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ONLINE ISSN : 1349-1008

PRINT ISSN : 1343-943X

Plant Production Science

Vol. 8 (2005) , No. 1 38-43



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Effects of Excess Magnesium on the Growth and Mineral Content of Rice and *Echinochloa*

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(Received: May 13, 2004)

Abstract: The tolerance of three cultivars of rice (*Oryza sativa* L.) and three species of the genus *Echinochloa* to excess magnesium was examined in solution culture. In *Echinochloa* species, excess $MgCl_2$ or $MgSO_4$ in the culture solution (30 mM) reduced the growth to 33-42% of that in the control plants and caused symptoms resembling those of calcium deficiency. In rice cultivars, however, excess Mg in the culture solution reduced the growth only to 54-67% of that in the control and did not cause the symptoms like those of Ca deficiency. The effect of excess Mg on the mineral contents of plants differed between rice (Nipponbare) and *Echinochloa oryzicola*. The Mg content of the whole plants in rice increased in proportion to $MgCl_2$ concentration in the culture solution up to 30 mM, while that in *E. oryzicola* leveled off when $MgCl_2$ concentration exceeded 10 mM. The excess $MgCl_2$ treatment greatly reduced the calcium content of the whole plants in *E. oryzicola* and slightly in rice. In rice, the excess Mg treatment increased the Mg content of shoots and roots, and the potassium and chloride contents of roots, but slightly decreased the Ca and K contents of shoots. In *E. oryzicola*, the excess Mg treatment increased the K and Cl contents of shoots and the Mg and K contents of roots, and slightly increased the Mg content of shoots, but greatly decreased the Ca content of shoots. These results indicate that rice is more tolerant than *Echinochloa* to excess Mg and that the tolerance is related to Ca deficiency.

Keywords: [Barnyard grass](#), [Early watergrass](#), [Japanese millet](#), [Magnesium](#), [Rice](#), [Salinity tolerance](#)

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To cite this article:

Hidekazu Kobayashi, Yoshikuni Masaoka and Setsuro Sato: "Effects of Excess Magnesium on the Growth and Mineral Content of Rice and *Echinochloa*". Plant Production Science, Vol. **8**, pp.38-43 (2005) .

doi:10.1626/pps.8.38

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