Morphological and anatomical comparison of leaves of date palm cultivars (*Phoenix dactylifera* L) grown in the southeastern region (Algeria)

Laouedj Hacene , Kheraze Khaled 2,Ghemam Amara Djilani 1 , Keddour Abdelbaset.
Laboratory of Biology, environment and health - University of El Oued1
Higher school of teachers El Kouba 2
Email :soufhacene@gmail.com

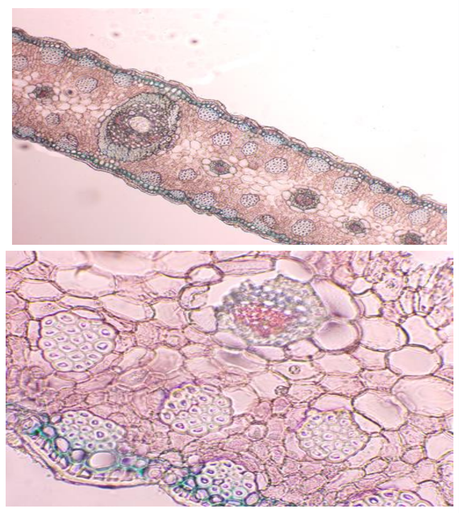
Abstract
This study was carried out in the laboratory of the Faculty of Natural and Life Sciences at the University of ElOued. Where this work aims to study the anatomical comparison for leaves from the date palm of five varieties (Garess, Hamraya, Deggla Bidha, Deggla Nour, Tekermist) and cultivated in the area EL-oued, Through a morphological description (Length and width of the frond, yield) and anatomical study (the diameter of the leaf, Diameter of the large, medium and small vascular bundle, the diameter of the large fibrous bundle, the number of fibrous bundle between the two large bundles, the number of small and medium vascular bundles between the two large bundles, The area of the primary and secondary wood in the large beam, the thickness of the epidermis and waxy layer and the middle tissue). Through the results obtained, it was found that the Hamraya variety achieved the highest yield in the number of inflorescences per palm tree, This variety (Hamraya) was characterized by the largest number of medium vascular bundles compared to other varieties, It was also characterized by the smallest thickness of the waxy layer, the diameter of the medium vascular bundle as well as the diameter of the large fibrous bundle, As for the rest of the studied characteristics, they differed between the largest and the smallest compared to the other varieties.
Mots clés: dates palm (*Phoenix dactylifera* **L**), morphological traits, leaf anatomy.

Introduction
The leaf plays an essential role in plants because it is the main organ dedicated to carrying out the process of photosynthesis. To this end, the leaf is usually flat and thin, exposing the greatest possible surface area and the greatest amount of chlorophyll-containing cells to sunlight and allowing light to penetrate all of the leaf tissue. The leaf is also responsible for respiration, transpiration and excretion. It also has great importance in influencing the growth rate of the plant, its size and the structure of its organs on the one hand, and on the speed of its entry into its different phenological components steps on the other hand. Therefore, this study came with the aim of comparing the anatomical and morphological comparison of the leaves of certain Phoenix dactylifera date palm cultivars to know the differences in the cell layers and tissues that make up the leaf, which are reflected in the genetic differences. and the yields of these cultivars and the influence of growing medium and surrounding conditions.

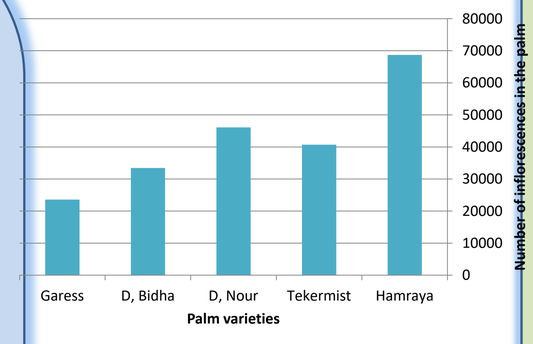
Materials and Methods
For this experiment, 5 cultivars of date palms (Phoenix dactyliferaL) were chosen, as follows: (Garess, Hamraya, Deggla Bidha, Deggla Nour, Tekermist), where these cultivars were close in age between 18 - 20 years, and the planting area. and they are watered with well water and live in about the same conditions.
The experiments of this research were conducted on leaf samples of the previously mentioned varieties, where a leaf (frond) was taken from the middle of the leaf located in the middle of the compound leaf cycles and was fully mature, fully green.
Cross-sections of each leaf were made using a microtome (Thermo Scientific HM325 Microm), then double staining was performed, and the following characteristics were calculated:

Length of wicker (µ m)	width of wicker (µ m)	diameter of cut X10 (µ m)	The thickness of the medial tissue X10 (µ m)
The thickness of the waxy layer X40 (µ m)	cuticle thickness X40 (µ m)	The number of fiber bundles between two large bundles X4 (µ m)	Large fiber bundle diameter X10 (µ m)
The number of small vascular bundles between two large bundles X10 (µ m)	The diameter of the small vascular bundle X10 (µ m)	The number of intermediate vascular bundles between two large bundles X4	The diameter of the median vascular bundles X10 (µ m)
Large vascular bundle diameter X10 (m) µ	Initial wood space in a large bundle X10 (m^2) µ	Secondary lumber space in a large bundle X10 (m^2) µ	

Anatomical parameters studied



A cross-section of a Garess leaf under a microscope



Characteristic of the number of inflorescences in the palm tree (yield)

Results and discussion
Through the results of the analytical study, we note that the Deglet Nour variety is superior to other varieties in terms of frond width .As for the length of the frond, it is greater than the white variety, whose role is to increase the leaf surface and thus increase the number of layers and cells. The Garess variety was superior to other varieties in the following characteristics: epidermis thickness, mesophyll thickness, number of fibrous bundles between two large bundles, and area of secondary xylem in the large vascular bundle.

We note that the thickness of the wax layer is equal between the two varieties, Al-Ghars and Degla Al-Bayda. These characteristics respectively help to support and protect the internal tissues and photosynthetic mechanisms of the plant because it contains plastids. Reinforcement of the leaf, which participates in the support of the compound leaf, which facilitates the transfer of the deficient copy from the roots to the leaves, avoiding the loss of water present inside the leaf and preserving it for as long as possible. We also observed that the Deglet Abyad variety was superior in terms of the diameter of large and small vascular bundles, and the Deglet Nour variety excelled in the number of small vascular bundles between two large bundles. The Takramoust variety excels in the transverse diameter of the frond, the diameter of the large fiber bundle, the area of the first xylem in the large bundle and the diameter of the average vascular bundle, and we note that they are equal. The red variety had an increase in the number of medium vascular bundles between two large bundles. Finally, we note that the Hamraya variety is superior to other varieties in the number of inflorescences it bears, thus increasing the overall yield.