

Morphological and Chemical (Phenolic Compound) Study of *Althaea cannabina* L. (Malvaceae) in Syria

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Abstract - Our current research is investigating a detailed study of the morphological characteristics of the roots, steams, leaves and flowers of *Althaea cannabina* L. , and also Phenolic acids in the roots , leaves and flowers of this species were investigated by means high performance liquid chromatography (HPLC) .The Phenolic acids occurring in these fractions have been identified as Chlorogenic acid , Caffeine,

Cumaric acid , Ferulic acid , Vanillin , 2-6 Dimethyl Phenol , Salicylic acid , P-cresol , t-zimt-savve , Eugenol . This research have been shown the contents of phenolic acids was higher in the flowers than in the leaves and roots in this species.

Keywords: *Althaea cannabina*L. ,*Malvaceae* , morphology , phenolic compounds , HPLC

I INTRODUCTION

Althaea cannabina belong to the family Malvaceae . It is a family of flowering plants containing over 200 genera with close to 2300 species. The largest genera in terms of species include *Hibiscus* (300 species), *Povonia* (200 species) and *sida* (200 species) ([1], [2]), whereas the genus *Althaea* contains 50 species [3]. This family widely distributed in the Mediterranean and irano-turanian phytogeographical regions, Mediterranean Europe , north America , northern Africa , the Caucasus, southwest and central Asia, southern Russia and Afghanistan ([5], [6]). *Althaea* species have been the basis for countless medicines since Egyptian antiquity. The generic name, *Althaea* , is derived from the Greek , although (to cure) , due to its healing properties , owing to the high mucilage content, the plants were used commonly for soothing internal and external inflammations , sore throats , minor wounds and chapped skins [6]. And also as an antitussive , demulcent , diuretic , emollient , laxative , and odontalgic [7]. *Althaea* is also used to prepare herby cheese as preservative and aroma source [8]. A

poultice prepared by *A.cannabina* root is applied externally to soothe the calcifications [9]. With respect to the phenolic acids are secondary plant metabolites plant metabolites widely spread throughout the plant kingdom [10]. They are hydroxylated derivatives of benzoic (e.g ., gallic , syringic , vanillic , and protocatechuic acids) , and cinnamic acids (e.g.,caffic and p-coumaric acids) ,and both kinds of derivatives have their biosynthetic origin in the aromatic amino acid L-phenylalanine [11]. In plants, benzoic and cinnamic acids derivatives are physically dispersed throughout seeds, leaves, roots, and stems [12]. dx their roles in plants are many, including nutrient uptake, protein synthesis, enzyme activity, photosynthesis, structural components , and allelopathy ([13], [14], [15]). It has been established that derivatives of cinnamic acids , mainly p-coumaric and ferulic acids , also show estrogenic activity and could influence the reproductive activity [16]. Reference [17] reported that there is a relationship between plant taxonomy and chemical content of the plant where the

chemical compounds used to insulate the plants depending on the medical and economic uses, Reference [18] pointed out that the addition of chemical classification information to other information, such as information phenotypic can create a basis for our decisions knowledge of plant taxonomy, reference [19] stressed that Filavonat with taxonomic importance because they are not primary and phenolic compounds of important chemical compounds in the plant classification and are usually found in the leaves, flowers and seeds. The lack of data on the phenolic acids in *Althaea cannabina* L. which could be responsible for the medicine importance , prompted us to examine this plant for their content .

II MATERIALS AND METHODS

A. Morphological Study:

The material of the current study are based on10 samples collected from Selnfi (in Syria) , they are collected at summer of 2015. We took the necessary measurements of the parts of the plant by a meter and ruler, it has been working under a magnifying regarding the measurement of small parts. The pollen grains were studied using a microscope. Some samples are dried in the shade and stored in the laboratory degree heat while in use for chemical study.

B. Chemical Study :

I). Extraction :

Phenolic compounds were extracted from plant parts (root, leaf, flower) according to the method of [20] with some modification in accordance with the following:

- The dried roots , leaves and flowers of the species studied were crushed in the Electrical mill.
- Weight (4) g of each sample was added to it (40-50) mL of 70% alcohol ethyl and left at room temperature for 48 hours .
- Conclusion nominated using the filter paper of the kind Ederolmedium pores filtering .
- Extract focused to get rid of the alcohol using a pneumatic dryer at a cool temperature (laboratory temperature) .
- added to the filtrate as fits the size of diethyl ether with a boiling point (40-60) M°, Shake blend well then put in Separation funnel .

- Lower layer in separating funnel containing phenolic compounds taken and then focused even (1ml) by stream of dry air .

2). Chromatography :

The extracts were analyzed by Jasco HPLC equipped with UV detector and stabelbond C18 analytical column was used for analytic separation the wavelength of 275nm . mobile phase (Acetonitrile + 1% Acetic acid and V / V 60:40) was at flow rate of (1) ml/min .

III RESULTS AND DISCUSSION

A. Morphological Descriptions:

Herbs perennial, with glandular and eglandular hairs, plant 120-160 cm height .plant has roots with length 25 – 35 cm , and has stem erect ,branched above, Cylindrical, stellate hairy (Figure1A) .Leaves orbicular-triangular, petiole and stipule stellate hairy . Basal leavespalmatifid-palmatisect , consist of 5-lobed , 5- 12 x 4-15 cm , margin serrate , apex acuminate , petiole 2.5-7.5 cm (Figure1B).cauline leaves palmatisect , consists of 5-lobed , 2-8 X 4- 10 cm ,margin serrate , apex acuminate , petiole 2- 7 cm (Figure 1C) . floral leavespalmatisect, consists of 3 lobed the middle lobe larger than others , 1.5-5 x 1-6 cm , margin serrate , apex obtuse , petiole 0.5- 3 cm (Figure 1D) .Regarding venation patterns we have found that leaf venation patterns is Reticulate . flowers solitary or peduncles 2-3 flowered (Figure 1E) . pedicels 1-14 cm with stellate hairy . Epicalyx less than ½ as long as calyx (Figure 1F) .Epicalyx 7-9 , connate at the base , lobes 2.5- 4 x 0.2- 0.9 mm , densely stellate hairy. sepals 5 , connate at the base , 5.5 – 7 x 3.5 - 4.5 mm , with densely stellate hairy . petals 5 , pink – purple , 17-24 x 15 – 18 mm . margin entire, apex retuse , white pilose hairy at the connate part . filaments unite in its lower part composed staminal tube(Figure 1G) , staminal tube cylindrical , glabrous , 2- 5 mm , there papillose hairy on the free part of the filaments . anthers reniform(Figure 1H) , purplish – brown , content pollen grains (164 – 212 grainper anther) , pollen grains have spherical shape with spines on the outer surface (Figure 1I) . stylus divided toward the apex . Number of stigma equals the number of carpel . ovary consists of approximately (11 – 14) carpels In each of which one ovule (Figure 1 J) .Mericarps 2.6 – 3.8 x 2.3 – 3.4 mm , reniform , brown , glabrous (Figure 1K) . seeds 1 – 2.5 x 0.9 – 2.8 mm reniform ,

glabrous . This result is compatible with results

of [21].

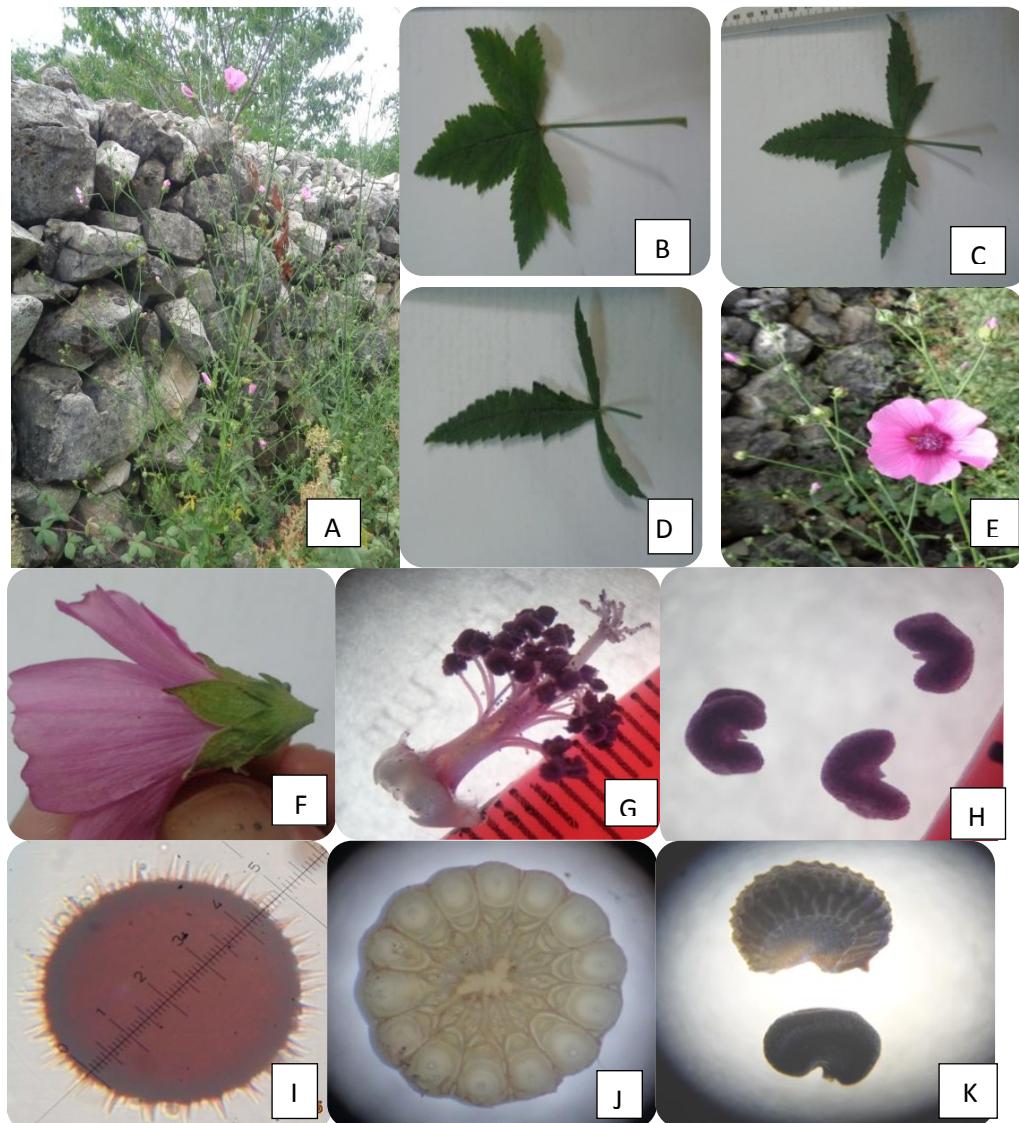


Fig. 1 : *Althaea cannabina* L. . A- General view of the plant; B- Basal leaves; C- caudine leaves; D- floral leaves; E- flowers; F- Epicalyx; G- staminal tube; H- anthers; I- pollen grain; J- cross section of Ovary; K- Mericarp above and seed below .

B. Chemical Study :

Phenolic acids in roots , leaves and flowers of *Althaea cannabina* L. have been investigated by means of HPLC . The present study showed a disparity in terms of the total content of phenolic compounds within the plant parts of

the species studied, where the highest percentage of these compounds in flowers, followed by the leaves, roots respectively. As shown in Table (1).

Table(1) The amount of phenolic compounds in flowers, leaves and roots of *A. cannabina*

Phenolic acids Part of plant studied	The total content of phenolic acid
Flowers	90.323
leaves	0.041 69.126
roots	0.364 66.184

for the flowers it was phenols ratio is too high, where the increase of almost 90% and the compound Salicylic acid is the main compound in flowers as rate stood at 63%,

followed by the compound Vanillin by 26%. As shown in Figure (2).

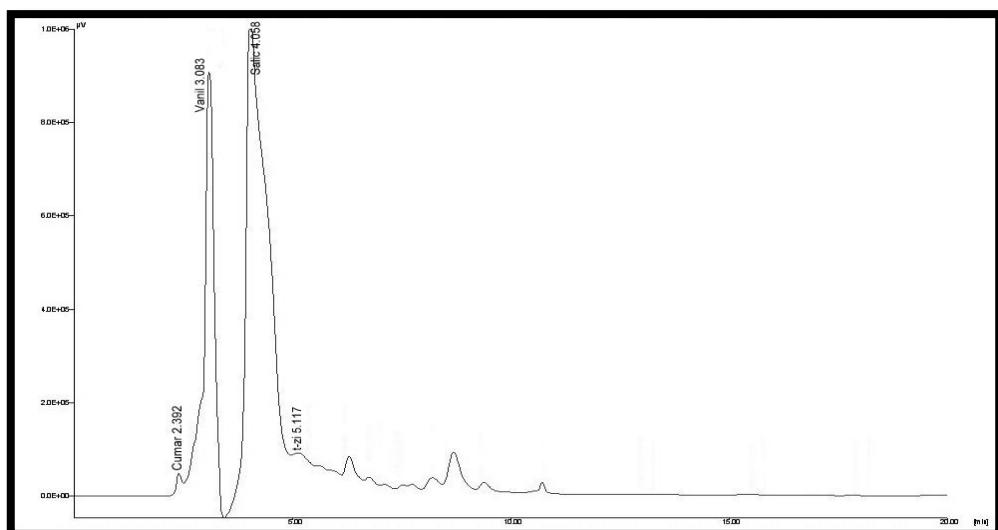


Fig. (2):High performance liquid chromatographic analysis (HPLC) for flowers *A. cannabina*

While in the leaves the amount of phenolic compounds have reached 69% , it has exceeded the amount of phenolic compound 2-

6 Dimethyl phenol the rest of the compounds as it exceeded 52% and can be seen through (Figure 3) .

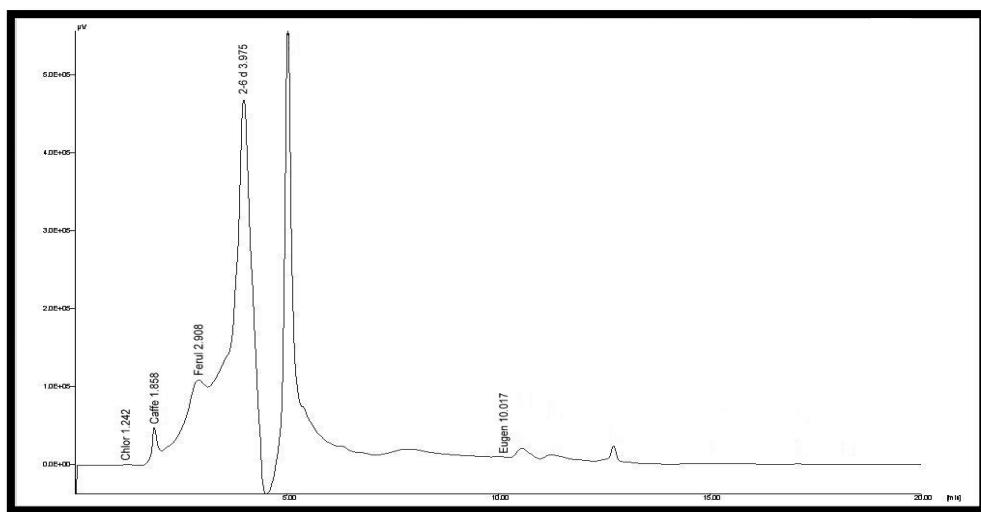


Fig. (3) : High performance liquid chromatographic analysis (HPLC) for leaves *A. cannabina*

The roots of this species has reached the amount of phenolic compounds in which the 66% and the compound Ferulic acid is the prevailing

rate of 45% (Figure 4) .These results are consistent with results [22].

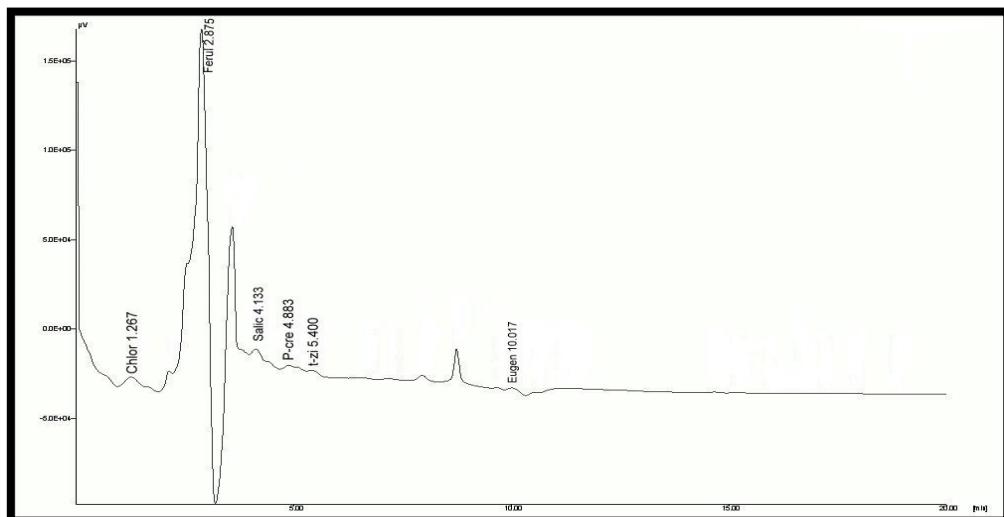


Fig. (4) : High performance liquid chromatographic analysis (HPLC) for roots *A. cannabina*

IV CONCLUSION :

Thus, we find that the Morphological characteristics have taxonomic importance particularly great with regard to the shape and size of leaves, The size of the epicalyx for the calyx , The color and shape of anthers, shapes and ornamentations pollen grains, where these characteristics contribute to other characteristics such as anatomical, cellular and chemical characteristics in helping scientists

Category solve a lot of complex taxonomic problems.

So also we have found through this research that the amount of phenolic compounds in flowers higher than it is in the leaves and roots. And also Our results have shown that the compounds (Salicylic acid, Vanillin) are prevalent in the flowers did not notice the presence of the latter compound in the leaves. while the compound (2-6 Dimethyl Phenol) is

the main compound in the leaves Where its presence is limited only in leaves. The basic

compound in the roots is Ferulic acid .

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