

OCCURRENCE OF HALOPHILIC FUNGI AND THEIR
METABOLIC ACTIVITIES INCLUDING AMYLASE
PRODUCTION

THESIS

Submitted For Partial Fulfillment of the
Requirements for the Degree of

MASTER OF SCIENCE
IN
MICROBIOLOGY



BY

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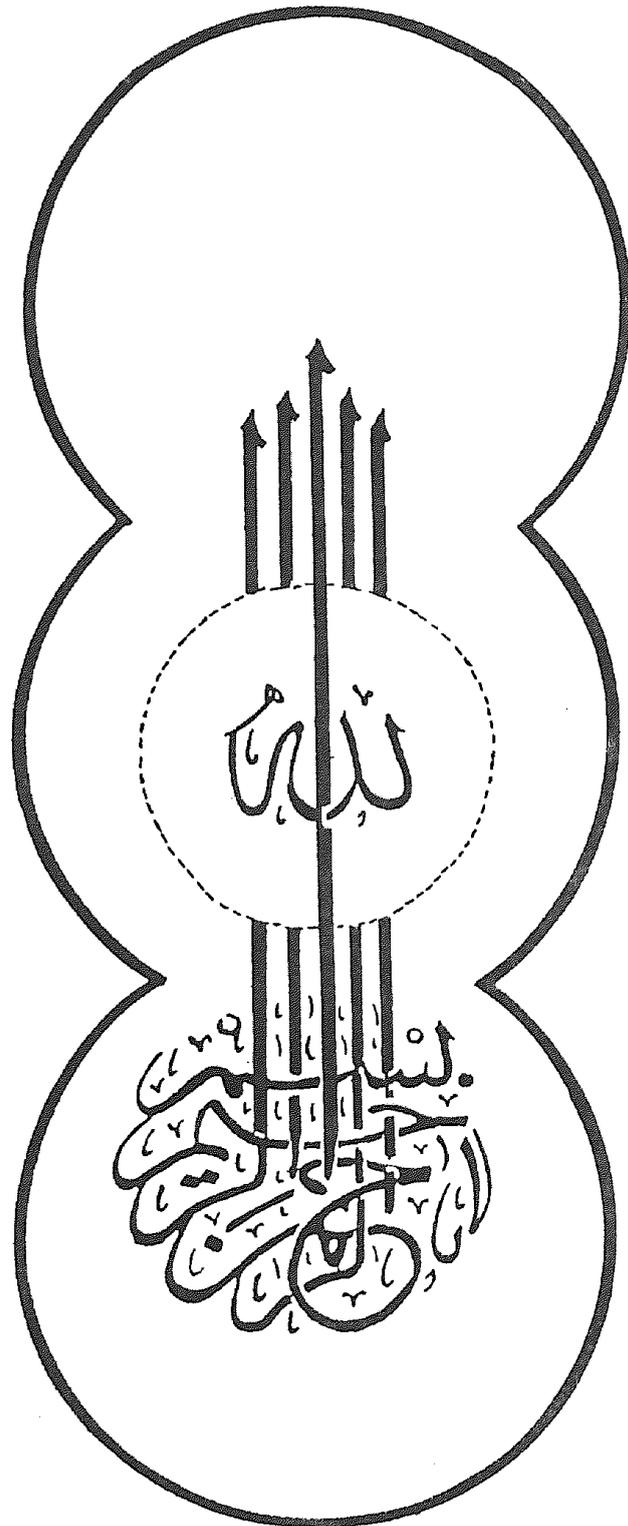
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A C K N O W L E D G E M E N T

I wish to express my deepest thanks and gratitude to **GOD** for helping me to be able to finish this thesis.

I wish to express my deepest thanks and gratitude to **Prof. Dr. KHAIRIYA . YOUSSEF**, Prof. of Microbiology, Botany Department, Faculty of Science, Ain Shams University for her supervision, guidance and helpful discussions during this work.

I wish also to express my deepest thanks and gratitude to **Prof. Dr. MUSTAFA EL-S. ABDULLA**, Prof. of Microbiology, Faculty of Education, Ain Shams University for his supervision, guidance and helpful discussions during this work.

I wish also to express my thanks to **Dr. RAWIA R. SAAD**, Lecturer of Microbiology, Faculty of Education, Ain Shams University, for her supervision during this work.

I wish also to thank **Prof. Dr. WAGEH EL-SAADAWI**, Head of Botany Department, Faculty of Science, Ain Shams University and **Prof. Dr. AHMED F. AFIFI**, Head of Biology Department, Faculty of Education, Ain Shams University, for their continuous help and encouragement.

*This thesis has not been previously submitted
to this or any other University*

In addition to to the present thesis the student has passed
an examination in the following courses:

- 1] Plant Physiology.
- 2] Microbiology.
- 3] Cytology and Cytogenetics.
- 4] Taxonomy.
- 5] Ecology.

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P R E F A C E

The ability of certain microorganisms to develop successfully in environment of high salinity stimulated the interest of microbiologists.

The present work was conducted to explore the potentiality of some halophilic fungi to produce α -amylase and proteins in appreciable amounts under conditions of high salinity. Two fungi namely Aspergillus stellatus and Penicillium purpurrescens were selected for the present study.

The most important nutritional and environmental factors which govern either proteins or α -amylase synthesis by Aspergillus stellatus and Penicillium purpurrescens were investigated.

Examination of the behaviour of the two halophilic fungi in presence of certain compounds was studied. These compounds were: low molecular weight alcohols, some chemicals, natural products and lipids.

The amino acids content of Aspergillus stellatus and Penicillium purpurrescens as affected by either sodium chloride concentration, potassium chloride concentration or sodium sulphate concentration was investigated.

The present investigation was also carried out to throw some lights on the response of α -amylase of halophilic fungi when treated with different concentrations of either sodium chloride, potassium chloride or sodium sulphate. Moreover, an

attempt was made to find out the importance of either protein or carbohydrate as an osmoregulatory agents in the metabolism of halophilic fungi.

PART I
A. INTRODUCTION
B. MATERIALS AND METHODS

PART I
A. INTRODUCTION

A. INTRODUCTION

Several investigations have been carried out on osmophilous and osmotolerant microorganisms. The term osmophily was introduced by Richter (1912) to describe microorganisms growing in the presence of high solute concentrations.

Osmophilic Fungi

Dale (1909) was able to grow some members of Aspergillus glaucus group in culture medium containing 20% sucrose.

Ohtsuki et al. (1950) noticed that the growth of Aspergillus glaucus var. tonophilus increased in Czapek's medium containing 60% sucrose. Harrold (1950) was able to grow Eremascus albus and E. fertilis in a medium which contained 40% sucrose. The two isolates were originally isolated from jam and mustard powder.

Christensen (1957) isolated Aspergillus sp. that contaminates stored rice grain by plating on malt agar containing 20% or on Czapek-Dox's agar medium with 80% sucrose.

Fungi recovered from rice grain were Aspergillus amstelodami, A. chevalieri, A. repens and A. ruber. These species, having osmophilic properties (Raper and Fennel, 1977).

Razak (1976) investigated the osmophilic mycoflora of spoilt local and foreign wheat meal. He isolated 12 fungal isolates capable of growth at 80% sucrose concentrations. Aspergilli were the most dominant.

Raper and Fennel (1977) noticed that Aspergillus halophilicus requires great amount of either salt or sugar (20%

NaCl or 70% sugar) for its optimum growth and development.

Saito (1952), isolated from salt marches Penicillium, Trichoderma, Fusarium, Mucor, Aspergillus, Pestalozzia and Zygorhynchus. Pugh (1962) reported the presence of Cephalosporium, Mucor, Aspergillus, Cercospora, Penicillium, Fusarium, Tricoderma and Mortierella as the most frequent fungi in a developing salt marsh. Moustafa and Al-Musallan (1975) in a survey of the mycoflora of saline soils in Kuwait obtained 75 fungal species. The growth of these fungi in medium containing different sugar concentrations indicated that few species were highly osmophilic, while most of them showed different degrees of osmotolerancy. Moustafa (1975) investigated the osmophilous fungi inhabiting saline soils in Kuwait, and noticed the dominance of Aspergillus, Alternaria, Penicillium, Cephalosporium, Fusarium, Stachybotrys and Drechslera. Osmophilic fungi isolated from Egyptian salt marches were studied by Abdel-Hafez et al. (1978). Thirteen genera were isolated on both 30% and 60% sucrose Czapek's agar medium. El-Abyad et al. (1979) studied the microflora of saline Egyptian soils. The total number of species isolated was sixty - five of which Aspergillus niger and A. flavus were abundant; A. flavipes was of moderate occurrence; A. carbonarius, A. fumigatus, A. ochraceus, A. terreus, Fusarium sp. and Spicaria silvatica were of low occurrence. Aspergillus was represented by eighteen