ECOLOGICAL AND PHYTOCHEMICAL STUDIES ON CLEOME ARABICA JUSL.

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PHYTOCHEMICAL STUDIES

" This dissertation has not previously been sumbitted for a degree at this or other universities.

The references in the text will show specificially the extent to which I have availed myself of the work of other authors ".

A. M. El-Habibi

A C K N O W L E D G E M E N T

I wish to express my great indebtedness and sincere appreciation to Prof. Dr. A. H. Montasir, Professor of Botany, Faculty of Science, Ein Shams University, who kindly suggested the subject together with Ass. Prof. Dr. Ahmed Fouad Shalaby, Botany Department, Desert Institute, who personally supervised the work. The kind help, indispensable advice and continuous encouragement of the two Professors made this work possible.

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I N T R O D U C T I O N

At present time, the efforts in U.A.R. are focused to industrialize the local raw materials, including with the economic natural plants which occupy a prominent position in the national economy.

Among the natural resources of our deserts may be mentioned the utilization of medicinal plants. From the genus Cleome, only Cleome arabica was studied. The plant grows wild in the eastern desert, and nothing is known about its constituents. The studies of this species will form the subject of the present investigation. In this connection the importance of an ecological study must coincide with the phytochemical study.

No ecological work has hitherto been done on such plant. The writer tried in the first part of this work to study the ecology of C. arabica already mentioned, besides its distribution in different phytogeographical regions of Egypt proper. For this purpose monthly visits were made to the different regions of the Egyptian deserts. The communities in which the plant lives were studied, and variations in their characters in the different spots due to topographic, climatic, or edaphic factors were noted. A carefull investigation of the autecology of the plant is of a prime importance as it furnishes some knowledge for understanding the

the conditions under which it can grow successfully and to be utilized economically. Osmotic pressure measurements of plant shoots were followed at a more or less monthly intervals.

Soil texture, soil moisture, as well as the penetrabbility of the roots in addition to the mechanism of seed germination were studied.

The second part includes the phytochemical study of the plant. It includes the preliminary phytochemical screening as well as the methods of preparing the extracts and the tests for investigating the different constituents. Also it deals with the determination of constants and other certain constituents. Stress was made on the flavonoids of the plant. The main flavonoid was separated and estimated. The high seed productivity of C. Arabic as well as the relatively considerable weight of the seeds are the main reasons to encourage for carrying out its analysis. Their general analysis and the study of their sugars, proteins, and lipids were also done.

P A R T I

E C O L O G I C A L S T U D I E S

I. TAXONOMY

Cleome is one of the seven genera belonging to family Capparidaceae recorded in Egypt. According to Täckholm (1956), it belongs to:

Division	Embryophyta, Siphonogama.
Subdivision	Angiospermae.
Class	Dicotyledoneae.
Subclass	Choripetalae.
Order	Rhoedales.
Family	Capparidaceae.
Genus	Cleome.

The species of Cleome recorded in Egypt are :

Cleome arabica, Cleome droserifolia,
Cleome chrysantha, Cleome papillosa,
Cleome trinerva, Cleome brachycarpa,
Cleome paradoxa , Cleome viscosa.
and Cleome hanburyana.

They are herbs or undershrubs with simple or digitate leaves and flowers in a terminal raceme (except C. droserifolia and C. chrysantha). Sepals and petals four. Stamens four to numerous, free. Gynophore absent (except C. hanburyana and C. paradoxa). Fruit capsule, stipitate or sessile, the two valves at length separating from the placenta.

Of the nine species, only Cleome arabica was ecologically and phytochemically studied.

According to Montasir and Hassib (1956), C. arabica is glandular pubescent, annual plant, lower leaves 3-foliate while the upper ones simple, leaflets oblong-linear 1.5-3.0 cm. Flowers in terminal racemes. Petals yellow, and tipped. Fruit flattened and pendulous, 4-5 cm long, 0.8 mm broad.

Wheeler Haines (1951) gave a complete discription of C. arabica growing in the arid Egyptian desert, at its different stages of life cycle. According to him the plant is, when fully developed being dwarf bush, about 50 cm. height with upright branches springing from a short root stock. The shoot (Fig. 1) is covered with capitate hairs, which are sticky when young, but when older become blackend by desert dust.

On bruising, the plant gives off a nauseous smell, which protects it from grazing by animals. The lower leaves on each shoot are trifoliate, and bear in their axils buds of new shoots, again with trifoliate leaves. But the upper leaves, each of which bears a single flower in its axil, which become irrigularly bifoliate, one or other of the lateral leaflets being suppressed, and finally at the end of the shoot, which becomes greatly elongated as flowering proceeds, all the leaves may become simple. The flowers when they first open are short-stalked and densely crowded at the ends of the shoots, as in many other Capparidaceae and most Cruciferae. The four sepals are unequally developed,

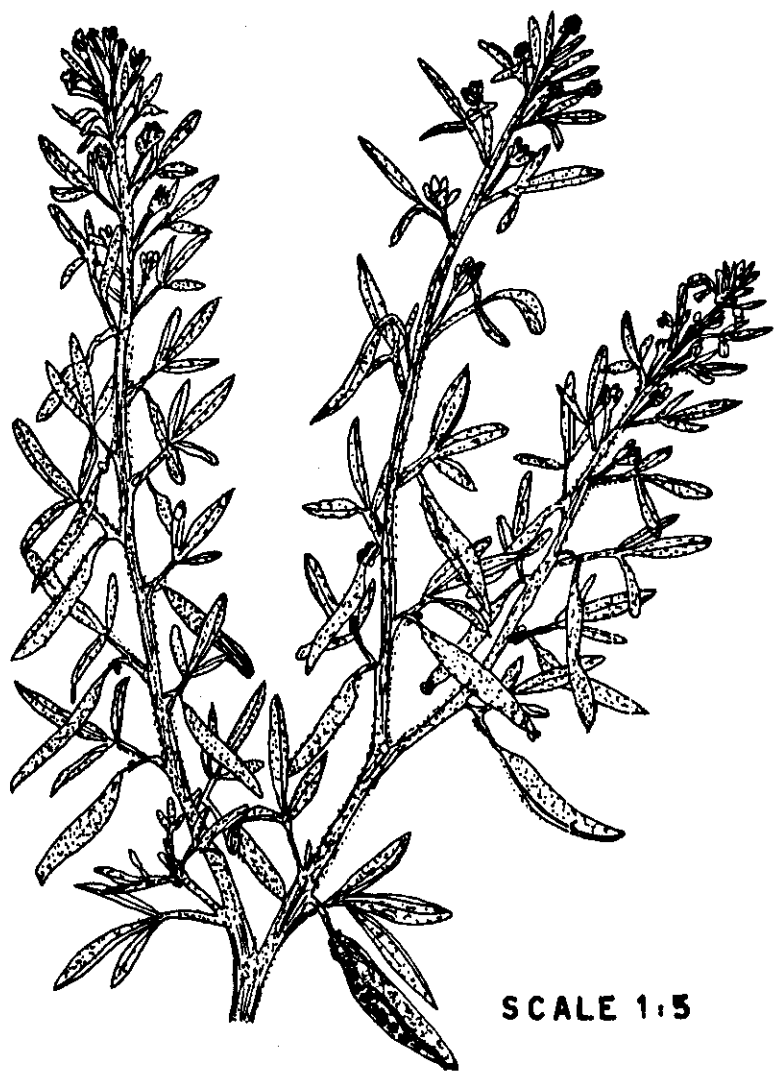

Fig. 1 : Photo showing the vegetative growth of C.arabica.