Impact of saline groundwater irrigation on net assimilation in *Cucumis melo* cv. Huanghemi in north-western China

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Abstract

Groundwater salinization is a critical environmental problem, significantly hindering agricultural production. However, saline groundwater could represent the only available resource for irrigation in arid and semiarid regions. Thus, investigating its impacts on crops is crucial to address the challenge of maintaining agricultural productivity and sustainable development.
The aim of this open field experiment was to study net assimilation in melon crop (*Cucumis melo* L. cv. Huanghemi), cultivated in the Minqin Oasis, in response to water saline content. Effects of leaf age and leaf temperature were studied as well. Net assimilation was studied in terms of light response curve parameters (R_d dark respiration; A_{Nmax} maximum photosynthetic rate; Q_{app} 'apparent' light efficiency) obtained imposing eight light intensity levels. Two saline water concentrations were evaluated: 0.8 and 5 g L^{-1} with a conductivity equal to 1.00 and 7.03 dS m^{-1} respectively. The saline concentrations of the higher conductivity level were obtained reproducing the actual saline concentration in groundwater experienced in progressively expanding areas in Minqin Oasis, differing in ionic composition as well. Measurements were conducted during fruit maturation period (44 and 49 days after transplanting-DAT) when 1.708 m^3ha^{-1} have been restored in 4 applications (10, 23, 36, and 48 DAT).
The net assimilation light response curve showed the typical asymptotic response and, among the function coefficients, exclusively A_{Nmax} was significantly affected by leaf age, leaf temperature and their interactions, and, in particular, it resulted higher in the younger leaves, and in the colder leaf temperature conditions. In spite of the effects of leaf age and temperature on net assimilation, dark respiration appeared not affected by the studied factors.
None of the light response curve parameters were influenced by actual groundwater salinity levels, during the studied crop growth period (60% of the whole cycle).