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STOMATAL AND NONSTOMATAL COMPONENTS TO INHIBITION OF PHOTOSYNTHESIS IN LEAVES OF SUGAR BEET PLANTS UNDER SALT STRESS

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ABSTRACT

Sugar beet (*Beta vulgaris* L.) plants grown in sand culture were gradually exposed to different levels of salinity (0, 50, 150, 250, and 350 mM, NaCl + $CaCl_2$ in 5:1 molar ratio) and photosynthetic rates of individual attached leaves were measured during salinisation period at external CO_2 concentrations ranging from approximately 70 to 1500 µmol CO_2 mol^{-1} air. Salinity dramatically decreased net photosynthesis (A_{CO2}) and stomatal conductance (g_s). Net photosynthesis was plotted against computed leaf internal CO_2 concentration (C_i), and the initial slope of this A_{CO2}-C_i curve was used as a measure of photosynthetic ability. Leaves from plants exposed to 50 mM salinity showed little change in photosynthesis, whereas those treated to high levels of salinity had up to 91.5% inhibition, with increase in CO_2 compensation point. Leaves appeared healthy and leaf chlorophyll content increased with increasing salinity. Although partial stomatal closuer occurred with salinisation but reductions in photosynthesis were partly non-stomatal at high levels of salt treatment. Photosynthetic ability was inversely related to the concentration of either Na^+ and Cl^- in the leaf laminas sampled at the end of experimental period.

Key words: Photosynthetic ability, Salt stress, Stomatal conductance, Sugar beet.

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