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ONLINE ISSN : 1349-1008

PRINT ISSN : 1343-943X

Plant Production Science

Vol. 11 (2008) , No. 1 139-145


[\[PDF \(2248K\)\]](#) [\[References\]](#)

Correlation between Chloroplast Ultrastructure and Chlorophyll Fluorescence Characteristics in the Leaves of Rice (*Oryza sativa* L.) Grown under Salinity

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(Received: February 5, 2007)

Abstract: The seedlings of *Oryza sativa* L. cv. Nipponbare grown by hydroponic culture for 3 wks were treated with 75, 100, 150 and 200 mM NaCl for 14, 14, 6 and 3 days, respectively, and examined for chloroplast ultrastructure in the region where chlorophyll fluorescence had been recorded. NaCl treatment decreased the ratio of variable to maximum chlorophyll fluorescence yield (F_v/F_m) and caused swelling of thylakoids. The swelling of thylakoids was quantified by the percentage of the length of swollen thylakoids to the total length of thylakoids. This value was increased with increasing NaCl concentration. Although F_v/F_m decreased at all concentrations of NaCl, the minimal fluorescence yield F_0 was not increased by the treatment with 75 or 100 mM NaCl. The percentage of the length of swelling was low at 75 and 100 mM NaCl. On the other hand, F_0 increased and the swelling of thylakoids was prominent with 150 and 200 mM NaCl treatment. These results suggest that the decrease in F_v/F_m due to the increase in F_0 under salt stress correlates with the ultrastructural damage. The decrease in F_v/F_m due to the increase in F_0 is expected to be useful as an indicator to evaluate the damage in chloroplasts, especially in thylakoid membranes, under salinity.

Keywords: [Chlorophyll fluorescence](#), [Chloroplast](#), [Rice \(*Oryza sativa* L.\)](#), [Salt stress](#), [Ultrastructure](#)

To cite this article:

Koji Yamane, Michio Kawasaki, Mitsutaka Taniguchi and Hiroshi Miyake: "Correlation between Chloroplast Ultrastructure and Chlorophyll Fluorescence Characteristics in the Leaves of Rice (*Oryza sativa* L.) Grown under Salinity". Plant Production Science, Vol. **11**, pp.139-145 (2008) .

doi:10.1626/pp.s.11.139

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