Faculty of Science
Department of Botany

Floral morphology of the Polygonaceae in Egypt

A Thesis Submitted for the Degree of Doctor of Philosophy of Science in Botany (Plant Taxonomy)

By

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(B.Sc., 1993) - (M.Sc., 1998)

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DECLARATION

This thesis has not been previously submitted for a degree at this or at any other University

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ABSTRACT

In the present study the macro, and microfloral characters of 20 taxa of Polygonaceae (17 species, two subspecies and one variety) were investigated to trace the floral organ vascularization. The obtained data clarified that the floral vasculature is almost significant in extracting the intra-affinities of the studied taxa as well as in constructing an artificial key for the taxa identification.

Key words: Floral morphology, Polygonaceae.

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SCOPE OF THE THESIS

In the present work, the macro, as well as microfloral characters of 20 taxa representing 17 species, two subspecies and one variety of Polygonaceae were investigated for more accurate identification.

The artificial keys which have been suggested in the different texts for identification of the polygonaceous taxa are primarily based on macrofloral characters such as number of tepals, stamens, carpels and styles. The sharing of most taxa of this family in the number and insertion of stamens, the free styles and the uni-locular ovary with one basal ovule makes such characters almost significant at the family level. However, the same characters become less reliable at the generic and specific levels. Therefore the microfloral characters become necessary to be dealt with. A system of floral anatomical features as expressed by vascularization, number and behavior of tepal traces, number of staminal traces and the number of carpel traces have been shown to be useful at the generic and specific levels.

With this in mind the macro, and microfloral characters were investigated in 20 taxa to fulfill:

1- The behavior of the floral vasculature and its bearing on the morphological expression of characters.

2- The probable intra-affinities of the studied taxa.

PREFACE

The Polygonaceae are very large cosmopolitan family containing about 30 genera and about 750 species, including herbs, some shrubs and a few trees, with a number of cultivated ornamentals **(Heywood, 1956)**. It is represented in flora of Egypt by 22 wild species under six genera; *Atraphaxis*, *Calligonum*, *Emex*, *Oxygonum*, *Polygonum* and *Rumex* **(Montasir & Hassib, 1956)**. Fourteen out of the 22 species are of very rare occurrence and the remainders are either common or very common. **Täckholm (1974)** has recognized 28 species and added one more genus *viz*. *Bilderdykia* to the genera cited by **Montasir and Hassib (1956). Boulos (1999)** recorded eight genera (*Atraphaxis*, *Calligonum*, *Emex*, *Fallopia*, *Oxygonum*, *Persicaria*, *Polygonum* and *Rumex*) with 25 species, four subspecies and one variety.

Concerning the life form, **Hassib (1951)** reported that the Polygonaceae range between therophytes (eighteen species), geophytes (five species), helo- and hydrophytes (two species), chaemophytes (one species) and nanophanerophytes (one species). Phytogeographically, seven monoregional species are known to be distributed as two species in Nile Delta, two species in Oasis, one species in Gebel Elba, one species in the western coast of the Mediterranean region and one species in Sinai region. The other species are either bi- or multiregional. In Egypt the Polygonaceae inhabit different habitats. Twelve species are xerophytic, eleven species are among the element of the uncultivated land community, and one species (*Polygonum maritimum*) is halophytic **(Hassib, 1951)**.

Horticultural species in Egypt are represented by *Antigonon leptopus*, *Coccoloba peltata*, *Muehlenbeckia platyclados*, *Ruprechtia excelsa*, *Rup. polystachya* and *Rup. salicifolia*.

The Polygonaceae are either annual or perennial herbs. A few species are woody; the latter may be erect or sometimes twining with noded stem. However, in *Muehlenbeckia platyclados* the main stem as well as the branches become flattened assuming a ribbon like phylloclades. Stems usually manifestly jointed; leaves various, almost linear, lanceolate, to broad-ovate and hastate, simple and entire, sheaths or ochreae usually well developed **(Bailey, 1949)**. Flowers regular, unisexual or bisexual, small, usually borne in large numbers in compound inflorescence, trimerous (more rarely dimerous) and cyclic, or acyclic. Perianth of one or two series, more or less persistent, two-six cleft or parted, sometimes distinct, hypogynous, more rarely the outer and inner whorls different. Stamens usually six to nine, sometimes fewer. Pistil solitary and superior, mostly one- celled but of two-four carpels, single - ovuled. Ovule erect, orthotropous and basal. Flowers wind- or insect-pollinated. Fruit usually a lenticular or angled achene, sometimes enclosed in the enlarging perianth which forms a berry-like body. Seed containing a more or less excentric or lateral embryo which is folded or straight, with copious mealy endosperm. Economically the leaf stalks of *Rheum rhaponticum* are edible. *Fagopyrum esculentum* (common buck-wheat) is widely cultivated for its floury seeds. *Rheum officinale* supplies medicinal rhubarb. Notable among the ornamentals are the mountain-rose vine (*Antigonon*), the silver-lace vine (*Polygonum aubertii*), Sacalina (*Polygonum sachalinense*) and the edible purple berries of the West Indian sea side grape (*Coccoloba uvifera*).

HISTORICAL INTRODUCTION

1- Synopsis of systematy

Linnaeus (1753): established the genus *Polygonum* L. as a loose but not entirely successful unit. Many authors have tried to subdivide the genus into more natural units as subgeneric, sectional or generic rank.

Meisner (1856): had a wide conception of his "subordo Polygoneae" and included what have also been called Rumiceae, Atraphaxeae, Polygoneae, Coccolobeae and Triplareae.

Bentham and Hooker (1883): classified the **Polygonaceae** under order Nyctagineae of the series Curvembryeae of the division Monochlamydeae. They united **Meisner's** "Eupolygoneae and Calligoneae" in their "Eupolygoneae", changed the circumscription of Rumiceae, and Placed *Koenigia* in Koenigieae close to Eriogoneae.

A Bentham and Hooker's Classification (1882-1883)

Group: Angiospermae
Subgroup: Dicotyledoneae
Division: Monochlamydeae
Series: Curvembryeae
Order: Nyctagineae
Family: **Polygonaceae**

Dammer's Classification (1893): The "Eupolygoneae" of **Bentham** and **Hooker** has been divided by **Dammer (1893)** into Atraphaxeae and Polygoneae and included *Koenigia* in Eriogoneae, which together with Rumiceae made up the sub-family Rumicoideae.

Engler and Prantl (1897-1915): classified the family in the order Polygonales under the group Archichlamydeae of the Dicotyledoneae.

Engler and Prantl's Classification (1897-1915):

- Spermatophyta

Division: Angiospermae

Class: Dicotyledoneae

Group: Archichlamydeae

Order: Polygonales

Family: **Polygonaceae**

Hallier (1912) has included the Polygonaceae and the Caryophyllaceae in his order Centrospermae.