

Effect of Water Quality on the Efficacy of Acaricides against *Oligonychus afrasiaticus* on Date Palm (*Phoenix dactylifera* L.)

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Received 8th January 2026; Accepted 1st June 2026; Available online 29th June 2026

Abstract: The objective of the study was to assess the influence of water quality on the efficacy of some acaricides against *Oligonychus afrasiaticus* (McGregor). Four acaricides (Spiromesifen, Fenpyroximate, Abamectin and Pyridaben) were selected for their field relevance and different modes of action, and were prepared in three types of water (well water, Tap water and Reverse Osmosis water). The following physicochemical parameters of water were measured before the experiments: pH, electrical conductivity (EC), total dissolved solids (TDS), calcium, magnesium and total hardness. Mite mortality under laboratory condition was evaluated at four exposure intervals (12, 24, 36, and 48 h) for larvae, nymphs, and adults. The results indicated that Spiromesifen exhibited the highest efficacy among the tested acaricides. when prepared in, reverse osmosis (RO) purified water (pH: 7.08; EC: 0.07 dS m⁻¹; TDS: 46.20 mg L⁻¹; Ca⁺²: 1.12 mg L⁻¹; Mg⁺²: 0.72 mg L⁻¹; Total hardness: 5.75 mg L⁻¹ as CaCO₃), Spiromesifen achieved mortality rate of 86.17%, 87.22% and 88.24% for larvae, nymphs and adults, respectively, after 48 h. In contrast, the efficacy of Spiromesifen significantly declined when prepared with well water (pH: 8.10; EC: 12.28 dS m⁻¹; TDS: 7862.2 mg L⁻¹; Ca⁺²: 1270 mg L⁻¹; Mg⁺²: 950 mg L⁻¹; Total hardness: 7070 mg L⁻¹ as CaCO₃), resulted in lower mortality rates of 64.15%, 65.25% and 66.23%, respectively. These findings demonstrated that physicochemical properties of water particularly hardness and dissolved ion content have a significant impact on the effectiveness of the acaricides at all life stages of *O. afrasiaticus*. Improving water quality during acaricide preparation may greatly improve the performance of the date palm mite control program.

Keywords: Acaricide, Date palm dust mite, Integrated pest management, Mortality percent, Water hardness

Introduction

Date palm (*Phoenix dactylifera* L.) is an economically and culturally pivotal fruit crop in dry and semi-dry regions, especially in the Middle East and North Africa (Al-Habsi, 2025). Date palm production is often affected by numerous pests, including the date palm dust mite, *Oligonychus afrasiaticus*

(McGregor), that is ranked among the most destructive. This mite attacks developing fruits, inflicting heavy damage which results in fruit quality deterioration and loss of market value, particularly in hot and dry climatic conditions (Bennour *et al.*, 2020). Chemical control is still the most effective