1. Introduction

Malvaceae includes more than 1000 species that are divided into 80 genera. Its distribution is essentially ecumenical and it is most strongly represented in sunny, outdoor habitats in warm temperate and seasonally dry tropical regions. It is made up of herbs, shrubs, and trees that are erect or decumbent and have stellate hairs and mucilage [1]. Simple, lobed, or split leaves are present, along with lower, single or clustered flowers. The epicalyx, which has five sepals and petals as well as an excessive number of stamens, is a useful trait for identifying distinct species. In rare cases, the fruit is a berry and is a loculicidal dehiscent, indehiscent capsule, or schizocarp. While the seeds are reniform or ovoid and have a great economic value, Hibicuse sabdrippa and sida stem fibres are used to make cordage, ropes, sacks, and papers [2]. The fibres from the seeds of Gossypium spp. (cotton), a perennial dicotyledon in the Malvaceae family is utilized in textile and rubber tire materials [2]. The structure of cotton fibres at various phases of development and their significant commercial relevance have been thoroughly investigated [3]. The aim of this work is to study the anatomical differences among the Gossypium genotypes.

2. Materials and Methods

2.2. Plant collection

Plants of Gossypium hirsutum genotypes (Coker 310, Lachata (Iraqi genotypes), Cafko, Dunn 1047, Montana, Stone Ville (USA genotypes), Bakhtegon, Khorda, and Vanamin (Iranian genotypes) were collected from Qwshtapa district, Grdmala village, which is 30 km far from the center of Erbil city, and fixed in fixative (FAA) that the prepare by mixing of formalin 5ml, Glacial acetic acid 5ml and ethyl alcohol 90ml (70%).

2.3. Plant Sections’ Preparation

Pieces of the samples were placed in the FAA, dehydrated using a succession of alcohol concentrations, cleaned with xylene, injected with paraffin wax, and then left at 60°C overnight. After that, sections were created using a rotary microtome and embedded in paraffin wax. Afterwards, safranin and light green were used to dye the sections. Finally, the sections were examined under the microscope using DPX Mount [4].
3. Results and Discussion
Since the invention of the microscope, systematic anatomy has had a lengthy history, and taxonomists are now able to identify anatomical similarities across related plant groups. Plant taxonomy and systematics always viewed anatomical qualities as the cornerstone of plant structure and morphology, elucidating the diversity, phylogeny, and evolution of plants in the wake of these traits. Anatomical information is used for identification and to correct classification schemas. Systematics involving stem, leaf, petiole, stipule, node, flower, fruit, seed, etc. makes extensive use of anatomical data. These anatomical characteristics are primarily associated with environmental variables. It is advantageous to define the taxon with a wide range of morphological differences since the character's anatomy of the plant is more important than morphological data [5]. The trichomes, stomata, and other characteristics of the leaf anatomy are helpful anatomical tools [6]. Each genotype has four strands. In Coker310, Lachata, Cako, and Bakhtegon, the trichomes are multicellular glandular, but in Montana, Stoneville, Khorda, and Vanamin, the trichomes are both multicellular glandular and unicellular branching non-glandular. Only Lachata has starch grains, while the other genotypes all have aleurone grains, tannins, druses crystals, and lysigenous cavities (secretory canals) (Figure 1, 2, 3). Most members of the Malvaceae family have six vascular bundle threads and show secretory tissues in the cortex, according to [7].

According to this study, genotype midribs varied in shape. For example, the adaxial surface of the Coker310 midrib is short and humped, while the abaxial surface is rounded. In contrast, the adaxial surface of the Lachata and Cako midrib is humped and the abaxial surface is U-shaped. The adaxial surface is curved, whereas the abaxial surface is rounded, as in Montana, and the abaxial surface is cup-shaped, like in Dunn 1047. The abaxial surface is cup-shaped, like in Stoneville, while the adaxial is lengthy and heavily humped. While the adaxial surface in Bakhtegon and Khorda is humped, the abaxial surface is broad and rounded. While the adaxial surface in Bakhtegon and Khorda is humped, the abaxial surface is broadly rounded. Last but not least, the adaxial surface of Vanamin (Iranian genotypes) is curved and the abaxial surface is V-shaped. The tannins, secretory cells, and druse crystals are present in all genotypes. In Coker310, Lachata, and Bakhtegon, the hairs are absent. In Cako and Montana, the hairs are unicellular branched non-glandular, in Stoneville, Khorda, and Vanamin, the hairs are multicellular glandular, and in Dunn1047, the hairs are both multicellular glandular and unicellular branched non-glandular. The tannins and rosette crystals are found in all genotypes (Figure 4, 5). While the adaxial surface in Bakhtegon and Khorda is humped, the abaxial surface is broadly rounded. Last but not least, the adaxial surface of Vanamin (Iranian genotypes) is curved and the abaxial surface is V-shaped. The tannins, secretory cells, and druse crystals are present in all genotypes. In Coker310, Lachata, and Bakhtegon, the hairs are absent. In Cako and Montana, the hairs are unicellular branched non-glandular, in Stoneville, Khorda, and Vanamin (Iranian genotypes), the hairs are multicellular glandular, and in Dunn1047, the hairs are both multicellular glandular and unicellular branched non-glandular [8,7,3].

This study showed that the lamina genotypes are made up of the mesophyll layer, palisade layer, and upper epidermis layer. These layers contain vascular cylinders, cluster crystals, tannins, and lysigenous canals (secretory canals). In Montana and Khorda, the furs are multicellular glandular; in Cako, it is unicellular branching non-glandular; in Dunn1047, Stoneville, Bakhtegon, and Vanamin, it is both unicellular non-glandular and multicellular glandular; and in Coker310 and Lachata, the hairs are nonexistent (Figure 6, 7). [5,8,2,3] pointed out that the leaf anatomy is often dorsiventral, with the mesophyll layer containing a large number of cluster or rosette crystals and the dorsal layer made of elongated cells called palisade cells. Present the multicellular glands and non-glandular unicellular organisms with sharp apices hairs. The margin between genotypes with rounded ends and those with rounded or pointed ends. As in Lachata and Vanamin, the furs are multicellular glandular; as in Cako, Montana, and Khorda; or as in Dunn1047, the hairs are unicellular non-glandular non-branched; and as in Coker310, Stoneville, and Bakhtegon, the hairs are absent (Figure 8, 9).
Figure 5. T.S midrib sections of *Gossypium hirsutum* genotypes: A. Bakhtegan, B. Khlorda, C. Vanamin, D, E, F. magnification power of midribs. C: collenchyma, S: secretory canal, D: druses, V: vascular bundle, T: tannins, LY: lysigenous cavities, trichomes (black arrow). A, B, C = 4X, D, E, F = 40X.

Figure 8. T.S margin sections of *Gossypium hirsutum* genotypes: A. Coker310, B. Lachata, C. Cafeo, D. Dunn1047, E. Montana, F. Stoneville. LY: lysigenous cavities, V: vascular bundle, T: trichome, trichomes (black arrow). A, B, C, D, E, F=10X.
4. Conclusions
This investigation concluded that *Gossypium hirsutum* genotypes differ in the outline shape of the petiole, midrib, and margin. The druses crystals, lysigenous cavity and tannins are present in all taken parts in this work. The starch grains are found only in the petiole of genotype Lachata. All genotypes petiole contains aleurone grains. Trichomes are presented which are multicellular glandular or unicellular branched non-glandular.

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**Conflicts of Interest:**
The authors declare no conflicts of interest for this work.

**References**


