL and use the link with the DOI). Articles disseminated via www.springerlink.com are indexed, abstracted and referenced by many abstracting and information services, bibliographic networks, subscription agencies, library networks, and consortia.

After submission of this agreement signed by the corresponding author, changes of authorship or in the order of the authors listed will not be accepted by Springer.

Date / Author's signature _____

8.5 x 11 in

2 of 18

□ _____

468_2007_160_Author.pdf		
Metadata of the article that will be visualized in OnlineFirst		
ArticleTitle	Estimating nutrient uptake by mature tree roots under field conditions: challenges and opportunities	
Article Sub-Title		
Journal Name	Trees	
Corresponding Author	Family Name	Yanai
	Particle	
	Given Name	Ruth D.
	Suffix	
	Division	Department of Forest and Natural Resources
	Organization	State University of New York College of Environmental Science and Forestry
	Address	13210, Syracuse, NY, USA
	Email	rdyanai@mailbox.syr.edu
Author	Family Name	Lucash
	Particle	
	Given Name	Melissa S.
	Suffix	
	Division	Department of Forest and Natural Resources
	Organization	State University of New York College of Environmental Science and Forestry
	Address	13210, Syracuse, NY, USA
	Email	
Author	Family Name	Eissenstat
	Particle	
	Given Name	Dave M.
	Suffix	

468_2007_160_Author.pdf

BookmarksSignaturesLayersPagesComments

Journal: 468
Article: 160

Dear Author

During the process of typesetting your article, the following queries have arisen. Please check your typeset proof carefully against the queries listed below and mark the necessary changes either directly on the proof/online grid or in the 'Author's response' area provided below.

Author Query Form

Query	Details required	Author's response
1.	References: Atkinson and Wilson (1979) and Wallander (1997) are cited in text but not listed, please add them to the list or delete their citations.	
2.	Reference: Bledsoe and Rygiewicz (1986) is not cited in the list, please add its citation or delete it from the list.	

many insights, each has drawbacks. Estimates of uptake are affected by the sampling scheme, experimental conditions, whether roots are excised or not, concentrations of ions, and the rate of efflux of ions. Microbes and mycorrhizas can also affect estimates of uptake. A greater focus on methods development is critical to advancing our understanding of nutrient uptake of mature trees under conditions representative of those in the field.

Keywords Efflux · Excision · Ion uptake · Nutrient concentration · Mycorrhizas

A1 Communicated by H. Rennenberg.

A2 M. S. Lucash · R. D. Yanai (✉)
A3 Department of Forest and Natural Resources,
A4 State University of New York College of Environmental Science
A5 and Forestry, Syracuse, NY 13210, USA
A6 e-mail: rdyani@mailbox.syr.edu

A7 D. M. Eissenstat
A8 Department of Horticulture, Pennsylvania State University,
A9 218 Tyson Building, University Park, PA 16802, USA

A10 J. D. Joslin
A11 Belowground Forest Research, Apartado 104-5655,
A12 Santa Elena de Monteverde, Puntarenas, Costa Rica

A13 K. J. McFarlane
A14 Department of Forest Engineering, Oregon State University,
A15 204 Peavy Hall, Corvallis, OR 97331, USA

spacing, number, morphology and physiology heterogeneous, often associated with microbes and mycorrhizal fungi and frequently intertwined with those of other plants. These characteristics make it difficult to accurately measure uptake under conditions representative of those in the field. The most common approach to estimating nutrient uptake by trees has been to construct nutrient budgets, but this technique does not provide any information on processes at the root scale. Measurements of specific root uptake or uptake capacity are required. In this study, we define specific root uptake as the rate of uptake of nutrients per unit root mass and uptake capacity as specific root uptake at non-limiting concentrations. Other parameters are also important for estimating uptake of trees in the field, such as absorptive root surface (Van Rees et al. 1990), buffering capacity (Van Rees et al. 1990) and soil supply of nutrients (Rengel 1993), but are not addressed in this review.

In the past, specific root uptake of trees has been measured primarily using the fine roots of seedlings in solution culture. Results of these studies are difficult to extrapolate to mature trees in the field because roots in solution differ in age, morphology and physiology from those grown in solid media or the field (Skene et al. 1998). Furthermore, roots of seedlings in solution culture are seldom mycorrhizal (Van den Driessche 1971; Ingestad and Lund 1979; Bledsoe and Rains 1981), whereas many trees depend on mycorrhizas to supplement nutrient uptake (Smith and Read 1997). Finally, there is little reason to expect that parameters measured on seedlings will accurately reflect

Springer

	Journal : 458	Dispatch : 2-8-2007	Pages : 12
	Article No. : 140	<input type="checkbox"/> L ^A T _E X	<input type="checkbox"/> TYPSET
	MS Code : 360	<input checked="" type="checkbox"/> C ^P	<input checked="" type="checkbox"/> DISK