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NITRIC OXIDE-MEDIATED MODULATION OF BIOCHEMICAL RESPONSES AND LEAF SPOT DISEASE PROGRESSION IN DATE PALM (*Phoenix dactylifera* L.) UNDER DROUGHT STRESS

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ABSTRACT

This study investigates the role of sodium nitroprusside (SNP) in enhancing drought tolerance and mitigating leaf spot disease in date palm (*Phoenix dactylifera* L.). Three SNP concentrations (0, 75, and 150 µM) were applied under progressive drought stress (1, 3, and 6 weeks). The results showed that drought stress significantly increased oxidative stress markers, including malondialdehyde (MDA) and hydrogen peroxide (H_2O_2), while SNP, particularly at 150 µM, reduced their levels. Additionally, SNP treatment enhanced antioxidant enzyme activities (catalase and peroxidase). SNP also reduced the severity of leaf spot symptoms caused by *Alternaria alternata*, limiting lesion size. These findings suggest that SNP modulates physiological and biochemical responses to drought stress, improving plant defense and disease resistance. Thus, SNP application could be a promising strategy to support the long-term viability of date palm cultivation, particularly in arid regions.

Keywords: Antioxidant enzymes, Oxidative stress, Plant disease