دراسة التوزيع الموسمي للفطريات في البيئة و تأثيرها على صحة الإنسان والحيوان وحساسيتها تجاه مضادات الفطريات.

رسالة مقدمة من

هبه برعي بشير أحمد

بكالوريوس علوم، جامعة القاهرة 2004

لاستكمال متطلبات الحصول علي درجة الماجستير
في العلوم البيئية

قسم العلوم الأساسية البيئية
معهد الدراسات والبحوث البيئية
جامعة عين شمس

2015

Study on the Seasonal Distribution of Fungi in the Environment, Their Effect on Human and Animal Health and Sensitivity to Antifungal Agent.

BY

HEBA BORAI BASHEER AHMED

B.Sc. **Sciences** . Cairo University, 2004

A Thesis Submitted in Partial Fulfillment
of
The Requirements for the Master Degree
in
Environmental Sciences

Department of Environmental Basic Sciences
Institute of Environmental Studies and Research
Ain Shams University

2015

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ABSTRACT

Fungi are among the most important aeroallergens. The major allergic diseases induced by fungi are asthema, rhinitis, and hypersensitivity pneumonia. The concentration of airborne fungal spores has been linked to wind, humidity, temperature, rainfall, altitude, vegetation and various specific reservoirs of contamination ***(TOPBAS et al., 2005)***. The aim of this study was to provide aeromycological baseline information for the first time about some areas in 6th October governorate (previously), Egypt (Monshat El Kanater, Embaba, El Ayat, Oceem Abo rawash, 6 th October city and El wahat), 104 air samples were collected from the aforementioned locations (56 outdoor and 48 indoor) during four year seasons from December 2009 to December 2010 and subjected for mycological study. The investigated areas are characterized by high populations, human activities including agriculture, trades, industry and animals grazing. Mycoaerospora samples were cultivated by gravitational method. Outdoor air samples revealed the isolation of 14 genera of fungi belonged to 19 species. The predominant fungi were *Asperigillus niger (4.41%) Asperigillus flavus (3.68%)* and *Cladosporium cladosporiodes (3.68%)* in falls season, *Asperigillus niger* (2.94%) in winter, *Rhodotorula mucilaginosa* (2.94%) in spring and *Asperigillus flavus (3.68 %)* in summer. Indoor air samples revealed the isolation of 19 genera of fungi included 20 species. The predominant fungi were *Asperigillus niger (6.02%)* in fall and spring, *Asperigillus niger*, *C. cladosporiodes* and *Mucor recemosis* (3.61%) in winter, *Asperigillus niger* and *C. cladosporiodes (3.61%)* in summer.

Soil from the same sites samples revealed the isolation of 19 genera which identified into 25 species. The predominant fungi in fall, winter and spring were *A.niger* which isolated in 5.18%, 5.93% and 5.93% respectively. *A.flavus* was the predominant fungi isolated in summer (2.96%). On the other hand in

soil contained with pigeon droppings; the pathogenic fungus (*Cryptococcus neoformance)* was isolated in 0.74%.

Keratinophilic fungi have been receiving considerable attention in recent days as these include dermatophytes and are able to degrade various types of keratinous substrates. Several opportunistic keratinophilic fungi with pathogenic potential are emerging rapidly. Keratinophilic fungi namely *M. gypseum* and *Chrysosporium tropicum* were isolated from soil collected from stock yards in 2.22% for each of them.

The antifungal effect of some traditional plant extracts (garlic-onion-black pepper) were tested on some isolated fungi, the susceptibility of fungi was different towards the different plant extracts. Garlic showed great antifungal effect against *Asperigillus niger, Asperigillus flavus, Fusarium oxysporum, Pinicillium chrysogynum* and *Candida albicans*, onion showed moderate antifungal effect against *Asperigillus flavus*, *Asperigillus fumigatus*, *Fusarium oxysporum*, *Pinicillium chrysogynum* and *Candida albicans.* While black pepper showed antifungal effect only against *Asperigillus niger* and *Pinicillium chrysogynum*.

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INTRODUCTION

Many microorganisms present in the air, including viruses, bacteria, and fungi are associated with diseases occurring in humans, plants and animals. Fungi were found everywhere in the water, air and soil. The problem start when their concentration is high and they find proper conditions for growth, such as high humidity and suitable temperature ***(Bugajny., 2004).*** Fungi are widespread all over the world, and high environmental burdens have been shown to be affected by various factors such as wind, moisture, and temperature and air pollution leading to variations with respect to species and quantities from one season to another. Fungal spores and hyphal fragments are commonly observed in aerosol samples collected from outdoor and/ or indoor environments. Exposure to bioaerosol particles associated with common fungi (mould) in the indoor environments of residences, offices and schools has increasingly become a public health concern. ***(Godish et al. 2007)***

There are many studies from different geographic areas which indicate that bronchial asthma and allergic rhinitis reacted positively to fungal extracts and that higher symptom scores in asthmatic children correlate well with higher fungal exposures in indoor dwellings. Moreover, with radiotherapy, corticosteroid and immunosuppressive treatments, there is a tendency towards opportunistic systematic fungus infections such as Aspergillosis, Mucormycosis, Penicillosis, brain abscess, pneumonitis and Endocarditic especially in diabetes mellitus, bronchiectasia, and emphysema ***(TOPBAS et al., 2005).***

Candida spp. constitutes the third to fourth most common causes of nosocomial blood stream infection. *Aspergillus spp.* is the most common cause of infectious pneumonic mortality in haematopoietic transplant recipients.

Cryptococcus neoformans is the most common cause of fungal-related mortality in human immunodeficiency virus (HIV)-infected patients. Although these organisms are important pathogens, less common but emerging fungal pathogens also cause morbidity and mortality in an increasingly expanding immunocompromised patient population ***(Walsh et al.2004).***

The soils represent the main reservoir of fungi. Some soil fungi are potential pathogen to both human and animals. Soils that are rich in keratinous materials are the most conductive for the growth and occurrence of keratinophilic fungi. The potentially pathogenic keratinophilic fungi and allied geophilic-dermatophytic species are widespread worldwide ***(Shadzi et al., 2001).***

The soil in farmyard, park, street and desert contained organic material are the best candidate for growth of keratinolytic and saprophytic fungi. Most dematiaceous fungi are ubiquitous, are cosmopolitan saprobes of soil and decaying matter, and are pathogens of plants. As a result, dematiaceous fungal infections occur worldwide. ***(Shtayeh et al., 2000).***