



## Research Article

# Evaluation of the Effectiveness of Spraying Nano-Silica and Aqueous Rice Extract to Alleviate the Phenomenon of Redness to Barhi Cultivar Date Palm Fruits under Basrah Conditions, Iraq

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**Abstract** | Severe changes in climate over the past three years have caused various problems for palm orchards in Basrah, Iraq. One of the main challenges has been the phenomenon of redness and immaturity of the fruits. Therefore, this study was conducted to determine the effect of spraying nano-silicone (0, 250, and 500) mg. L<sup>-1</sup>, and rice water extract (0, 50 and 100%) help alleviate and reduce this phenomenon. The results showed that using aqueous rice extract at a concentration of 100% was the most effective treatment, improving most physical and chemical characteristics of the fruit compared with the comparison treatment. However, the comparison treatment had a higher sucrose percentage and water content. The results of the anatomical analysis showed that the nano-silicone (Nsi) 250 mg.L<sup>-1</sup> spray treatment was significantly better than other treatments in terms of the thickness of the outer layer of the fruit and the number of vascular bundles. On the other hand, treatment with 100% aqueous rice extract was significantly better in terms of the number of tannin layers and pulp cells. The Nsi-500 mg.L<sup>-1</sup> spray treatment performed well in increasing the thickness of the inner pulp layer. There were no significant differences between the spray and control treatments in the other anatomical characteristics of the fruits. The above results demonstrated the significant role of nanosilica and rice water extract in improving fruit characteristics and quality by alleviating the side effects of climate change in Basrah Governorate.

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## Introduction

*Phoenix dactylifera* L. palm is a crucial evergreen fruit that grows in subtropical regions. It is widely cultivated in Iraq and some parts of the Middle East, because it holds significant economic

value (Barreveld, 1993). This blessed tree has played a vital role in Mesopotamian civilization because of its importance. The cultivation of palm trees is a crucial aspect of Iraq's agricultural environment. In Iraq, the Barhi date is a significant and well-known variety. It ripens early and produces a fruit with a sweet and