

Comparative Ecological and Physiological Studies On a Xerophytic, Mesophytic and Hydrophytic Plants

THESIS

Submitted in Partial Fulfilment For the Degree

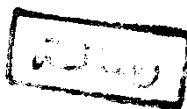
OF

MASTER OF SCIENCE

(M.Sc.)

IN

BOTANY



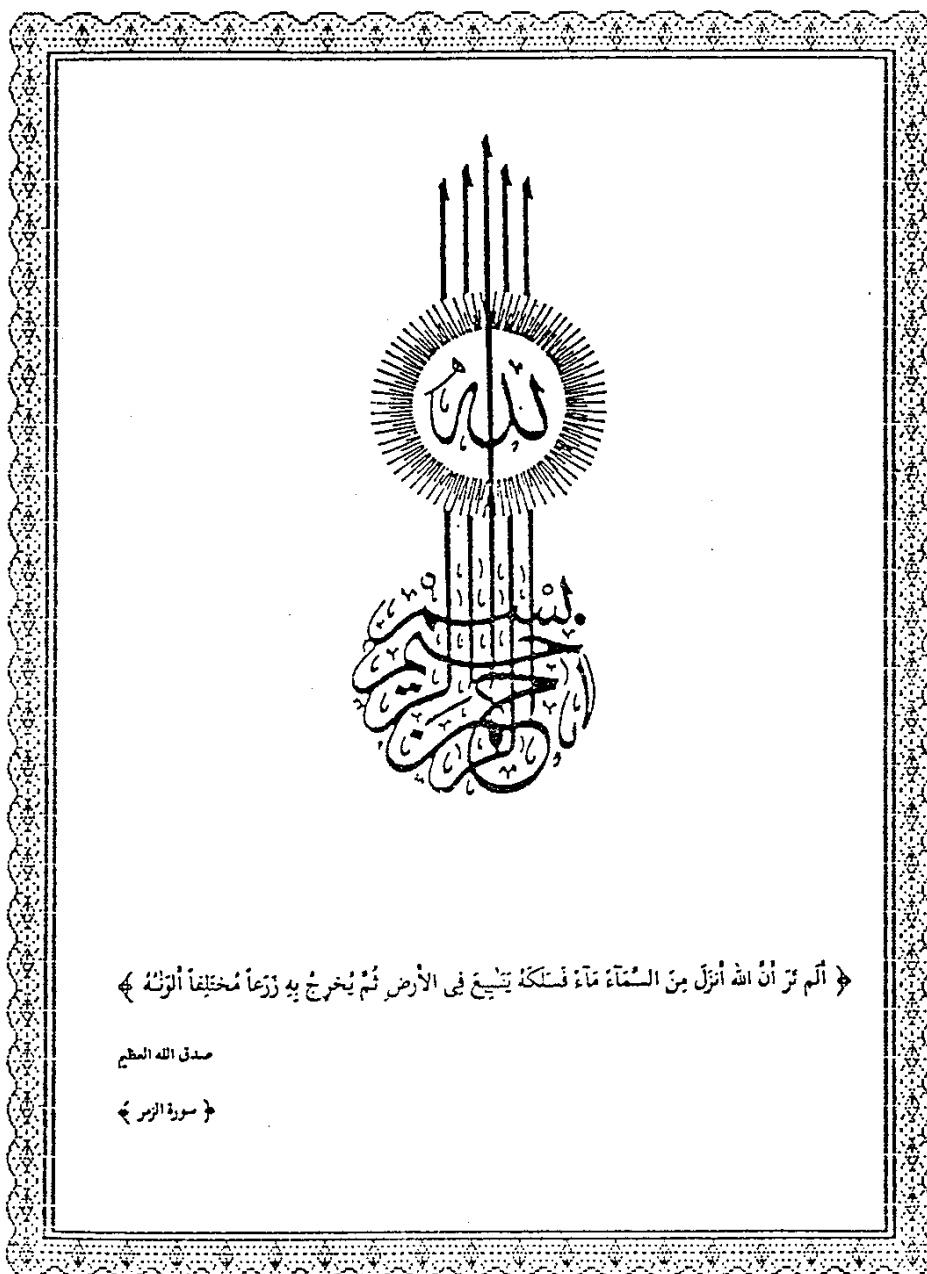
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**DEDICATED
TO MY SMALL FAMILY
AND BIG ONE**

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

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PREFACE & AIM OF WORK

PREFACE

Every living organism reacts according to its environmental conditions and this naturally leads to variation in its behaviour , morphology , anatomy and physiology .

Plants according to their water relationships were classified into three main classes namely hydrophytes(growing in water) , mesophytes (growing in moderate water supply) and xerophytes(growing in water deficient medium)

In the present investigation, we are dealing with Pistia stratiotes as a floating hydrophyte , Helianthus annuus as a mesophyte and Alhagi maurorum as a true xerophyte .

Pistia stratiotes(Family : Araceae) is a free floating , stemless , stoloniferous hydrophyte herb .

Helianthus annuus (Family: Compositae) is a mesophytic plant .

Alhagi maurorum(Family: Leguminosae) is a true xerophyte, richly branched intricate shrublet with short patent-tipped twigs . Leaves are simple , entire , soon deciduous. Alhagi plant is mainly reproducing itself vegetatively by its long creeping rhizomes pushing up to a wide distance .

The main morphological, anatomical and physiological characteristics of the different ecological groups of plants were described by Schimper(1903) ,Weaver&Clements (1966) , Ashby(1973) , Daubnmire(1974) , Abd-El-Rahman et al(1976) , Hall(1976) , Bilgrami et al(1979) , fitter and Hay(1981) , Vickery & Hall (1984) .

The aim of the present work was:

- (1) To study the main morphological and anatomical characteristics of the three plants under investigation(Pistia, Helianthus and Alhagi.)
- (2) To investigate the physiological characteristics of the above plants including :
 - a- Comparative studies of the different growth regulating substances including auxins , gibberellins , cytokinins and growth inhibitors .
 - b- Comparative studies of pigment contents .
 - c- Comparative studies of carbohydrate contents .
 - d- Comparative studies of nitrogenous constituents .
 - e- Comparative studies of amino acid composition .
 - f- Comparative studies of nucleic acid contents .
 - g- Comparative studies of mineral composition .
 - h- Comparative studies of free and bound water as well as the saturation capacity of the air dried powdered

tissues of the investigated plants .

i- March of water during plant wilting .

(3) To carry out comparative analytical studies of the media surrounding the roots of the three plants under investigation.

MATERIALS & METHODS

MATERIALS AND METHODS

A: MATERIALS

The experimental plants used in the present investigation were :

- 1- Sea lettuce or tropical duck-weed (Pistia stratiotes ; Family : Araceae), as a floating hydrophytic plant . This plant was collected during its vegetative form from Moetamedia Canal at Imbaba near Cairo .
- 2- Sunflower (Helianthus annuus ; Family : Compositae) as a mesophytic plant. This plant was cultivated in the Botanical garden of Botany Department , Faculty of Science, Ain Shams University, Abbassia ,Cairo . It was collected during its vegetative form .
- 3- Camel thorn or hebrew manna plant (Alhagi maurorum ; Family : Leguminosae) as a true xerophytic plant. This plant was collected during its vegetative form from Ismalia desert .

In the bioassays of auxins , gibberellins and cytokinins , pure strains of grains and seeds of barley (Hordeum vulgare var.C.C. 89), sorghum (Andropogon sorghum var. Giza 15) and cocklebur (Xanthium brasiliacum Hell.) were used respectively.