AIN SHAMS UNIVERSITY
FACULTY OF EDUCATION
EPARTMENT OF BIOLOGICAL
SCIENCES & GEOLOGY

STUDIES ON THE FUNGAL FLORA OF SOME SPICY PLANTS

THESIS

SUBMITTED IN PARTIAL FULFILMENT FOR THE DEGREE

OF MASTER OF PREPARATION OF SCIENCE TEACHER

(BOTANY)

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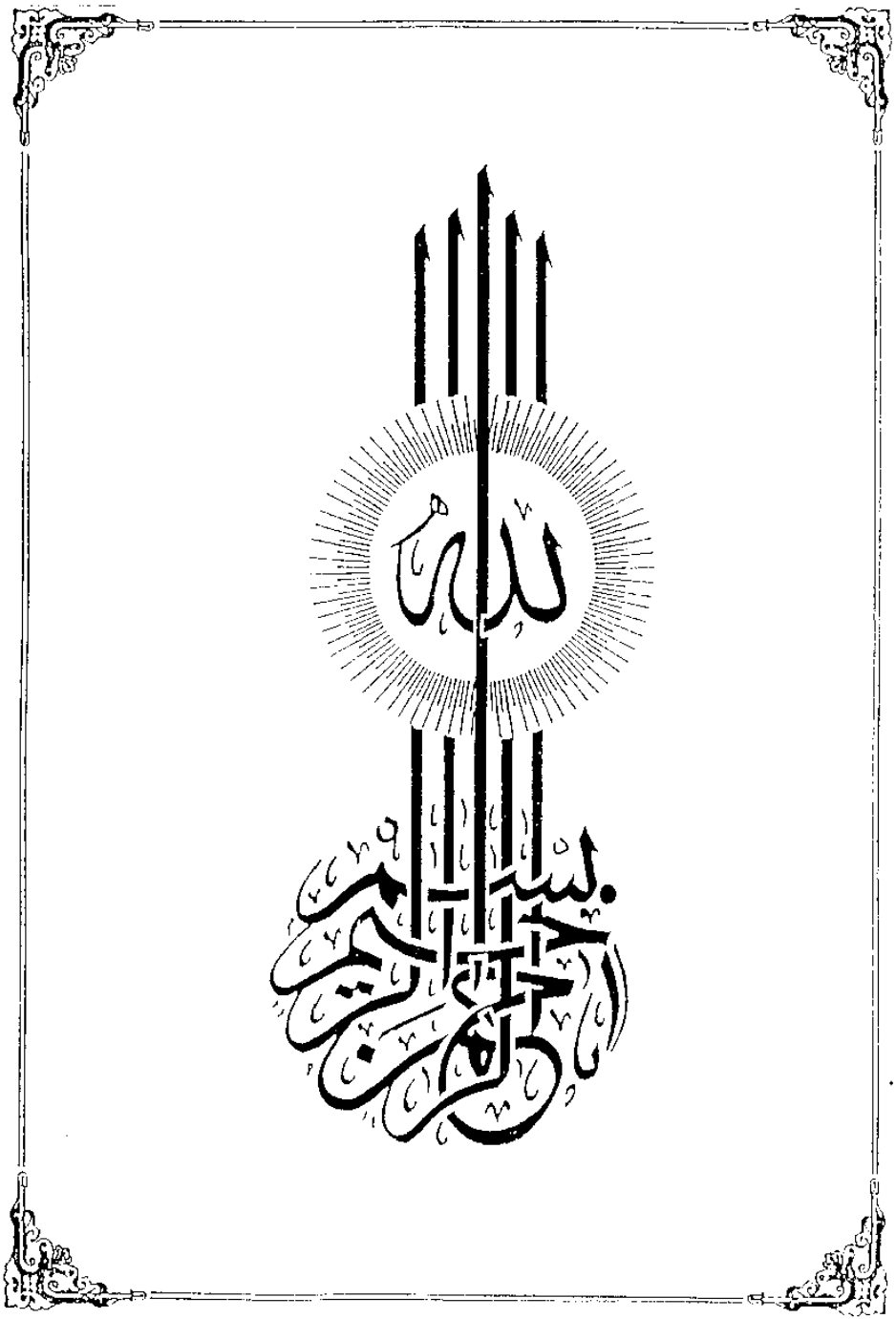
1992

Sometimes, the truest feelings are those we keep inside,
and though not often mentioned,
they are the most sincere

To my Wife and my Sara
they are my life



ACKNOWLEDGEMENT

The author wishes to express his profound, sincere appreciation and gratitude to Dr. Ahmed Fouad Afifi, Professor of Microbiology and Head of Biological Sciences and Geology Department, Faculty of Education, Ain Shams University, for suggesting the point of this study, constant supervision and for his guidance and helpful discussion during this work.

The author is greatly indebted and wishes to express his deep thanks to Dr. Ahmed Awad El-Gindy, Assistant Professor of Microbiology, Biological Sciences and Geology Department, Faculty of Education, Ain Shams University, for his continuous supervision, guidance and valuable help during preparation of this manuscript.

The author is thankful to Dr. Amin Dowidar, Professor of Physiology and Ex-head of Biological Sciences and Geology Department, Faculty of Education, Ain Shams University, for his continuous encouragement.

A word of thanks, a word of praise for my father, mother and wife for being so great in many ways which pushed me foreward.

This dissertation has not previously been submitted for any degree at this or any other university. The references in the text will show the extent to which I have availed myself of the work of other authors.

Hossam Hamdy.

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Preface

PREFACE

As a result of their metabolic activity, certain plant parts determine the existence of a specific type of fungal flora in their vicinity.

Spicy plants show a specific type of mutual interactions between their spermoplane, rhizoplane or phylloplane and their corresponding fungi.

In addition to the effect of these parts, exerted through their seed, root and leaf exudates as well as gaseous exudates emanated from them, they show a lesser or greater degree of volatility of oil contained in the seeds and leaves of such plants.

The aim of the present work is to study fungal flora of ***Anethum graveolens, Coriandrum sativum and Petroselinum sativum***. Therefore, the following points have been elucidated :

(1) Isolation and identification of fungal flora associated with seeds, roots and leaves of the experimental plants. The most abundant fungi were chosen for studying spermoplane, rhizoplane and phylloplane effect.

(2) Seed, root and leaf exudates were prepared and fractionated into their major constituents of amino acids,

sugars, organic acids and growth regulators using partition chromatography in addition to bioassay for the latter, in which coleoptile test of ***Hordeum*** for auxins and hypocotyl test of lettuce for gibberellins and gibberellin-like substances were made.

(3) Extraction and quantitative determination of volatile oils from seeds and leaves of the experimental plants. Thin layer chromatography was adopted for analysis of the oils.

(4) The effect of seed, root and leaf exudates of the experimental plants as well as their individual constituents on spore germination of the most abundant fungi was investigated.

(5) The effect of gaseous exudates emanated from seeds, roots and detached leaves in addition to essential oils extracted from seeds and leaves of the experimental plants on spore germination of the most abundant fungi was studied.

HISTORICAL REVIEW

Many species of the family umbellifereae usually used as a household remedies or as ingredients of medicine, and have a considerable economic value in the pharmaceutical industries. **Ayres et al. (1980)** and **Amin (1983)** identified spices as a varieties of plant parts with pungent fragrance and flavour used in ultraminute quantities to enrich, alter, or mask the flavour of food.

Essential oils of some spices are widely used medicinally as carminatives and mild stomachic. **Tresse (1961)** demonstrated that coriander seeds and its oil are employed widely in some specific fresh drinks, essences and or flavoring some kinds of food products such as souses, soups, baked goods and confectionery.

Wallis (1967) stated that dill is employed as an aromatic stimulant and carminative, being given to infants to relieve flatulence.

El-Shafey (1972) stated that the essential oils of ***Petroselinum sativum*** are of value in the treatment of cough, cold and urinary infections. The drug is in the form of a volatile oil, and it mainly contains apiol. He also stated

that its fresh leaves are used to decorate meat dishes and salads.

(A) Fungal flora associated with spicy plants :

Krishnaswamy et al. (1971) stated the presence of a variety of molds in spices. The spore densities of such molds were fluctuated from insignificant levels to many millions. **Flannigan (1976)** reported that cloves were mold free. **Takatori et al. (1978)** stated that cloves and star anise had no or low fungal associations, while high fungal associations were recovered in allspice, cardamom, chilli pepper, cinnamon, white pepper and some peppers. High microbial populations were recorded to be usually associated with black and white pepper by **Krishnaswamy et al. (1971) and Surkiewicz et al. (1972).**

Weiser et al. (1971) recorded that celery seeds, paprika and ginger contain relatively high microbial populations. **Farkas (1981)** found that black pepper, coriander and capsicum were of high microbial populations. **Srivastava and Chandra (1985)** reported a heavy fungal infestation ranging from 65% to 100% associated with four samples of seed spices, namely coriander, cumin, fennel and fenugreek. Twenty-three spices samples were examined for their mycological populations by **Takatori et al. (1978).** They found heavy to extremely heavy

fungal flora in allspice, cardamom, chilli pepper, cinnamon and white pepper samples, high fungal population in some pepper samples, while clove samples were of low fungal infestation. Hussein (1984) recorded high fungal count associated with garlic and cardamom.

Moreau and Moreau (1978) recorded the presence of the following genera in spices; i.e. ***Aspergillus, Absidia, Mucor, Rhizopus*** and ***Candida***. They also reported that species of ***Aspergillus, Fusarium, Alternaria, Rhizopus, Cladosporium, Chaetomium*** and ***Penicillium*** were the most frequent members of the seed mycoflora. ***Aspergillus, Penicillium, Cladosporium, Mucor, Rhizopus, Chaetomium, Fusarium*** and ***Paecilomyces*** were isolated by Wada et al. (1978) from garlic, red pepper, white pepper and black pepper.

Flannigan (1976) reported the presence of fungal flora associated with twenty different ground spices and three mixtures except cloves. The same author reported that ***Aspergillus glaucus*** and ***A. niger*** were predominant while ***A. flavus*** was found only in fourteen samples of spices. Dragoni (1978) found that pepper corns were heavily contaminated by ***Penicillium lanosocoeruleum***. Several species of ***Aspergillus*** namely ***A. glaucus, A. restricus, A. ochraceous*** and ***A. flavus*** were isolated from ground pepper by Ayres et al. (1980).