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HAS THE "IONIC EFFECT" A ROLE IN PLANT SALT TOLERANCE?

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Recent studies have shown that xylem hydraulic conductance (Kx) is enhanced by increase in xylem sap cation concentration. This phenomenon (hereafter named 'ionic effect') would be caused by shrinking of the pectic matrix in the intervessel pit membranes and consequent increase in the dimensions of pores in them. The ionic effect has been described in different species and seems to play important functional roles in *planta* like compensation for Kx loss induced by xylem embolism and modulation of water delivery to branches exposed to different light conditions. This study reports experimental evidence of the potential role of the ionic effect on plant resistance to salinity

Measurements were performed in plants of *Solanum lycopersicum* L. cv Naomi, a moderate salt-tolerant species. Plants were either grown in half-strength Hoagland hydroponic solution (Control plants, C) or in the same solution enriched with 35mM NaCl (NaCl- plants).

Salt treatment induced increase of leaf succulence as well as of fruit dry mass whilst leaf conductance to water vapour (g_L) and evapotranspiration rate (E_L) were similar for both growth conditions.

Potassium and sodium concentrations as recorded in the xylem sap were higher in plants subjected to salt treatment thus suggesting that increase in external [Na+] favoured K+ uptake. An increase of hydraulic conductance (DKh) of about 10% was recorded in shoots of C-plants when perfused either with 25 mM NaCl or with 25 mM KCl solutions. Shoots of NaCl-plants when perfused with the above solutions gave substantially higher DKh values with respect to control plants. Accordingly, Kx was higher in NaCl- than in C-plants using the evaporative flux method.

In conclusion, tomato plants grown under high salinity seemed to improve water transport to the leaves through Na^+-mediated enhancement of stem hydraulic conductance.

Preliminary observations under microscope suggest that the ionic effect recorded in NaCl-treated plants resulted in increased volume of leaf cells. This may facilitate Na^+ segregation in vacuoles with the final consequence of better tolerance of salt stress conditions.

Present findings would confirm that the ionic effect has potentially important functional implications for plant interaction with environmental factors.