

Correction

Correction: Salomón-Torres et al. Effects of Pollen Storage on Physiological Quality and Reproductive Performance in Date Palm (*Phoenix dactylifera* L.): A Systematic Review and Meta-Analysis. *Horticulturae* 2026, 12, 475

Ricardo Salomón-Torres ^{1,*}, Mohammed Aziz Elhoumaizi ², Glenn C. Wright ³,
Abdelouahhab Alboukhari Zaid ⁴, Yohandri Ruisanchez-Ortega ¹, Fidel Núñez-Ramírez ⁵
and Laura Samaniego-Sandoval ¹

- ¹ Unidad Académica San Luis Río Colorado, Universidad Estatal de Sonora, San Luis Río Colorado C.P. 83500, Sonora, Mexico; yohandri.ruisanchez@ues.mx (Y.R.-O.); laura.samaniego@ues.mx (L.S.-S.)
- ² Laboratory for Agricultural Productions Improvement, Biotechnology and Environment (LAPABE), Faculty Sciences, University Mohammed First, BP-717, Oujda 60000, Morocco; elhoumaizi@yahoo.fr
- ³ School of Plant Sciences, University of Arizona, Yuma Agriculture Center, Yuma, AZ 85364, USA; gwright@ag.arizona.edu
- ⁴ Khalifa International Award for Date Palm and Agricultural Innovation, Abu Dhabi P.O. Box 3614, United Arab Emirates; abdelouahhabz@diwan.gov.ae
- ⁵ Instituto de Ciencias Agrícolas, Universidad Autónoma de Baja California, Mexicali C.P. 21705, Baja California, Mexico; fidel.nunez@uabc.edu.mx
- * Correspondence: ricardo.salomon@ues.mx

The authors would like to make the following corrections to the published paper [1]. The changes are as follows:

Text Correction

In the original publication [1], the authors have revised the Abstract to improve the clarity and structure of the summary in accordance with PRISMA item 2 (“Provide a structured summary including background, objectives, methods, results and conclusions.”).

The revised paragraph now explicitly includes:

Abstract

Date palm (*Phoenix dactylifera* L.) production relies on the availability of viable and physiologically active pollen during female flowering, making pollen storage an important strategy to overcome flowering asynchrony and ensure effective artificial pollination. This study aimed to systematically review and quantitatively synthesize the effects of pollen storage conditions on pollen physiological quality and reproductive performance in date palm. Following PRISMA guidelines, 22 experimental studies were included in the qualitative synthesis, and comparable quantitative datasets were used for meta-analysis. Acetocarmine staining, the most commonly used method for assessing pollen stainability across studies, was selected as the standardized indicator of pollen stainability. Multilevel random-effects meta-regression models were applied to evaluate temporal deterioration patterns over storage periods of up to 24 months, while standardized forest plot meta-analyses were used to estimate pooled effects after 12 months of storage. The results showed a strong temperature-dependent decline in pollen physiological quality. Acetocarmine stainability declined by -6.41 , -3.10 , -2.62 , and -2.24% month⁻¹ under ambient, refrigerated, mild freezing, and moderate freezing conditions, respectively, whereas germination declined by



Received: 9 June 2026

Accepted: 12 June 2026

Published: 16 July 2026

Copyright: © 2026 by the authors.

Licensee MDPI, Basel, Switzerland.

This article is an open access article distributed under the terms and conditions of the [Creative Commons Attribution \(CC BY\)](https://creativecommons.org/licenses/by/4.0/) license.

−6.77, −1.86, −3.14, −1.09, and −1.05% month^{−1} under ambient (23–25 °C), refrigerated (4–5 °C), mild freezing (−5 °C), moderate freezing (−20 °C), and deep freezing (−80 °C) conditions, respectively. After 12 months of storage, stainability, germination, and fruit set were significantly reduced relative to fresh pollen, while final fruit weight was not significantly affected. These findings suggest that pollen deterioration primarily affects fertilization success rather than subsequent fruit development. Overall, the available evidence supports low-temperature storage as the most effective strategy for preserving date palm pollen functionality. Refrigerated storage around 4 °C appears to provide a reliable and accessible option for short- to medium-term pollen preservation, whereas freezing conditions may be advantageous for longer storage periods when moisture control and thawing procedures are properly managed.

Also, the *PRISMA checklist* needs to be moved from the unpublished materials into the Supplementary Materials, and it requires proper citation within the main text. Therefore, in Section 2.4. Study Selection, the citation of the Supplementary Materials has been added. The specific modifications are as follows:

Text Correction

Finally, 15 studies from Scopus and seven additional studies identified through Google Scholar were integrated. Web of Science did not contribute any additional eligible studies (beyond duplicates) because they did not meet the search criteria. In total, 22 studies (k = 22) were included for the qualitative synthesis, and the subset with comparable data was used for the quantitative synthesis (meta-analysis). The complete process flow is presented in Figure 1 (PRISMA diagram), and the PRISMA checklist is provided in the Supplementary Materials (Table S3). The included studies are summarized in Table 1, with their characteristics and extracted variables.

Supplementary Materials Correction

The following supporting information can be downloaded at <https://www.mdpi.com/article/10.3390/horticulturae12040475/s1>: Table S1: Methodological quality assessment of the studies selected from the systematic review. Table S2: Quantitative dataset extracted from the studies included in the systematic review. For each study, storage condition, storage duration, evaluation method, outcome, and reported value were recorded. Reference numbers correspond to the reference list in the main manuscript. The last column indicates whether each study-condition-method-outcome combination was included in the quantitative meta-analysis based on comparability criteria. Table S3: PRISMA checklist.

The authors state that the scientific conclusions are unaffected. This correction was approved by the Academic Editor. The original publication has also been updated.

Reference

1. Salomón-Torres, R.; Elhoumaizi, M.A.; Wright, G.C.; Zaid, A.A.; Ruisanchez-Ortega, Y.; Núñez-Ramírez, F.; Samaniego-Sandoval, L. Effects of Pollen Storage on Physiological Quality and Reproductive Performance in Date Palm (*Phoenix dactylifera* L.): A Systematic Review and Meta-Analysis. *Horticulturae* **2026**, *12*, 475. [[CrossRef](#)]

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.