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 + CaCl₂ in 5:1 molar ratio) and photosynthetic rates of individual attached leaves were measured during salinisation period at external CO₂ concentrations ranging from approximately 70 to 1500 μmol CO₂ mol⁻¹ air. Salinity dramatically decreased net photosynthesis (Aₐ) and stomatal conductance (gₛ). Net photosynthesis was plotted against computed leaf internal CO₂ concentration (Cᵢ), and the initial slope of this Aₐ-Cᵢ 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 CO₂ compensation point. Leaves appeared healthy and leaf chlorophyll content increased with increasing salinity. Although partial stomatal closure 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 laminae sampled at the end of experimental period.

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

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