



# Plant Production Science

The Crop Science Society of Japan

Available Issues | [Japanese](#) >> [Publisher Site](#)

Author:  [ADVANCED](#) | Volume  Page

Keyword:   |



[TOP](#) > [Available Issues](#) > [Table of Contents](#) > [Abstract](#)

ONLINE ISSN : 1349-1008

PRINT ISSN : 1343-943X

## Plant Production Science

Vol. 8 (2005) , No. 4 397-404

[\[PDF \(501K\)\]](#) [\[References\]](#)

### Regulation of Ammonium Accumulation during Salt Stress in Rice (*Oryza sativa* L.) Seedlings

[Hoai Thi Thu Nguyen](#)<sup>1)</sup>, [Je Sung Shim](#)<sup>2)</sup>, [Katsuichiro Kobayashi](#)<sup>1)</sup> and [Kenji Usui](#)<sup>1)</sup>

1) Environmental Plant Biochemistry Laboratory, Graduate School of Life and Environmental Sciences, University of Tsukuba

2) Department of Environmental Horticulture, University of Seoul

(Received: August 30, 2004)

**Abstract:** Metabolic processes related to ammonium release and assimilation were investigated in a salt-sensitive rice (*Oryza sativa* L.) cultivar Anapurna. Ammonium content of the 3<sup>rd</sup> leaves increased 3-4 times when seedlings were treated with 100 mM NaCl for 6 days under both growth chamber light condition and in darkness (non-photorespiration). An in vitro experiment revealed strong inhibition of protein synthesis as an effect of NaCl on the incorporation of <sup>14</sup>C-leucine into protein. Exposure to salt stress slightly increased leaf proteolytic activity. The increase of proteolytic activity and decrease of protein synthesis, which directly causes accumulation of free amino acids, might lower the need for ammonium incorporation to form amino acids and indirectly cause the excessive accumulation of ammonium. No significant changes in the assimilatory activities of glutamine synthetase (GS; EC 6.3.1.2) and ferredoxin-dependent glutamate synthase (Fd-GOGAT; EC 1.4.7.1) were found under salt stress. Salt treatment changed the balance of the direction of glutamate dehydrogenase (NAD(H); EC 1.4.1.2); the aminating (NADH-GDH) activity increased while deaminating (NAD-GDH) activity decreased. We conclude that the accumulation of ammonium under salt stress was not due to inhibition of assimilatory activity of GS/GOGAT cycle or aminating GDH. Since these enzymes require supply of C-skeleton in the form of 2-oxoglutarate, reductant and energy to function, the reduction of photosynthetic capacity and the decrease of 2-oxoglutarate might be responsible for the excess accumulation of ammonium in salt-stressed seedlings.

**Keywords:** [Glutamate dehydrogenase](#), [Glutamate synthase](#), [Glutamine synthetase](#), [2-](#)

[[PDF \(501K\)](#)] [[References](#)]

Download Meta of Article [[Help](#)]

[RIS](#)

[BibTeX](#)

To cite this article:

Hoai Thi Thu Nguyen, Ie Sung Shim, Katsuichiro Kobayashi and Kenji Usui: "Regulation of Ammonium Accumulation during Salt Stress in Rice (*Oryza sativa* L.) Seedlings". *Plant Production Science*, Vol. **8**, pp.397-404 (2005) .

---

doi:10.1626/pps.8.397

JOI JST.JSTAGE/pps/8.397

Copyright (c) 2005 by The Crop Science Society of Japan

---



---

[Japan Science and Technology Information Aggregator, Electronic](#)

