

Response of Plant Pigments and Some Growth Indicators of Date Palm Offshoots to the Combined Effect of Cadmium and Nickel

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Abstract

This study evaluated the combined effect of Cadmium at concentrations (0, 5 and 10 mg kg⁻¹) and Nickel at concentrations (0, 20 and 40 mg kg⁻¹) on plant pigments and some growth indicators of date palm sap, Al-Sayer variety. Shoot height, concentration of chlorophyll and Carotene pigments, dry weight to leaves, leaf area, trunk diameter in shoot, length and weight of roots and pollution resistance index were evaluated. The results showed significant differences in the combined effect of Cadmium and Nickel on the studied treatments. The treatment (Cadmium 10 mg kg⁻¹ + Nickel 40 mg kg⁻¹) with high concentrations resulted in a significant decrease in plant pigments and indicators of vegetative and root growth compared to the treatment A, This caused a decrease in the above indicators, which amounted to (41.13 cm, 3.88mg100gm⁻¹, 1.22 mg100gm⁻¹, 5.64 g , 42.09 cm² , 6.21 cm , 26.82 cm , 2.13 g and 70.15%) respectively, compared with the treatment A, which gave the best results for the same studied indicators, This study contributed to the evaluation of the leaf content of plant pigments and some vegetative and root growth indicators of date palm offshoots of the Sayer c.v. growing under Cadmium and Nickel stress conditions. These were taken as significant indicators to assess the severity and intensity of heavy metal stress. So, we recommend further comprehensive studies on a larger scale on other plants and at other concentrations in order to understand the strategies that plants exhibit to reduce the damage of heavy metal stress and its effects on their cultivation and growth development.

Keywords: Date palm, Cadmium, Nickel, Chlorophyll, Carotene.

1- Introduction

Fruit of date palm One of the first plants to be cultivated, *Phoenix dactylifera L.* is native to the Arabian Peninsula and is part of the Arecaceae or Palmae family. Ajwa, Khalas, Ruthana, Sukkari, Safri, Saq'i, Khadrawi, Lulu, Hilali, and Manifi constitute some the more than 2000 different types of dates (1,2). Because they tend to bioaccumulate in addition to acting as a stressor

resulting in larger economic losses, high concentrations of all essential and non-essential heavy metals in soil and water from mining operations, energy and fuel production, energy transportation, intensive agricultural practices, sludge, the dumping of industrial wastewater, and military operations have increased toxicity and growth inhibitors in a majority of plants.(3). Cadmium is an important environmental