

Plant Mineral Nutrient Deficiency: A Hydroponic Alternative Utilizing Nutrient Flow Techniques

Kevin Johnson

Clemson University, 2705 E. Lee Rd., Taylors SC 29687 USA
(kevin7@clemson.edu)

The purpose of this lab experiment is to show the nutrient deficiencies in eight-week old tomato or lettuce plants. Results of the experiment include design methodologies, plant mineral deficiency results, possible errors in nutrient flow technique (NFT) performance, and costs involved. Controlling the growth factors of plants is difficult in a lab setting with students. The variability in the growing medium is limited based on the size of the lab, available equipment, number of students, and budget availability. Using soil to show macronutrient deficiency is almost impossible so the use of hydroponic systems is the most suitable alternative. The (NFT) yields the appropriate nutrient deficiency results in a short turnaround period. With particular design implications, an appropriate hydroponic NFT system can be used to display the teaching prospective of plant mineral deficiency. NFT uses a solubilized nutrient solution which is pumped into a gradient flow reservoir containing exposed roots. The solution is recycled back into the storage container creating a closed loop cycle. The particular macronutrients important to plant growth that are tested include nitrogen, potassium, and phosphorus. The hydroponic systems used in this experiment were specifically designed and built for this laboratory experiment and with student interest in mind. The designs are not only useful in display of mineral deficiency but also present an attractive visual appeal.

Mission, Review Process & Disclaimer

The Association for Biology Laboratory Education (ABLE) was founded in 1979 to promote information exchange among university and college educators actively concerned with teaching biology in a laboratory setting. The focus of ABLE is to improve the undergraduate biology laboratory experience by promoting the development and dissemination of interesting, innovative, and reliable laboratory exercises. For more information about ABLE, please visit <http://www.ableweb.org/>.

Papers published in *Tested Studies for Laboratory Teaching: Peer-Reviewed Proceedings of the Conference of the Association for Biology Laboratory Education* are evaluated and selected by a committee prior to presentation at the conference, peer-reviewed by participants at the conference, and edited by members of the ABLE Editorial Board.

Citing This Article

Johnson, K. 2013. Plant Mineral Nutrient Deficiency: A Hydroponic Alternative Utilizing Nutrient Flow Techniques. Page 321 in *Tested Studies for Laboratory Teaching*, Volume 34 (K. McMahon, Editor). Proceedings of the 34th Conference of the Association for Biology Laboratory Education (ABLE), 499 pages.
<http://www.ableweb.org/volumes/vol-34/?art=27>

Compilation © 2013 by the Association for Biology Laboratory Education, ISBN 1-890444-16-2. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the copyright owner.

ABLE strongly encourages individuals to use the exercises in this proceedings volume in their teaching program. If this exercise is used solely at one's own institution with no intent for profit, it is excluded from the preceding copyright restriction, unless otherwise noted on the copyright notice of the individual chapter in this volume. Proper credit to this publication must be included in your laboratory outline for each use; a sample citation is given above.