الملخص الإنجليزي للبحث رقم ٤

عنوان البحث باللغة الإنجليزية :

Exploring the reinforcing effect of nano-potassium on the antioxidant defense system reflecting the increased yield and quality of salt-stressed squash plants.

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ABSTRACT:

To explore the reinforcing effects of nano-potassium fertilizer (nano-K) on growth, yield and quality, physiobiochemical responses, antioxidant defense systems, antioxidant gene expressions, and nutrients of salt-stressed squash plants, field experiments were performed using normal (EC = 2.34 dS m^{-1}) and saline (EC = 9.38 dS m^{-1}) soils during the 2021 and 2022 seasons. The traditional recommended K at full dose (TRK100) or half dose (TRK50) was used in both soils. Salinity and/or TRK50 significantly decreased photosynthetic pigment contents (by 8.7- 22.5%), photosynthetic efficiency (by 6.0- 0.9%), relative water content (RWC by 5.0- 5.1%), membrane stability index (MSI by 7.2- 7.4%), nutrient contents (by 28.4- 48.2%), K^{+}/Na^{+} ratio (by 66.4- 67.1%), which contributed to the decrease in growth (by 12.2- 25.8%) and yield traits (by 4.2- 28.5%), and fruit quality (by 8.5- 19.7%) due to an increment of oxidative stress biomarker ($O_2^{\bullet-}$ by 32.4- 52.9% and H2O2 30.4- 57.1%) levels, electrolyte leakage (EL by 23.3- 24.5%), malondialdehyde (MDA by 71.4- 77.6%), and Na^{+} (by 55.5- 56.9%). Under stress in both soils, foliar-applied 0.50 g nano-K L^{-1} suppressed the levels of $O_2^{\bullet-}$, H2O2, MDA, EL, and Na^{+} , while noticeably increased photosynthetic pigment contents, hotosynthetic efficiency, RWC, MSI, nutrient contents, K^{+}/Na^{+} ratio, which were positively reflected in growth and yield traits, and fruit quality due to increased osmoprotectant and low-molecular-weight antioxidant contents, antioxidant enzyme activities and enzymatic gene expressions. Therefore, our findings recommend using nano-K as an effective strategy to promote antioxidant and photosynthetic machineries, minimize oxidative stress biomarkers and Na^{+} levels, boost tolerance to salt stress, and improve squash yield and yield quality under salt stress.