

ABSTRACT FOR GENERAL PUBLIC.

The use of new technologies in research work and scientific experimentations is of great importance, for scientists and researchers, in obtaining well-founded, objective, rapid and reliable results. In this context, the present project proposes to integrate "technology based on image analysis and machine learning algorithms" in the determination of the properties and quality criteria of dates (*Phoenix dactylifera* L.) in four states: fresh, dried, chilled and frozen.

On the one hand, the choice of the aforementioned technology is justified by its rapidity, its principle based on the non-destruction of samples, its low cost and its proven results on other fruits and vegetables. On the other hand, choice of date fruits is justified (i) by the quantitative and qualitative importance of this fruit specie on a global scale and (ii) by the lack of scientific work undertaken on "date fruits" in relation with technologies based on image analysis and machine learning algorithms.

Thus, the present project aimed to assess date fruits quality under drying, as an important post-harvest treatment, and different storage conditions, using innovative models based on image texture parameters. To reach this objective, 4 interconnected workpackages will be realized:

WP1. Determination of micro/macro structure, morphological characteristics, biochemical properties, surface texture, thermal, mechanical, sorption, and optical properties of fresh date fruits and subjected to selected drying techniques.

WP2. Assessment the changes in deep features, geometric, color and texture parameters of the outer surface of date fruit images obtained using a digital camera and a flatbed scanner as a result of different cold and freezing storage conditions.

WP3. Determination of the effect of the combination of cold and/or freezing storage conditions and selected drying techniques on (i) preserving and maintaining biochemical quality of date fruit under 10 months of storage and (ii) on the changes in the features of date fruit images obtained using a digital camera and a flatbed scanner.

WP4. Development of predicting models of date fruits ability under cold/freezing storage based on data obtained from image analysis (potential relationship between date fruit ability under cold/freezing storage and images analyses features).

In its execution, the project will be based essentially on the combined expertise of (i) the PI in storage behaviors of date fruits and of (ii) the Mentor in the image analysis and machine learning approaches in quality evaluation of fruits and vegetables. This expertise will benefit, during the 2 years of the project, from the entire infrastructure of the National Institute of Horticultural Research in Skierniewice and the various equipment which hosts this institute; and which will be reinforced, based on the allocated funds, by any other material and scientific tool essential to reach the objectives of the project.

The results generated by the project will be disseminated through (i) internal seminars with PhD students and host institution staff, (ii) participation in national and international congresses and conferences, (iii) publication of at least 5 articles in specialized journals with high impact factor, (iv) scientific exchanges with scientific and technical staff of secondment institution and finally (v) through concrete actions of dissemination of the scientific package (acquired during this project) in the PI institute and other southern institutes of research and high education.

Keywords.

Dates (*Phoenix dactylifera* L.) – Quality – Drying – Storage – Cooling – Freezing – Image analysis – Machine Learning.