

ALUMINUM TOXICITY AND PHOSPHORUS UPTAKE IN CORN. II. NITROGEN SUPPLIED AS AMMONIUM

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There is evidence that tolerance to the Al toxicity is associated with P absorption capacity of plants (Foy & Brown, Soil Sci. Soc. Am. Proc. 28: 27, 1964). The N source, however, affects both the Al toxicity (Cunha Filho, XIII Reun. Bras. Milho e Sorgo, p. 113, 1980) and the P absorption (Miller, Plant Root and Its Environment, p. 646, 1974).

Two corn lines considered tolerant to the Al toxicity (CMS 153 and CMS 297) and two considered sensitive (CMS 244 and CMS 408) were grown, from the 10th to the 23th day after germination, in a nutritive solution containing ammonium as the N source, and whose pH was corrected to the initial value of 4.6 every other day. The additional Al 0.22 mM to the nutritive solution did not alter the inorganic P (Pi), lipids bound P (Pl), nucleic acids bound P (Pa), proteins P (Pp) and total P (Pt) concentrations in the upper part of the plants. A second experiment was conducted with the following modifications: The considered sensitive CMS 408 line was substituted for the CMS 407 line; the lines were grown in the nutritive solution from the 5th to the 24th day after germination; and no correction was made in the nutritive solution pH. In these new conditions the Al caused the following alterations: The CMS 297 and CMS 408 lines increased P concentrations for each parameter; the CMS 153 line increased Pp concentration; and the CMS 244 line decreased Pi and Pt concentrations. The tolerant lines could not be distinguished from the sensitive lines for any of these alterations if the procedure used for classifying the lines in regard to Al toxicity is acceptable (see previous summary). Nevertheless, when Al was beneficial to rice the Al-tolerant cultivars showed greater growth stimulus than the Al-sensitive ones (Howeler & Cadavid, Agron. J. 68: 551, 1976). If a similar association proves to be true for the corn lines and P concentrations the CMS 297 and CMS 408 lines might be classified as Al-tolerant, and the CMS 153 and CMS 244 as Al-sensitive.

The results suggest that further research should be carried out to determine the mechanism involved in the cases where Al favors or impairs P uptake, and if these responses by plants are correlated to the characteristics of Al tolerance or sensitiveness.

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