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Effects of salinity on photosynthetic physiology and chlorophyll fluorescence characteristics of mulberry (*alba*) seedlings.

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Abstract : Pot experiments were conducted to investigate the effects of salt stress on the photosynthetic physiology and chlorophyll fluorescence characteristics of 1-year-old mulberry (*Morus alba*, Shishengsang) seedlings which adapted to the Yellow River and northwestern areas in China. The seedlings were treated with NaCl concentrations of 1, 3, 5 and 7 g/kg, and with fresh water as the control. By using LI-COR 6400 photosynthesis system and PAM-2100 portable pulse-modulated chlorophyll fluorescence system, the net photosynthetic rate (P_n), stomatal conductance (G_s), intercellular CO₂ concentrations (C_i), transpiration rate (T_r) and other indexes were measured on the 2nd, 3rd, 7th and 21th day after salt stress treatments. The results showed that a low salinity in NaCl concentration of 1 g/kg had no significant impact on P_n of mulberry seedlings, but it significantly inhibited P_n under treatment with NaCl concentrations of 3 and 7 g/kg, especially the effects of salt in NaCl concentration of 5 and 7 g/kg were greater. Moreover, P_n gradually decreased as NaCl concentration increased. The salt had no significant effects on G_s , C_i , T_r and water use efficiency (WUE) under treatments with NaCl concentrations of 1 and 3 g/kg, however G_s , T_r and WUE decreased but C_i significantly increased when the mulberry seedlings were treated with NaCl concentration of 5 and 7 g/kg. Moreover, the salinity had impact on the parameters of chlorophyll fluorescence of mulberry seedling leaves. During the experiments, the original fluorescence (F_0) showed a declining trend, but non-photochemical quenching of fluorescence (NPQ) were at first increased and then decreased with the increment of NaCl concentration, however, the differences in NPQ under various salt stress treatments were not significant. However, salt stress significantly affected the maximal fluorescence (F_m), original light energy transduction efficiency (F_v/F_m), PS II latent activity (F_v/F_0) and quantum yield of PS II electron transport (qPS II) of mulberry seedling leaves under treatments with NaCl concentrations of 3, 5 and 7 g/kg, but F_m , F_v/F_m , F_v/F_0 and qPS II significantly declined when treated with NaCl concentrations of 5 and 7 g/kg. It denoted that NaCl critical concentration of mulberry seedlings was between 3 and 5 g/kg.

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