The Second International Conference on Mycology in MENA (ICM-2018)
"Fungi in a Changing World"

ASfC
ISMAILIA, EGYPT
16-18 OCTOBER 2018

ABSTRACT BOOK

CABI

The Second International Conference on Mycology in MENA (ICM-2018)

"Fungi in a Changing World"

Organized By: Arab Society for Fungal Conservation

Under the auspices of;

- President of Suez Canal University

Prof. Atef M. Abo El-Nour

- Vice President of Suez Canal University for Graduate Studies and Research

Prof. Magda M. Hagras

- Dean of the Faculty of Science

Prof. Mohamed S. Zaghloul

- Vice Dean for Graduate Studies and Research, Faculty of Science

Prof. Fayez M. Semeda

- Conference Chairman

Prof. Youssef A. Gherbaway

- Conference General Secretary and ASFC President

A. Prof. Ahmed M. Abdel-Azeem

Notes

ASFC

ICM-2018
EGYPT

The Second International Conference on Mycology in MENA (ICM-2018)

Theme of Conference:
"Fungi in a Changing World"

Organized By:

Arab Society for Fungal Conservation

"Dedicated to late Professor Abdel-Al H. Moubasher, the god father of mycology in Egypt and Arab Countries"

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Welcome,

On behalf of the University of Suez Canal, I'm greatly honored and pleased to welcome you all to the 2nd international conference on Mycology in Middle East and North Africa: "Fungi in a Changing World" which is held at the Suez Canal University, Ismailia, Egypt on 16-18 October, 2018. The conference is organized by Arab Society for Fungal Conservation (ASFC- Botany Department, Faculty of Science) and Suez Canal University and includes plenary lectures, specialized workshop, poster and oral sessions. It is our great pleasure and privilege to have Professor Waseem ElSessy the famous Egyptologist, Professor Andreas Bruder from Switzerland, Professor Bhim Singh from India, Professor Giovanna Cristina Varese from Italy and Professor Michael Weiß from Germany to join us for this conference.

I encourage everyone to take the opportunity to participate actively in this event and I hope you enjoy staying with us and have fruitful time.

Prof. Atef M. Abo El-Nour

President of
Suez Canal University

Welcome,

It is my pleasure to welcome our distinguished scientists and researchers from inside and outside Egypt in the 2nd international conference on Mycology in Middle East and North Africa.

I would like to express my great gratitude to Arab Society for Fungal Conservation and Botany Department, Faculty of Science, Suez Canal University for their scientific effort to propagate the important ways to preserve fungi and the possibilities to benefit from it.

The conference provides an opportunity to exchange ideas and experiences on all aspects of fungal biology. This conference allows knowledge transfer and proper networking through the fruitful discussion with our international and national pioneers: Prof. Andreas Bruder from Switzerland, Prof. Bhim Singh from India, Prof. Giovanna Cristina Varese from Italy, Prof. Michael Weiß from Germany, Prof. Waseem ElSessy the famous Egyptologist, Prof. Zakaria Baka and A. Prof. Ahmed Abdel-Azeem from Egypt.

Wishing you a successful conference that achieves all its goal.

Prof. Magda M. Hagras

Vice President of Suez Canal University for Graduate Studies and Research

Welcome,

Humans have been indirectly aware of fungi since the first loaf of leavened bread was baked and the first tub of grape must was turned into wine. Ancient peoples were familiar with the ravages of fungi in agriculture. Fungi are everywhere in very large numbers—in the soil and the air, in lakes, rivers, and seas, on and within plants and animals, in food and clothing, and in the human body concealing a vast fungal biodiversity. An approximation of the total number of fungal species on Earth remains an elusive goal, but estimates should include fungal species hidden in associations with other organisms. Together with bacteria, fungi are responsible for breaking down organic matter and releasing carbon, oxygen, nitrogen, and phosphorus into the soil and the atmosphere. Fungi are essential to many household and industrial processes, notably the making of bread, wine, beer, and certain cheeses. Fungi are also used as food; for example, some mushrooms, morels, and truffles are epicurean delicacies, and mycoproteins (fungal proteins), derived from the mycelia of certain species of fungi, are used to make foods that are high in protein.

Fungi conservation is an important issue with mycologists, naturalists or conservationists; however, a wider appreciation of the fungi is needed because of their far-reaching influence on the functioning of ecosystems. Fungi profoundly affect ecosystems by different ways including mediating nutrient and water uptake, protecting roots from pathogens and environmental extremes, and maintaining soil structure and forest food webs. Diversity of fungi likely aids ecosystem resilience in the face of changing environmental factors such as pollution and global climate change. Concerns over decline of fungi have centered on pollution effects, habitat alteration, and effects of overharvest. Various atmospheric pollutants have had serious direct effects by acidifying and nitrifying soils and indirect effects by decreasing the vitality of Ectomycorrhizal fungi-dependent host trees. In addition, a reduction in Ectomycorrhizal fungi- diversity has been documented where the distribution of host plants have been reduced, intensively used, or simplified.

The International Conference on Mycology, organized by the Arab Society for Fungal Conservation and Suez Canal University will take place from 16th October to 18th October 2018 at the Suez Canal University in Ismailia, Egypt. The conference will cover areas like bacterial-fungal interactions, beneficial and harmful effects, clinical mycology, enzymes and their types, and food mycology. It is a great pleasure to welcome you all, researchers and leaders from scientific organizations, to Ismailia for participating at this prestigious scientific event. I encourage you to take the opportunity to participate actively in this event and I hope you enjoy staying with us and have fruitful time.

Prof. Mohamed S. Zaghloul

The Dean of Faculty of Science, Suez Canal University

Welcome,

Dear Delegates of ICM-2018,

On behalf of the Arab Society for Fungal Conservation (ASFC) and the host organization the Suez Canal University (SCU), I welcome you to the 2nd International Conference on Mycology in MENA.

Every two years, the mycologists of the world gather to share the latest, cutting-edge research on all aspects of fungal biology. We are excited for this opportunity to meet in Ismailia in the spectacular SCU Conference Main Hall for what we know will be a fantastic meeting filled with informative keynote addresses, in-depth symposia, intriguing poster presentations, and workshops.

The Local Organizing Committee, led by chair Ishrak Khafagy and co-chair Abdelghafar Abo Elsouad, overcame enormous obstacles, and I owe them tremendous thanks for their efforts for this congress with special thanks to Amr El Kelish for his unlimited support. The Scientific Programme Committee led by chair Bhim Singh and co-chair Zakaria Baka have toiled for the past year assembling the diverse scientific program of the meeting.

The ASFC is extremely grateful to these committees and all who dedicated their time and energy to the organization of this meeting, the Faculty of Science at SCU for their support of the local organizing committee, and to all the sponsors for their contributions to the success of the meeting.

I would like to say that ICM-MENA 2018 conference is dedicated to late Professor Abdel-Al H. Moubasher, the god father of mycology in Egypt and Arab Countries.

I expect ICM-2018 to follow in the footsteps of previous congress as a life-changing, mycology affirming experience for all delegates. We are particularly happy to welcome students to the meeting. Please take the opportunity to interact with as many of your colleagues as you can, whether you are a student, a professor or an emeritus. The world of mycology is here. Embrace it.

A. Prof. Ahmed M. Abdel-Azeem

President of Arab Society for Fungal Conservation

Welcome,

It is a great pleasure, as the president of the International Mycological Association (IMA) to welcome A/Prof. Ahmed Abdel-Azeem, the current president of the Arab Society for Fungal Conservation, on the executive committee of IMA. This manifests Arab mycology within an international context. The founding of the Arab Society for Fungal Conservation in 2011 established the basis to diverse research into fungal conservation and mycology in general in the Arab world. Huge progress has been made since 2011, with the Frist International Conference on Fungal Conservation in the Middle East and North Africa taking place from the 18-20 October 2016 at the Suez Canal University, Ismailia, Egypt, covering a wide range of mycology related topics. It is with great interest to see the expansion of the themes to be covered at the upcoming International Conference on Mycology in MENA (ICM-2018), which is again held from 16-18. October 2018 at the Suez Canal University, Ismailia, Egypt. ICM-2018 is the 2nd in an ongoing series of international conferences on Mycology, Fungi and Fungal Biology organized by the Arab Society for Fungal Conservation. The conference will cover a range of scientific topics, from bacterial-fungal interactions, to medical mycology, food mycology, fungal immunology, fungal diversity and conservation, systematics, phylogeny and evolution, to veterinary mycology, to mention only a few. The IMA sends its greetings to the Arabian mycologists and whishes ICM-2018 a great success providing a forum for all mycologists from the region to exchange ideas and present results of their research on fungi to tackle the problems arising on a daily-bases. I wish the ICM-2018 Chair Prof. Youssuf Gherbawy and the ICM-2018 General Secretary A/Prof. Ahmed Abdel-Azeem all the best for the organization of the congress and all the conference participants a productive time in Ismailia. I am looking forward to work together with our Arab peers over the next 4 years as President of IMA.

Sydney 18. September 2018

Prof. Dr. rer. nat. Wieland Meyer

President of IMA

Programme: ICM-MENA 2018 Agenda

The Registration Desk will be open on **Tuesday 16 October 2018** from 8.30 to 10.00 at ***University of Suez Canal University' Conference Main Hall (The new university campus)***. If you arrive at the Conference later than that time, please find **Dr. Amr Adel ElKelish***, (+201005145454) the member of Conference Organizing Committee, and he will organize your registration.

Tuesday 16th

8:30 – 10:00	Registration
Opening Ceremony Moderator: **Dr. Amr A. Elkelish** (Local Organizing Committee)	
10:00 – 10:45	National Anthem Welcome Speeches - Prof. Ishrak Khafagy Chairman of Organizing Committee - A. Prof. Ahmed Abdel-Azeem Conference's General Secretary and President of ASFC - Prof. Youssef Gherbaway Conference's Chairman - Prof. Mohamed Saad Zaghloul The Dean of Faculty of Science-Suez Canal University - Prof. Magda Hagras Vice President for Graduate Studies and Research-Suez Canal University - Prof. Atef Abou El-Nour President of Suez Canal University
10:45- 11:00	Group Photo
11:00 – 11:30	*Networking Coffee Break*
11:30 – 12:30	Opening Keynote Speech Moderator: A. Prof. Abdelghafar Abu Elsaoud (Local Organizing Committee) - Dr. Waseem ElSeesy Egyptian urologist and Egyptologist "Medicine and other Sciences in Ancient Egypt"
Symposium I: Fungi in a Changing World Session I Moderators: Prof. Samira R. Mansour and Prof. Ishrak Khafagy	
12:30 – 14:00	Opening Keynote Speeches
12:30-13:15	- Ahmed M. Abdel-Azeem President of ASFC, Faculty of Science, Suez Canal University, Egypt. "Fungi in Egypt: A galaxy to discover"
13:15-14:00	- Andreas Bruder University of Applied Sciences and Arts of Southern Switzerland, Switzerland. "Ecology of aquatic hyphomycetes and the role of biodiversity"
14:00 – 15:00	*Lunch*

Symposium 2: Fungal Biotechnology Session I Moderators: **Prof. Michael Weiß, Prof. Atef M. Diab and Prof. Mohamed A. Abdel-Rahman**		
15:00 – 15:45	**Opening Keynote Speech** **- Bhim Singh** Department of Biotechnology, University of Mizoram, India. **"Biosynthetic potential of endophytic fungi and their applications in health and industry"**	
15:45 – 16:15	**- Mohamed El-Metwally** Botany and Microbiology Department, Faculty of Science, Damanhour University, Egypt.	**Mycoviruses: more understanding for more applications.**
16:15 – 16:30	**- Adel M. Ramadan** Microbiology Department, Faculty of Science, Ain Shams University, Egypt.	Biosynthesis of nanosilver using *Chaetomium globosum* and its application to control *Fusarium* wilt of tomato in the greenhouse.

Wednesday 17th

Symposium 3: Beneficial and Harmful Effects Session I Moderators: Prof. **Samira R, Mansour,** Prof. **Andrea Bruder and** Prof. **Mohammad El-Metwally**		
09:00 – 11:15 09:00-09:45 09:45-10:30 10:30-11:15	**Opening Keynote Speeches** **- Giovanna Cristina Varese** University of Turin, Italy. **"Fungi in Bioremediation"** **- Michael A. Weiß** Steinbeis Innovation Center, Germany. **"Tear down those walls! Why ecological categorisation may prevent us from acknowledging the complexity of fungal-root symbioses"** **- Zakria Baka** Damietta University, Egypt. **"Ultrastructure of Rust Fungi"**	
11:15 – 12:00	***Networking Coffee Break***	
Symposium 3: Beneficial and Harmful Effects Session II Moderators: **Prof. Mohamed A. Omran, Prof. Mohamed Abdel-Razik and Prof. Mamdouh Serag**		
12:00 - 12:20	**- Yasser Awad** Faculty of Agriculture, Suez Canal University, Egypt	**Improving the soil-plant ecosystem function and productivity through the applications of biochar and beneficial microorganisms.**
12:20 – 12:40	**- Amr Elkelish** Faculty of Science, Suez Canal University, Egypt	**Amelioration of abiotic stress tolerance in plants by endophytic microbiome.**
12:40 – 13:00	**- Amira Darwish** Food Technology Department, SRTA-City, Alexandria, Egypt.	**Fungal mycotoxins and natural antioxidants: Two sides of the same coin and significance in food safety.**
13:00 – 13:15	**- Shahzad Khan** The University of Poonch Rawalakot, Pakistan	**Immunotoxicopathological effect of experimental ochratoxicosis on Broilers.**

13:15- 13:30	- Abbas Ammari Diyala University, Baghdad, Iraq.	Molecular characterization of *Malassezia furfur* using ITS gene as a genetic marker in nuclear DNA.
13:30 – 13:45	- Bassem A. Balbol Microbiology Department, Faculty of Dentistry, October University for Modern Sciences and Arts, Egypt.	Production of L-Asparaginase enzyme from endophytic *Lasiodiplodia theobromae* hosted *Teucrium polium*.
13:45-14:00	- Zeinab A. Sayed-Ahmed Food Hygiene Research Unit, Animal Health Research Institute, Alexandria, Egypt.	Mycobiota and aflatoxins in some Egyptian dairy products.
14:00 – 15:00	*Lunch*	
Symposium 4: Fungi and Climate Changes Session I Moderators: **Prof. Amal A. H. Saleh and A. Prof. Ahmed Abdel-Azeem**		
15:00 – 15:20	- Abdelghafar Abu Elsaoud Botany Department, Faculty of Science, Suez Canal University, Egypt.	Effect of climate change on plants and Fungi: A special impact on phenylpropanoid pathway.
15:20 - 15:35	- Marica Lewis Malta Mycological Association, Malta.	An Assessment of Macro Fungal Diversity on the Maltese Islands.
15:35 - 16:00	*Networking Coffee Break*	
Symposium 5: Arab Society for Fungal Conservation (Students and Volunteers Section) Session I: Egyptian Fungi where and to where? Moderators: **A. Prof. Yasser Awad, Dr. Amr Elkelish and Dr. Amira Darwish**		
16:00 - 16:15	- Dalia S. Youssef Arab Society for Fungal Conservation, Faculty of Science, Suez Canal University, Egypt.	Mycotoxins and cancer: Awareness amongst children and youth.
16:15 - 16:30	- Mohamed A. Abdel-Azeem Faculty of Pharmacy, Sinai University, Egypt.	Endophytes-mines of pharmacological therapeutics.
16:30 - 16:45	- Mahmoud M. El-Ansary Botany Department, Faculty of Science, Suez Canal University, Egypt.	Saving the forgotten kingdom in Egypt.
16:45 - 17:00	- Mariam K. Moussa Botany Department, Faculty of Science, Suez Canal University, Egypt.	Egypt's national fungus day.
17:00 - 17:15	- Fady S. Shawky Botany Department, Faculty of Science, Suez Canal University, Egypt.	How many species of lichens are there in Egypt?
17:15 - 17:30	- Safaa A. Mansour Botany Department, Faculty of Science, Suez Canal University, Egypt.	Conserve the plant pathogenic fungus *Ganoderma*: An introduction to a business opportunity in Egypt.

Fungi, Biotechnology and Cultural Heritage Session I Moderators: Prof. Bhim P. Singh, Prof. Ishrak Khafagy and Prof. Mohamed A. Abdel-Rahman		
09:00 – 09:15	- Dalia M. Sabri Institute of Biotechnology for Postgraduate & Research, Suez Canal University, Egypt.	Biotechnology Institute in Suez Canal University where and to where?
09:15 – 09:30	- Ahmed M. Abdel-Azeem Botany Department, Faculty of Science, Suez Canal University, Egypt.	Fungi and the second ceremonial boat of the Pharaoh Cheops.
9:30 – 10:00	A movie dedicated by: **Dr. Jean Mouchacca** to ICM-MENA 2018 Natural History Museum, France.	RAMSES II Fungi – A film about examination of Ramses II mummy in France.
10:30 – 11:00	*Networking Coffee Break*	
Poster Session		
11:00 - 13:00	Assessment of Posters	
13:00 - 14:30	*Break*	
Conference's Workshop		
10:00 - 13:00	Workshop on Marine Fungi: the missing tile in the Ocean Biodiversity mosaic. By: **Giovanna Cristina Varese**	
14:30 – 15:15	Closing Ceremony Moderators: Prof. Ishrak Khafagy and Dr. Amr Elkelish Honors, Appreciation Certificates and Prizes Recommendations Moderator: A. Prof. Ahmed M. Abdel-Azeem	
15:15 – 15:30	Group Photo	
15:30	End of Conference	

KEYNOTE SPEAKERS

Biographies and Abstracts

- Waseem ElSessy
- Ahmed Abdel-Azeem
- Andreas Bruder
- Bhim P. Singh
- Giovanna Cristina Varese
- Michael Weiß
- Zakaria Baka

Wassem ElSeesy

Egyptian urologist and Egyptologist, Egypt.

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Dr. Waseem is the consultant urologist and surgeon in many educational hospitals. He holds a fellowship of the Royal Colleges of Surgeons (FRCS) in the United Kingdom and American college of Surgeons (FACS). Waseem is a member in the Aerial Phenomena Research Organization (APRO). He published many scientific papers on urology. He is the inventor of a patented instrument used in urology and the author of a book, Critical Medical Survey of Love and Sex (Cairo: Engineering Center for Printing and Publishing, 3rd. ed., 1999). He is also a researcher in ancient Egyptian history and has a weekly column on issues in Egyptology in Rose-el-Youssef. He is the founder of El-Maadi Cultural Salon and published many books related to ancient Egypt i.e. Medicine in ancient Egypt; This is Egypt; Egypt taught the world...etc. TV presenter of many programs like Yaro, The down of conscience....etc

Session Title
Honorary Session: Egypt: the Cradle of Civilization

Abstract

Medicine and other sciences in ancient Egypt

Ancient Egyptians had a widespread reputation for their medical knowledge. Homer's Odyssey mentions that the physicians of Egypt were skilled beyond all others, and Warren R. Dawson (1924) wrote, "There is no doubt that ancient Egyptians were a highly gifted people with a great capacity for practical achievement." Herodotus said that each of the physicians of Egypt was a specialist who had committed himself to the study of one particular branch of medicine. Many of the foundations of medical science were established in Egypt more than fifty centuries ago. We can document this with the rich archival material left behind by the ancient Egyptians. Time has spared for our admiration a mass of documentary evidence, the so-called medical papyri (Nunn, 1997: 30–41).

In my presentation I will discuss that the cities of San El-Hagar, Heliopolis and Menouf city of Badrashin had schools and universities to teach medicine and pharmacy. Also the medical information was kept on papyrus and walls of the temples, and the surgical machines founded in the temple of "Kom Ombo" Nubia is a number of scales to check the control of drugs.

Ahmed Abdel-Azeem

Conference General Secretary, Associate Professor at Suez Canal University, Founder and President of Arab Society for Fungal Conservation (ASFC), Executive Committee member of IMA, Egypt.
zemo3000@yahoo.com

A. Prof. Abdel-Azeem is currently working as academic staff member and mycologist with particular interest in the ecology, taxonomy, biology, and conservation of fungi and his specialist interest is members of the phylum Ascomycota. His research includes isolation, identification and taxonomic assessments of these fungi with particular emphasis on those which produce bioactive materials from different ecological habitats. Most recently he has become interested in the effect of climate change on fungi. This in turn has led him to become involved in fungal conservation. He is a member of the IUCN Species Survival Commission Specialist Group for Cup Fungi, Truffles & their Allies, and also the Founder of the Arab Society for Fungal Conservation. He got different grants and fellowships e.g. EOL fellow in 2011, Mohamed Bin Zayed Species Conservation fund in 2014 and 2018, National Geographic Society Fund in 2016. In 2018 Abdel-Azeem was elected to be the first Egyptian and Arabic mycologist as a member in the executive Committee of International Mycological Association (IMA). He was hired for his experience in taxonomy, ecology, biology, and conservation of fungi to study the fungi in ancient air of unveiled Cheops Solar Boat Project and fungi degraded ancient wood in Abydos Middle Cemetery Project. He studied the biodiversity of fungi in Romania, UK, US, Finland, Sweden, Italy and Greece. He is the editor in chief of Microbial Biosystems Journal (MBJ) and a reviewer in more than 7 international journals. Abdel-Azeem published more than 53 research papers journals, 4 book chapters in the books published by international publishers and five books. Dr. Abdel-Azeem is also editing one book published from Springer publication.

Session Title
Plenary Session: Fungi in a Changing World

Abstract

Fungi in Egypt: A galaxy to discover

Fungi are different from animals and plants. Since at least 1970, scientists have agreed that fungi belong in their own separate biological kingdom which is likely to contain far more species than the plant kingdom. Where plants produce and animals consume, fungi are the recyclers. Fungi are just as much threatened as animals and plants by climate change, habitat destruction, invasives, pollution, over-exploitation and even, in some cases, persecution. Habitats important for threatened fungi may be different from habitats important for threatened animals and plants. Biodiversity can only be conserved if the well-being of fungi is given as much consideration as that of animals and plants: without fungi life on earth would be unsustainable. Fungi provide enormously important ecosystem services (e.g. soil fertility, mycorrhizas, crop protection, litter decomposition, checks and

balances). The economic value of such services has been estimated as running to trillions of US dollars. Fungi are also a very important source of unusual chemicals of great value in industry and medicine. The yeast used to make bread is a fungus, and many pharmaceuticals such as antibiotics, statins and anti-cancer drugs are derived from fungi.

Egypt is considered the cradle of mycology where ancient Egyptians documented the use of fungi on walls and pillars of temples, within hieroglyphic texts, ear studs and medical prescriptions since 5619 B.C. Ancient Egyptians believed that some mushrooms were plants of immortality and called them “a gift from the God Osiris” and symbolized as Was, Djed pillar of Osiris, and ankh (crux ansata). Egyptian pharaohs proclaimed mushrooms to be food reserved only for royalty; common people were not even allowed to touch them. The Pharaohs of ancient Egypt believed they had magical powers. Egyptian crowns (white and triple) were inspired from the primordia of Psilocybe cubensis. The most ancient historical use of truffles probably originated prehistorically in the mideastern and North African cradles of civilization. Species of desert truffles (Terfezia, Tirmania and Phaeangium) probably served to the Pharaohs. Better descriptions of the kind of desert truffles that the pharaohs of Egypt may have consumed, along with an ancient version of traditional truffle preparations still popular in North Africa and the Middle East, can be found in the Bible. In the seventh century Prophet Muhammad (PBUH) said a hadith to his followers “Truffles are a part of manna and its juice is healing for the eyes”.

At the present time the total of the fungal names recorded in Egypt amounts to 2477, a figure apparently exceeding that of the higher plants developing in this country. This marked figure resulted from an exhaustive revision of all the existing literature and information sources established since the year 1813 up to the middle of the current one by Abdel-Azeem. On the kingdom level Fungi came first by 2230 species followed by Chromistan fungal analogues (186) and Protozoan fungal analogues (61) respectively. The Ascomycota form the single largest group within this checklist, with about 1762 species, of which about 158 are lichen-forming, and about 1000 are known only from their conidial (asexual) states, 90 belonging to Chytridiomycota, 27 to Blastocladiomycota, 70 to Zygomycota, 48 to Glomeromycota, and 233 to Basidiomycota.

Fungi are considered to be in urgent need of conservation by the British Mycological Society on the grounds that it is a traditionally neglected taxon which has legal protection in few countries. Current threats to fungi include destruction of forests worldwide, fragmentation of habitat, changes in land use, pollution, anthropogenic climate change and over-exploitation of commercially attractive species

Formal fungal conservation efforts in Egypt began in the early 2010s with idea of founded the Arab Society for Fungal conservation (ASFC) by Abdel-Azeem and his co-workers aimed at promotion, protection and development of ecosystems, habitats and wildlife and its diverse especially fungi from different aspects, and raise awareness of the importance of fungal conservation and access to more economic methods of sustainable and harmonious with the nature of human life in Egypt and the Arab world.

Conservation strategies are an important way of acheiving consensus between stakeholders and communicating priorities for fungal conservation action. This proposed strategy for fungal conservation in Egypt has its origins in the 'Convention on Biological Diversity' (CBD), one result from the Rio Earth Summit in 1992, and have been developed from the 'Global Strategy for Plant Conservation'.

A five objectives' strategy proposed by ASFC is taking a lead in fungus conservation in Egypt and will contribute significant progress to fill the gaps concerning fungal biodiversity and conservation in Egypt's National Biodiversity Strategy and Action plan to 2030.

Egyptian fungal biodiversity may benefit from many general conservation efforts, but many specific fungus values are also overlooked. We advocate increased interaction between scientists, politicians, conservation coordinators and practitioners, greater promotion of fungi and their conservation and ecosystem service values by mycologists, the production of Egyptian fungal Red-List and the need to integrate fungi with animals and plants in conservation issues.

Andreas Bruder

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Session Title
Plenary Session: Fungi in a Changing World

Abstract
Ecology of aquatic hyphomycetes and the role of biodiversity

Aquatic hyphomycetes (or Ingoldian fungi) represent a polyphyletic group of microscopic fungi, which have their main habitat in well-oxygenated streams, mainly headwaters. The group is mainly composed of ascomycetes with a minority of basidiomycetes (± 10%; Bärlocher 2010) and widely distributed in most biomes worldwide. As almost exclusive saprotrophs, principal ecological roles of aquatic hyphomycetes center on decomposition of allochthonous plant litter, which is dominated by abscised leaves from the riparian vegetation surrounding streams. For most food webs of headwater streams, allochthonous leaf litter is the main resource since primary production is limited by shading

from the riparian vegetation. Aquatic hyphomycete colonize leaf litter with their abundant conidia (concentrations up to 30`000 conidia per liter stream water) and develop their mycelium therein. Most species of aquatic hyphomycetes have the enzymatic capacity to degrade refractory compounds of leaves, including lignin and hemicellulose, but also more labile polysaccharids. Moreover, they often assimilate nutrients from the water column.

In addition to their own resource use, aquatic hyphomycetes play thus crucial roles in detrital food webs in streams by improving leaf litter quality for higher trophic levels, mainly invertebrate detritivores (Tank *et al.* 2010). However, the activity of aquatic hyphomycetes also depends on litter quality, i.e. it often correlates positively with nutrient concentrations in the litter tissue but negatively with concentrations of lignin and polyphenols (Bruder *et al.* 2011). These processes are mirrored in litter layers of forest floors, where other groups of saprotrophic fungi perform similar ecological roles as aquatic hyphomycetes do in streams.

Headwater stream ecosystems are important in terms of their abundance and ubiquity but also because of their disproportionally high biodiversity. They contribute substantially to the total biodiversity of freshwaters, which comprises approximately 6% of all described species while covering only about 0.8% of Earth's surface (Dudgeon *et al.* 2006). While these estimates are mainly based on vertebrate and plant species, the biodiversity of microbes including fungi is vastly understudied. However, there is no indication that these estimates substantially differ for microbial biodiversity.

Furthermore, stream ecosystems are important for adjacent terrestrial ecosystems and for many terrestrial and marine species that rely on stream ecosystems for parts of their life cycle. Due to their position at the deepest point in the landscape and the various services they provide for human societies, stream ecosystems are also among the most threatened and impacted by human activities. Human uses of the land and the water modify habitat availability and physical and chemical water quality, result in pollution and facilitate species invasions (Dudgeon *et al.* 2006). As a consequence of these impacts, biodiversity of freshwaters has been declining rapidly during the past decades, probably faster than in most other ecosystem types (Millenium Ecosystem Assessment 2005). Studies have provided evidence on the negative impacts of raising temperatures, stream acidification, and pollution by excess nutrients and heavy metals on the biodiversity and activity of aquatic hyphomycetes. These ongoing environmental changes warrant enquiries into the consequences of biodiversity loss on stream ecosystem functioning in general and on detrital food webs in streams and on aquatic hyphomycetes in particular (Gessner *et al.* 2010).

As the main goal of my presentation, I will take the opportunity to highlight the role of aquatic hyphomycetes in stream ecosystems. I will present and discuss examples of the role of biodiversity gradients on the activity of aquatic hyphomycetes. These examples will be drawn from recent field- and laboratory experiments. Due to the intimate connection and the importance of the processes, I will also provide examples on the influence of biodiversity of resources, i.e. of leaf litter on the activity of aquatic hyphomycetes. I will show examples where leaf litter identity had extreme consequences on decomposition rates controlled by aquatic hyphomycetes, which could be explained by litter quality. Other examples provide indication that increasing richness of leaf litter and fungal species had positive effects on the activity of aquatic hyphomycetes and in turn on litter decomposition rates. More detailed experimental designs allowed testing the influence of species richness on aquatic hyphomycetes in combination to that of litter quality. These results provide indications on influences across diverse litter species in complex but realistic litter assemblages during decomposition by aquatic hyphomycetes.

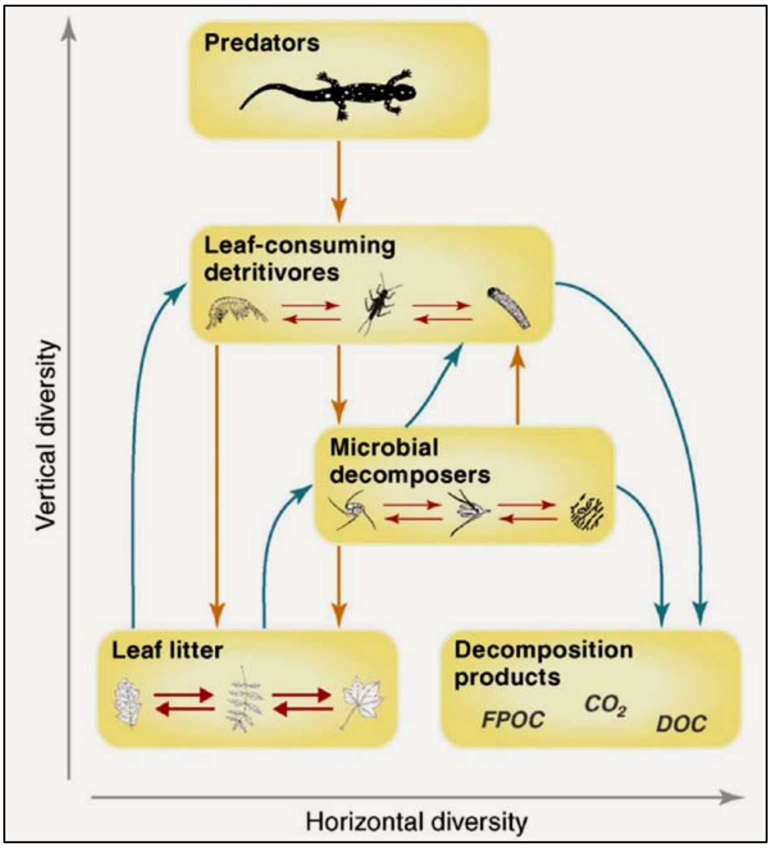

Figure 1: Conceptual diagram of detrital food webs in a forested stream with the components of vertical and horizontal (bio)diversity, i.e. the dominant trophic levels, highlighted. Aquatic hyphomycetes represent the most important group of microbial decomposers in these food webs. Red arrows represent species interactions in the same trophic level of the food web, orange arrows represent effects of consumers on their resource and turquoise arrows represent major flows of carbon through the food web (Gessner et al. 2010, reproduced with permission).

Some studies suggest that not only interspecific diversity but also intraspecific diversity of aquatic hyphomycetes can influence their sensitivity to environmental stressors (Ferreira *et al.* 2010, Fernandes *et al.* 2011) and their performance when decomposing leaf litter (Fernandes *et al.* 2011). Detailed studies addressing these research questions require quantification of intraspecific diversity, which, however, is challenging at best with established approaches in fungal taxonomy (i.e. morphological identification and DNA barcoding). The third part of my presentation will be dedicated to a novel proteomic approach that I am developing with colleagues and which is aimed at contributing to this challenge. This approach (MALDI TOF mass spectrometry) is based on mass spectrometry of ribosomal proteins and other conserved proteins from fungal tissue. Due to the broad range of ribosomal proteins analyzed simultaneously, this technique provides vast genomic information. It thus lends itself for detailed characterization and identification of cultures and for quantification of inter- and intraspecific diversity. I will present recent examples where we used this approach to investigate patterns of intraspecific diversity of a common species of aquatic hyphomycetes (Tetracladium marchalianum) for which a high level of intraspecific diversity has been suggested earlier (e.g. Letourneau *et al.* 2010).

References:
Bärlocher F. 2010. Molecular approaches promise a deeper and broader understanding of the evolutionary ecology of aquatic hyphomycetes. Journal of the North American Benthological Society 29: 1027–1041.
Bruder A, Chauvet E & Gessner MO. 2011. Litter diversity, fungal decomposers and litter decomposition under simulated stream intermittency. Functional Ecology 25: 1269-1277.

Dudgeon D, Arthington AH, Gessner MO, Kawabata Z-I, Knowler DJ, Leveque C, Naiman RJ, Prieur-Richard A-H, Soto D, Stiassny MLJ & Sullivan CA. 2006. Freshwater biodiversity: importance, threats, status and conservation challenges. Biological Reviews 81: 163-182.

Fernandes I, Pascoal C & Cássio F. 2011. Intraspecific traits change biodiversity effects on ecosystem functioning under metal stress. Oecologia 166: 1019–1028

Ferreira V, Gonçalves AL, Pratas J & Canhoto C. 2010. Contamination by uranium mine drainages affects fungal growth and interactions between fungal species and strains. Mycologia 102: 1004–1011.

Gessner MO, Swan CM, Dang CK, McKie BG, Bardgett RD, Wall DI & Hättenschwiler S. 2010. Diversity meets decomposition. Trends in Ecology and Evolution 25: 372-380.

Letourneau A, Seena S, Marvanová L & Bärlocher F. 2010. Potential use of barcoding to identify aquatic hyphomycetes. Fungal Diversity 40: 51–64

Millenium Ecosystem Assessment 2005. Ecosystems and Human Wellbeing: Biodiversity Synthesis. World Resources Institute, Washington DC.

Tank JL, Rosi-Marshall EJ, Griffiths NA, Entrekin SA & Stephen ML. 2010. A review of allochthonous organic matter dynamics and metabolism in streams. Journal of the North American Benthological Society 29: 118-146.

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Dr. Bhim Pratap Singh working as Assistant Professor in the Department of Biotechnology, Aizawl, Mizoram University, India, has more than 10 years of research experience in the field of molecular microbiology, biocontrol of plant diseases, mushroom diversity, biosynthetic potential of actinobacteria and fungi associated with medicinal plants. He has worked for last 10 years on microbial diversity and explored the microbial population associated with medicinal plants and rhizospheric soils. His group has documented the wild mushroom of from Mizoram, Northeast India. He has completed seven externally funded research projects on screening and characterization of endophytic actibacteria and fungi associated with medicinal plants and the rhizospheric soils funded by several funding agencies. Dr. Singh has organized several international and national conferences and seminars including India-UK scientific seminar jointly funded by the British Council and the Department of Science and Technology (DST), New Delhi. Dr. Singh has been awarded with several honors like young scientist award in 2014 from Scientific and education Research Society, India and Best achievement award for the contribution to the Asian PGPR society, USA. Dr. Singh is serving ad editors of several reputed peer reviewed scientific journals like Frontiers in Microbiology, Plos ONE etc., and he is an active member of several national and international professional bodies like Asian PGPR Society, Association of Microbiologists of India, MSI, ISCA etc.. His group has published more than 45 research papers in SCI journals and 16 book chapters in the books published by national and international publishers. Dr. Singh has also edited two books published from Springer and Elsevier publications. Dr. Singh has guided 4 Ph.D students and 3 M.Phil students till date.

Session Title
Plenary Session: Fungal Biotechnology

Abstract

Biosynthetic Potential of Endophytic Fungi and their Applications

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Abstract: Endophytic microorganisms associated with traditional medicinal plants are considered as a potential source for the discovery of secondary metabolites. Among endophytes, endophytic fungi have been recognized for their ability to produce plethora of secondary metabolites having application in health and agriculture. In the present study we explored the endophytic fungal population associated with *Mirabilis jalapa* L. collected from Dampa Tiger Reserve and Murlen National Park Mizoram, Northeast India and recovered

113 isolates belonging to 3 classes and 13 genera. *Fusarium* (18.58%), *Phomopsis* (15.04%) and *Penicillium* (13.27%) were the most dominant genera at both sites of collection. All the isolates were evaluated for their antagonistic activity against five phytopathogens (*Fusarium oxysporum* f. sp. pisi, MTCC-2480; *Fusarium oxysporum* f. sp. ciceri, NAIMCC-F-02211; *Fusarium graminearum*, MTCC- 1893; *Fusarium culmorum*, MTCC-2090; *Aspergillus flavus*, MTCC-9064 and one dermatophyte *Trichophyton mentagrophytes*, MTCC-8476. Based on their antimycotic potential, 53 endophytic fungi (KM203568-KM203598; KX262964-KX262985) were identified by sequencing ITS rRNA gene (ITS1-5.8S-ITS2). The ethyl acetate extract of identified isolates were screened for their antibacterial potential against five bacteria pathogenic to humans (*Staphylococcus aureus*, MTCC-96; *Bacillus subtilis*, MTCC-2097; *Micrococcus luteus*, NCIM- 2097; *Pseudomonas aeruginosa*, MTCC-2453; *Escherichia coli*, MTCC-739) and one pathogenic yeast (*Candida albicans*; MTCC-3017). Endophytic fungal isolate MJ73 identified as *Didymella* sp. (KX262982) showed highest zone of inhibition against all the tested isolates. MJ73 was cultured on large scale and the obtained methanol extract was fractionated using vacuum liquid chromatography (VLC) into nine fractions. The most interesting fraction (VLC fraction 6) was selected based on H NMR spectra and was further fractionated using medium pressure liquid chromatography (MPLC) into four fractions. The MPLC fraction 1 was obtained in highest amount (447 mg) and was selected for screening against multidrug resistant bacteria pathogens based on H NMR spectra. The crude methanolic extract of *Didymella* sp. and the MPLC1 fraction was evaluated against multidrug resistant *Staphylococcus aureus* (ATCC BAA-44) *Enterococcus faecalis* (ATCC-51575) and *Klebsiella pneumoniae* (ATCC BAA-2814). The results revealed that MPLC1 fraction showed highest zone of inhibition against *E. faecalis* (21.5±0.5) at concentration of 1mg/ml. TD-GC-MS of *Didymella* sp. revealed the presence of 31 volatile compounds of which some of them (butanoic acid, 3-methylbutyl ester, cedrene etc.) showed antimicrobial potential as compared to NIST database. Our results indicate that the endophytic fungi associated *Mirabilis jalapa* L. may act a potential source for the production of natural bioactive compounds.

Introduction: Endophytes comprise a diverse assemblage of ubiquitous microorganisms residing in the tissues of plants for at least a part of their lifecycle without causing any overt disease symptoms (Petrini 1991). No study has yet shown the existence of a plant species without endophytes which leads to the speculation that they contribute to the evolutionary fitness of their host by producing a range of secondary metabolites to provide resistance against diseases and survival of the plant (Qin *et al.* 2009). Plants with an unusual location and biology and traditional ethnobotanical history also have the prospect of housing endophytes with great potential for producing novel bioactive natural products (Strobel and Daisy, 2003). The most commonly encountered endophytes are bacteria and fungi that form a multifarious group of microbes which reside asymptomatically in the tissues of plants. Increasing risk of drug resistance by pathogenic microorganisms to available commercial drugs has become a global concern around the world (Santos *et al.*, 2015). Inappropriate use of antibiotics, poor hygienic conditions and delay in diagnosis of the disease are among some of the important factors that favored these circumstances. Methicillin resistant *Staphylococcus aureus*, penicillin resistant *Streptococcus pneumonie* and vancomycin resistant *Enterococcus faecium* are few such examples (Deshmukh *et al.*, 2015).

Endophytic fungi mostly belong to Ascomycota or their mitosporic fungi but members of Basidiomycota, Zygomycota, and Oomycota have also been reported and colonize plant tissues as symptomless endophytes (Guo 2010; Vidal and Jaber 2015). Interestingly, some of the endophytic fungi isolated from a particular host, showed to produce the same chemical compound as produced by their respective host (Aly *et al.*, 2010). These observations led to isolation of Paclitaxel (TaxolTM), an anticancer drug from an endophytic fungi *Taxomyces andreanae* isolated from the yew *Taxus brevifolia* (Stierele, 1993; Yang *et al.*, 2014). An endophytic fungus synthesizes various bioactive secondary metabolites including polyketides, alkaloids, terpenoids, phenylpropanoids, aliphatic compounds, and peptides (Mousa and Raizada, 2013). They are also well known as producers of extracellular enzymes (Correa *et al.* 2014) and volatile hydrocarbons (Stadler and Schulz, 2009). Mizoram is an important part of the Indo Myanmer diversity hotspot, which affords recognition as an area of immense importance due to richness in biodiversity. The native people in Mizoram use traditional methods of treatment based on herbal drugs from medicinal Plants (Sharma *et al.*, 2001). This may provide a large genetic resource for endophytic fungi for production of novel bioactive compounds.

Mirabilis jalapa (Nyctaginaceae) commonly known as “four o’clock plant” and “Marvel of Peru”, is an ornamental flowering plant. The plant is been used as traditional medicine throughout the world for the treatment of various diseases and disorders including sexually transmitted diseases, urinary and kidney infections, acute arthritis, anesthesia, inflammation, irregular menstruation and cancerous growths (Siddiqui *et al.*, 1990). The phytochemical constituents and medicinal property of this plant are well characterized and rich in many active compounds including triterpenes, flavonoids, alkaloids, and steroids (Xu *et al.*, 2010). Considering the medicinal attributes of *M. jalapa*, the present study was designed to explore the antimicrobial potential of endophytic fungi associated with the plant for their ability to produce bioactive substances endowed with antimicrobial potential.

Collection, isolation and identification of endophytic fungi: Healthy and diseased free plant (*Mirabilis jalapa* L.) were collected from Dampa Tiger Reserve Forest [DTRF] (23o.44’ N 92o.39’ E), Murlen national Park and Phawngpuii National Park Mizoram, Northeast India. The cut ends were sealed with wax and were brought to the laboratory. The samples were processed for isolation of endophytic fungi within 12 hours of collection. Surface sterilization of the tissues was done by following the protocol of Cannon and Simmons, (2002). Sterilized tissue fragments were incubated on three nutritional media [Potato Dextrose Agar (PDA), Malt Yeast Extract Agar (MYE) and Czapex Dox Agar (CDA)] supplemented with streptomycin sulphate (60 µg/ mL) and chloramphenicol (60 µg/ mL) to suppress bacterial growth. Efficacy of surface sterilization was tested by tissue fingerprinting method; briefly surface sterilized tissue fragments were imprinted on same set of nutritional media to monitor any fungal growth (Sanchez-Marquez *et al.*, 2007). Alternatively, aliquot from last wash was spresded on PDA plate and growth was monitored to cross check the epiphytic microbial growth (Passari *et al.*, 2016). All plates were incubated at 26oC± 2oC for 5-7 days under 12 h white lights: 12 h dark cycles (Bills and Polishook, 1991). Petri plates were monitored every day up to 3-4 weeks for any hyphae emerging from the tissues. The hyphal tips coming out from the sterile tissues were sub cultured on to a fresh nutritional media to obtain a pure culture for identification and enumeration. Obtained cultures were preserved in 30% glycerol at -80oC (Figure 1 and 2). Totally, 113 isolates were recovered belonging to 3 classes and 13 genera. *Fusarium* (18.58%), *Phomopsis* (15.04%) and *Penicillium* (13.27%) were the most dominant genera at both sites of collection.

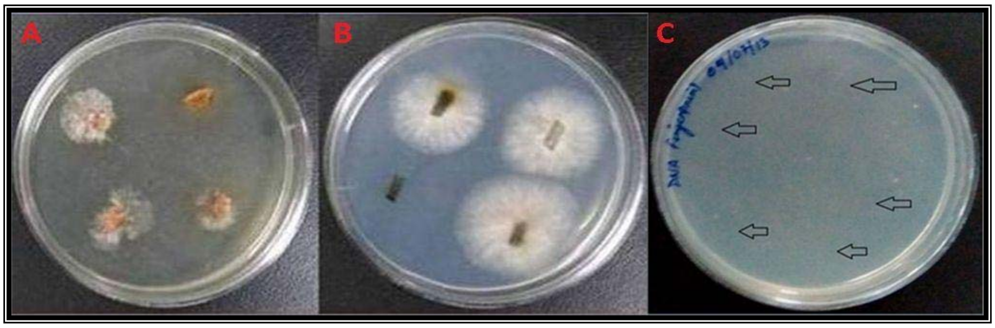

Figure 1: Isolation of Endophytic Fungi on different media- A) PDA, B) CDA. C) Validation of surface sterilization.

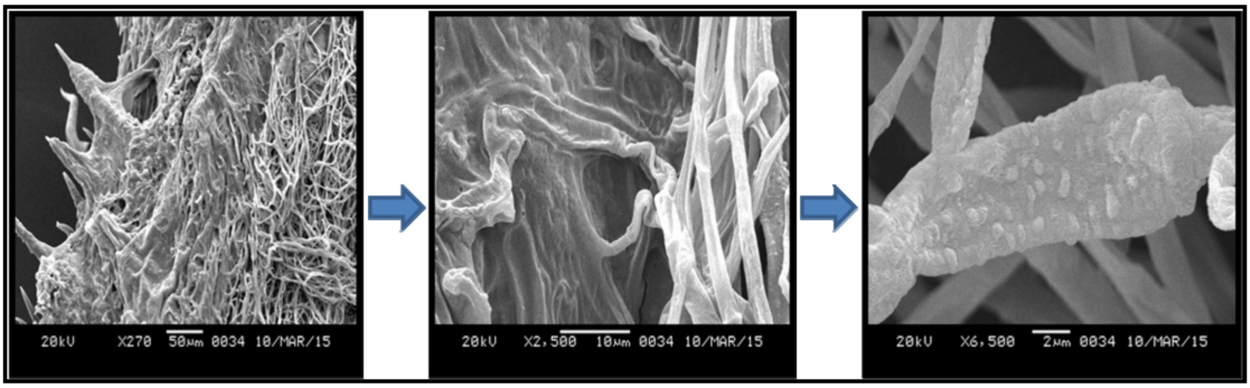

Figure 2: Validation of isolation of fungal endophytes. Emergence of hyphae from leaf tissues as indicated by FEG-SEM.

Antifungal test: Dual culture method: The fungal endophytes associated with *Mirabilis jalapa* showed significant antagonism against tested fungal plant pathogens, *Fusarium oxysporum* (NAIMCC-F-01261), *Fusarium oxysporum* f. sp. *pisi* (MTCC-2480), *Fusarium prolifratum* (MTCC- 286) and *Fusarium graminearum* (MTCC-1893) by dual culture technique (Figure 3). Among endophytic fungi associated with *Mirabilis jalapa*, highest inhibition percent was recorded by *Chaetomium* sp. (MJ 74) against all tested pathogens followed by *Aspergillus clavatonanicus* (MJ31), *Phomopsis lithocarpus* (MJ23) (Table 1).

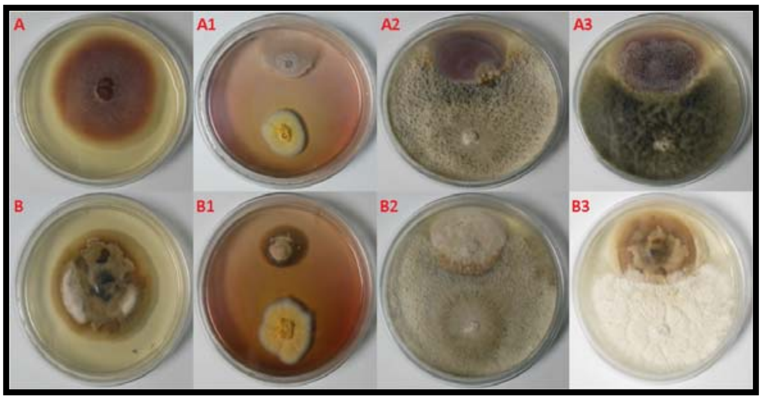

Figure 3: Antifungal activity of endophytic fungi associated with Mirabilis jalapa. A: Fusarium oxysporum (control), A1-A3: Growth of pathogen in presence of antagonistic fungal endophytes, *Chaetomium* sp. (MJ74), *Phomopsis lithocarpus* (MJ23) and *Botryosphaeria berengiana* (MJ18) respectively. B: *Fusarium graminearum* (control), B1-B3: Growth of pathogen in presence of antagonistic fungal endophytes, *Chaetomium* sp. (MJ74), *Phomopsis lithocarpus* (MJ23), and *Phomopsis* sp. (MJ53).

Poison food assay of potential isolate: The two potential isolates MJ74 and MJ 31 was used to determine the antagonistic potential using food poison assay as well. For this the crude methanolic extract was prepared by growing cultures in potato dextrose broth for about 30 days and the crude extract was prepared using Rotaevoporator system. Poison food bioassay of the crude extract was evaluated against fungal phytopathogens to confirm the presence of antifungal compounds (Figure 4). Highest percentage of inhibition (% PI) was recorded by *Aspergillus clavatonanicus* strain MJ31 against *Fusarium graminearum* with IC50 value of 492.9 µg/ml followed by *Fusarium culmorum* (496.1 µg/ml), *Fusarium oxysporum* f. sp. pisi (501.1 µg/ml), *Fusarium oxysporum* f. sp. *ciceri* (502.8 µg/ml) and *Trichophyton metagrophytes* (504.4 µg/ml)

Table 1: Antifungal activity, represented as percent growth inhibition, of several plant pathogens by endophytic fungi associated with M. jalapa

Isolate no.	Percent of Inhibition (%PI)			
	Fusarium oxysporum (NAIMCC-F-01261)	Fusarium oxysporum f. sp. pisi (MTCC-2480)	Fusarium prolifratum (MTCC- 286)	Fusarium graminearum (MTCC-1893)
Chaetomium sp. (MJ 74)	72.04±0.93	61.26±0.77	64.99±1.66	73±1.37
Phomopsis lithocarpus (MJ 23)	59.13±0.92	59.59±0.87	58.88±0.96	59.44±0.96
Botryospharia berengiana (MJ 18)	55.37±0.93	57.06±0.87	55.55±0.95	55.55±0.95
Aspergillus clavatonanicus (MJ 31)	58.90±1.34	61.25±1.56	52.21±0.96	74.59±1.37
Phomopsis sp. (MJ 53)	51.07±0.92	54.54±1.51	53.33±1.67	54.44±1.92

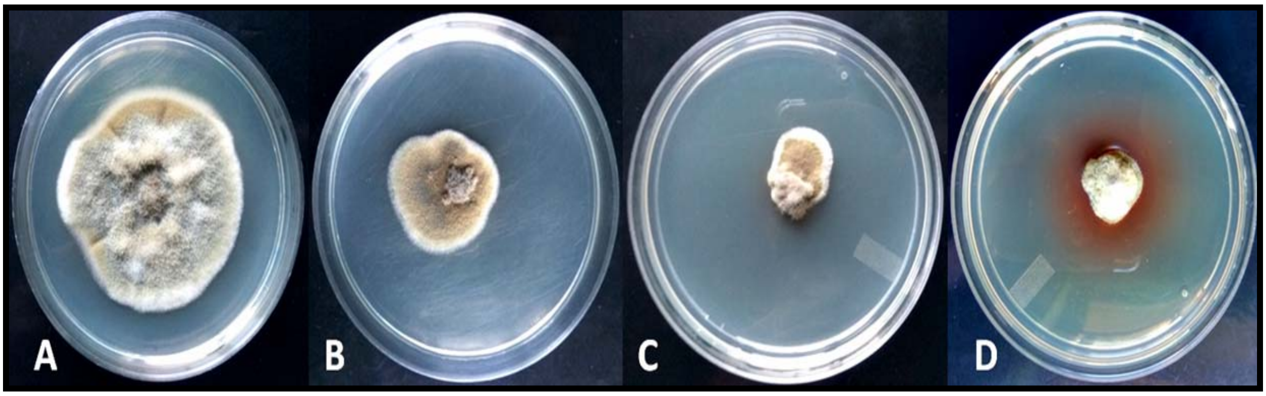

Figure 4: Antifungal activity of ethyl acetate extract of *Aspergillus clavatonanicus* strain MJ31 against fungal phytopathogens. A: *F. graminearum* (control), B- D: antifungal activity of ethyl acetate extract against *F. graminearum* at 250 µg/ml, 500 µg/ml and 1000 µg/ml.

Screening for antibacterial and anti yeast activity: The selected five isolates based on antifungal potential were selected to screen for antibacterial and anti-yeast potential using disc diffusion method. Ethyl acetate extract of endophytic fungi associated with M. jalapa was evaluated for its antibacterial and anti yeast activity against five human bacterial pathogens (*S. aureus*, *B. subtilis*, *M. luteus*, *P. aeruginosa*, *E. coli*) and a yeast pathogen (*C. albicans*). The results revealed that strain MJ31 (*Aspergillus clavatonanicus*) showed the highest zone of inhibition and inhibited the growth of all tested pathogens followed by MJ18 (*Botryosphaeria berengiana*) (Table 2 and Figure 5). The highest zone of inhibition was observed against gram positive bacteria *B. subtilis* (24.5±0.5) followed by *M. luteus* (22.66±0.57) and *S. aureus*

(21.83±0.28). However, the observed zone of inhibition was comparatively less against *C. albicans* (17±0.5) and least against *P. aeruginosa* (14.5±0.5).

Table 2: Antibacterial and anti yeast activity of ethyl acetate extract of fungal endophytes associated with M. jalapa using disc diffusion method

	Zone of inhibition (mm ± SD)					
Endophytic Fungi	S. aureus	B. subtilis	M. luteus	P. aeruginosa	E. coli	C. albicans
Aspergillus clavatonanicus (MJ31)	21.83±0.28	24.5±0.5	22.66±0.57	14±0.5	21±1.0	17±0.5
Botryosphaeria berengiana (MJ18)	20.66±0.57	21±1.0	21.66±0.57	11±1.0	10.83±0.76	12.33±0.57
Penicillum janthinellum (MJ5)	18.66±0.57	19.66±0.57	21.5±0.5	-	10.83±0.76	-
Paraphoma radicina (MJ3)	17.66±0.57	19±1.0	19.5±0.5	-	-	14.66±0.57
Diaporthe phaseolorum (MJ69)	14.66±0.57	19.83±0.76	18.16±0.28	10.66±0.57	13.33±0.57	13.66±0.57

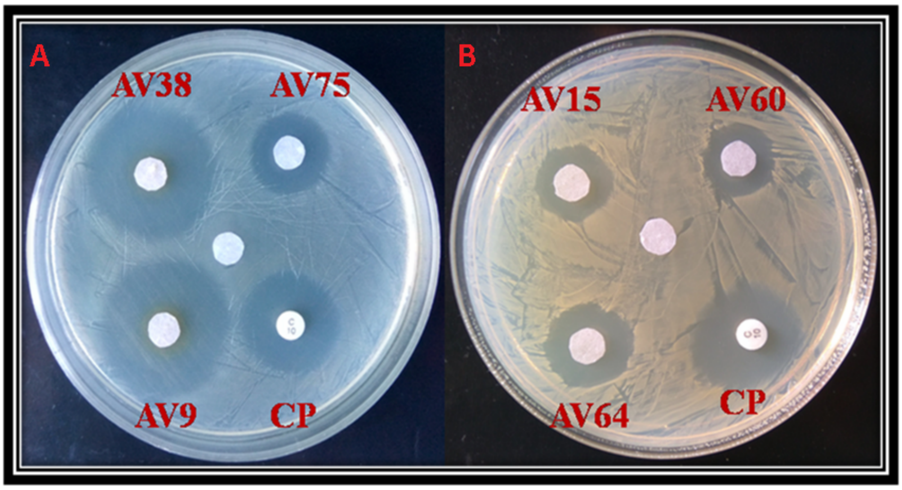

Figure 5: Antimicrobial activity of ethyl acetate extracts of fungal endophytes along with standard antibiotic discs against (A) *S. aureus* and (B) *B. subtilis* using disc diffusion assay.

Molecular identification and Phylogenetic analysis: The selected isolates based on their antimicrobial potential were identified using molecular tools and taxonomic placement was done by making a phylogenetic tree using Molecular Evolutionary Genetics Analysis (MEGA 5.05) with Kimura 2-parameter model (Kimura 1980). In total we identified 53 fungal isolates as endophytes associated with *M. jalapa* (KM203568-KM203598; KX262964-KX262985). The phylogenetic tree of identified fungal endophytes associated with M. jalapa was constructed by maximum likelihood method using Molecular Evolutionary Genetics Analysis (MEGA 5.05) with Kimura 2-parameter model (Kimura 1980). The robustness of the phylogenetic tree was tested by bootstrap analysis using 1,000 replicates. The tree revealed that Sordariomycetes was found to the most dominant class among endophytic fungi associated with *M. jalapa* (Figure 5)

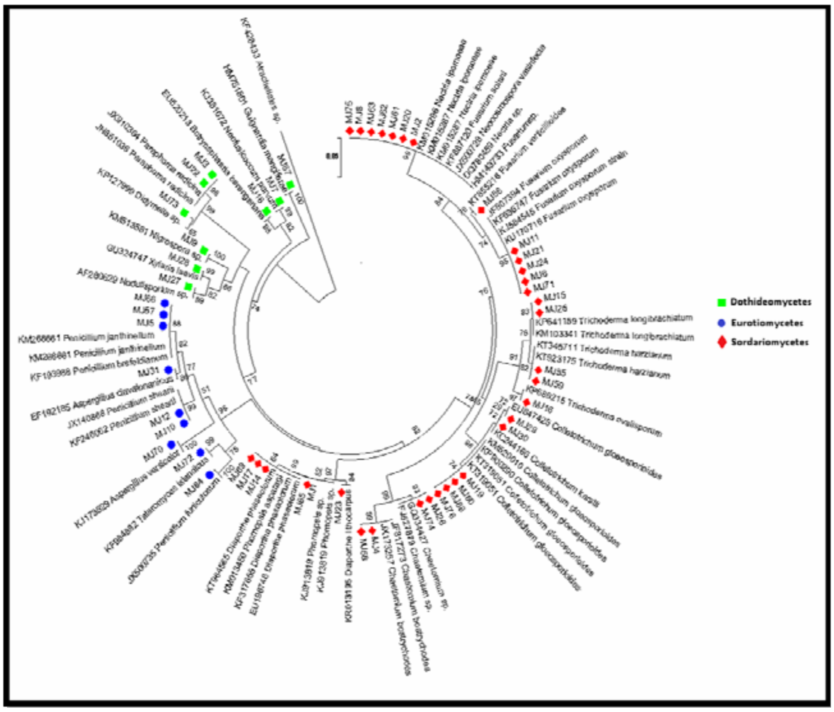

Figure 5: A maximum likelihood tree showing phylogenetic relationship of fungal endophytes associated with *M. jalapa*.

Detection and sequencing of PKS and NRPS gene: Ketosynthase (KS) domain of polyketide synthases (PKS) type I and adenylation (A) domain of non-ribosomal peptide synthetases (NRPS) were detected in 31 endophytic fungal isolates of M. jalapa. An expected 700 bp band of KS domain was detected byLC1/2c and LC3/LC5c primers which were responsible for the synthesis of highly reducing (HR) and partially reducing (PR) type PKSs. NRPS gene was also detected with the amplified product size of 300 bp (Fig. 6). Seven sequences were deposited in GenBank with accession numbers KX079335-KX079339, KY114487 and KY114488.

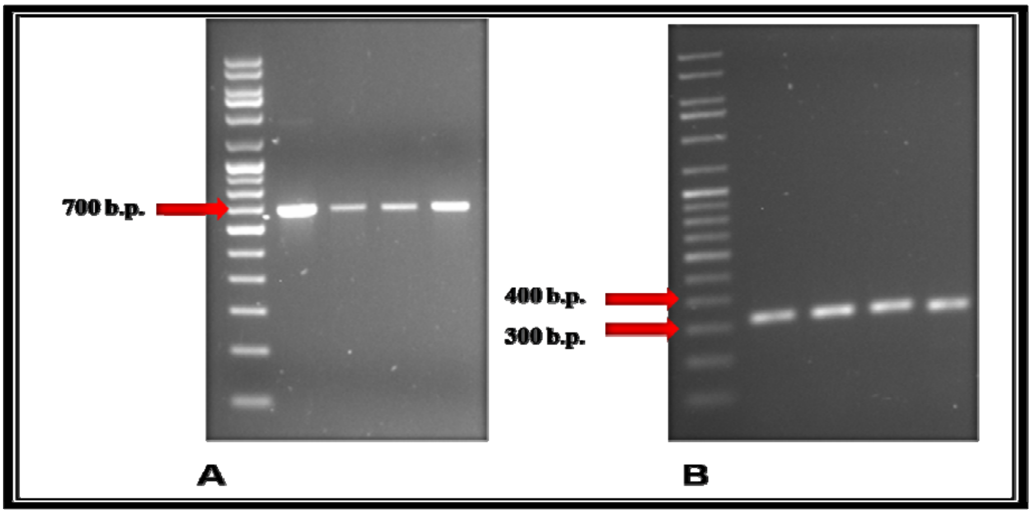

Figure 6: Detection of biosynthetic genes (A) PKS I and (B) NRPS I.

Screening of crude extract of MJ73 and MJ31 as well as fractions of MJ73 against MDR human pathogens: Antibacterial activity of the methanolic extract of both *Aspergillus clavatonanicus* and VLC as well as MPLC fractions of *Didymella* sp. (MJ73) was screened against multidrug resistant *Staphylococcus aureus* (ATCC BAA-44), streptomycin, vancomycin and gentamicin resistant *Enterococcus faecalis* (ATCC-51575) and amikacin, tobramycin as well as fluoroquinolones resistant *Klebsiella pneumoniae* (ATCC BAA-2814) (Figure 7). Results revealed that both the crude methanolic extract of Didymella sp. and MPLC fraction 1 of Didymella sp. was the most active strain and showed significant activity against all the tested pathogens. The highest zone of inhibition was obtained against *Enterococcus faecalis* by MJ73V6MPLC1. However, crude extract of Aspergillus clavatonanicus did not show any inhibition zone against the tested pathogens.

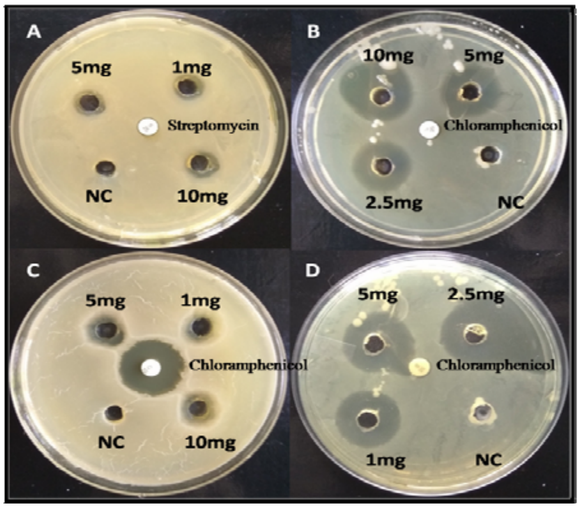

Fig. 7: Antibacterial activity of the methanolic extract and fractions of *Didymella* sp. (MJ73) against drug resistant bacterial pathogens (A) crude extract of MJ73 against multidrug resistant S. aureus, (B) *E. faecalis*, (C) *K. pneumoniae* and (D) MJ73V6MPLC1 fraction against *E. faecalis* along with standard antibiotics.

Conclusion: The present study demonstrates the endophytic fungi associated with M. jalapa has potential to fight against plant phytopathogens which can be used to develop biofertilizers as well as has a potential to inhibit human pathogens and showed the presence of several VOC using GC-MS. *Aspergillus clavatonanicus* (MJ31) and *Dydimella* sp. (MJ73) demonstrates broad spectrum antimicrobial activity against both plant and human pathogens. The detection of PKS1 gene and NRPS gene clearly suggests that the concerned strains can serve as a resource for bioactive natural products.

References:

Aly A, Debbab A, Kjer J, Proksch P (2010) Fungal endophytes from higher plants: a prolific source of phytochemicals and other bioactive natural products. Fungal Divers 41:1-16

Bills GF, Polishook ID (1991) Microfungi from *Carpinus* caroliniana. Can J Bot 69(7):1477-1482

Cannon PF, Simmons CM (2002) Diversity and host preference of leaf endophytic fungi in the Iwokrama forest reserve, Guyana. Mycologia94:210-220

Deshmukh SK, Verekar SA, Bhave SV (2015) Endophytic fungi: a reservoir of antibacterials. Front Microbiol 5:1-43

Guo LD (2010) Molecular diversity and identification of endophytic fungi. In: Gherbawy Y, Voigt K (eds) Molecular identification of fungi, Part 1, Springer, Berlin, Germany. pp 277–296

Kimura M (1980) A simple method for estimating evolutionary rate of base substitutions through comparative studies of nucleotide sequences. J Mol Evol 16:111-120

Mousa WK, Raizada MN (2013) The diversity of anti-microbial secondary metabolites produced by fungal endophytes: an interdisciplinary perspective. Front Microbiol 4:1-18

Petrini O (1991) Fungal endophyte of tree leaves. In: Andrew JA, Hirano SS (ed), Microbial ecology of leaves, Springer, New York. pp 179-197

Qin S, Li J, Chen HH, Zhao GZ, Zhu WY (2009) Isolation, diversity and antimicrobial activity of rare actinobacteria from medicinal plants of tropical rain forests in Xishuangbanna, China. Appl Environ Microbiol 75:6176-6186.

Santos IP, Silva LCN, Silva MV, Araújo JM, Cavalcanti MS, Lima VLM (2015) Antibacterial activity of endophytic fungi from leaves of Indigofera suffruticosa Miller (Fabaceae). Front Microbiol 6:350

Sharma HK, Chhangte L, Dolui AK (2001) Traditional medicinal plants in Mizoram, India. Fitoterapia.72:146-161

Stadler M , Schulz B (2009) High energy biofuel from endophytic fungi? Trends in Plant Science 14(7): 353-355

Strobel G and Daisy B (2003) Bioprospecting for microbial endophytes and their natural products. Microbiol Mol Biol R67: 491-502

Vidal S, Jaber LR (2015) Entomopathogenic fungi as endophytes: plant-endophyte-herbivore interactions and prospects for use in biological control. Curr Sci 109(46):46-54

Xu J, Ebada SS, Proksch P (2010) Pestalotiopsis a highly creative genus: chemistry and bioactivity of secondary metabolites. Fungal Divers 44:15-31

Yang Y, Zhao H, Barrero RA, Zhang B, Sun G, Wilson LW et al (2014) Genome sequencing and analysis of the paclitaxel-producing endophytic fungus *Penicillium aurantiogriseum* NRRL 62431.BMC Genomics15:69

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Prof. Giovanna Cristina Varese is a Full Professor at the University of Turin. She is the Scientific Head of the Mycotheca Universitatis Taurinensis (MUT) of the Department of Life Sciences of the University of Turin, the fungal collection which preserves more than 6000 fungal strains (www.mut.unito.it). She is member of the teaching board of the Doctoral School of "Sciences and Innovative Technologies" Ph.D. Program in "Biology and Applied Biotechnologies" and of the Master in Feeding and Nutrition Science and Technology "Michele Ferrero" at the University of Turin. Currently her main scientific interests focus on biodiversity, interactions and community dynamics of fungi in soil and water natural and polluted environments. One of her main aim is also the valorisation and exploitation of fungal biodiversity in the biotech sectors i.e. mycoremediation using whole-cell systems and or their metabolites. Such topics have been investigated both with conventional mycological (morphology-based) methods and molecular systematics and ecology techniques: i) studies of the mycoflora of extreme and/or polluted environments; ii) soil and wastewater bioremediation (i.e. PAHs, PCB, industrial dyes, crude oil, etc.); iii) use of fungal enzymes as biocatalysts in fine chemicals (flavours, drugs, etc) transformations and in textile finishing; iv) set up of protocols for the rapid identification of foodborne or airborne fungi in specific industrial environments or substrata; v) screening of marine fungi for extremozymes and 2° metabolites with pharmaceutical properties. As Scientific Head of the Mychoteca Universitatis Taurinensis, she is the scientific supervisor of one of the largest collections of microorganisms in Italy and in Europe, which guarantee as their main institutional remit, the safeguard of genetic resources and diversity of fungi as well as properties of biotechnological interest with the aim to explore and exploit their biotechnological potential in different field of applications in according to the new national and international legislations (Access and Benefit Sharing of genetical resources). MUT is affiliated for many years with the European Culture Collection Organization (ECCO) and the World Federation of Culture Collections (WFCC). She authored over 130 papers on international and national peer-reviewed journals, 7 book chapters, and ten international and national patents.

Session Title
Plenary Session: Beneficial and Harmful Effects

Abstract

Fungi in Bioremediation

Soil degradation is a serious problem all around the world. It is usually driven or exacerbated by human activities such as inadequate agricultural or forest practices, industrial activities, waste disposal, oil spills, urban and industrial proliferation, and construction works. The main negative impacts of soil degradation are loss of fertility and biodiversity, reduced water holding capacities, impairments of biogeochemical cycles and a reduced resilience and buffer capacities. Soil pollution is one of the main causes of soil degradation and loss of terrestrial ecosystem services.

The situation is very serious in Europe (https://www.eea.europa.eu):

- 2.5 million potentially contaminated sites have been estimated, where soil contamination is suspected and detailed investigations are needed;
- 340,000 sites have already been identified and require remediation intervention; nearly half of them (46%) have already been remediated;
- Contaminated soil continues to be commonly managed using "traditional" techniques, e.g. excavation and off-site disposal, which accounts for about one third of management practices. In-situ and ex-situ remediation techniques for contaminated soil are applied more or less equally. (Figure 1).

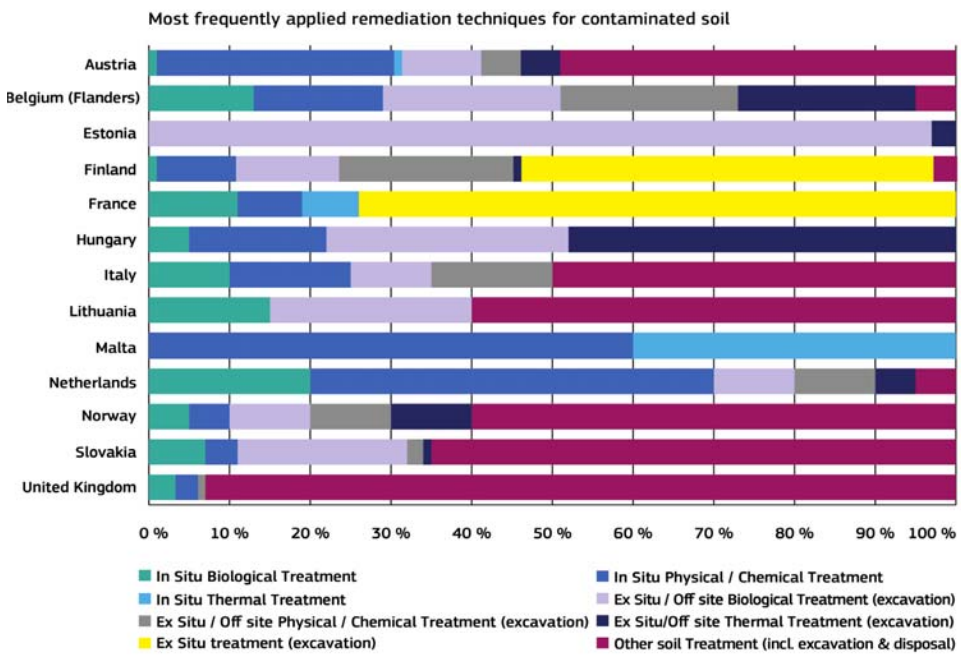

Figure 1. Most frequently applied remediation techniques for remediation soils.

- The relative importance of different contaminants is similar for both liquid and solid matrices (Figure 2). The most frequent contaminants are mineral oils and heavy metals, followed by polycyclic aromatic hydrocarbons (PAHs) and mixtures of benzene, toluene, ethylbenzene and xylene (BTEX).

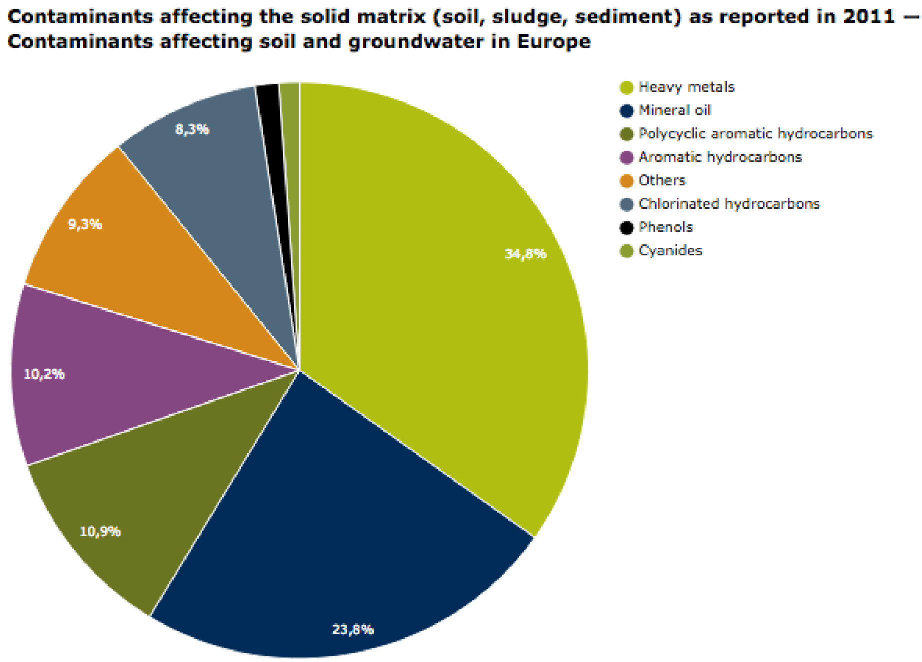

Figure 2. Contaminants affecting soil and groundwater in Europe.

- Overall, the production sectors contribute more to local soil contamination than the service sectors, while mining activities are important sources of soil contamination in some countries. In the production sector, metal industries are reported as most polluting whereas the textile, leather, wood and paper industries are minor contributors to local soil contamination. Gasoline stations are the most frequently reported sources of contamination for the service sector. However, the range of polluting activities varies considerably from country to country (Figure 3).
- On average, 42 % of the total expenditure on the management of contaminated sites comes from public budgets. Annual national expenditures for the management of contaminated sites are on average about EUR 10.7 per capita. This corresponds to an average of 0.041 % of the national GDP. Around 81 % of the annual national expenditures for the management of contaminated sites is spent on remediation measures, while only 15 % is spent on site investigations.

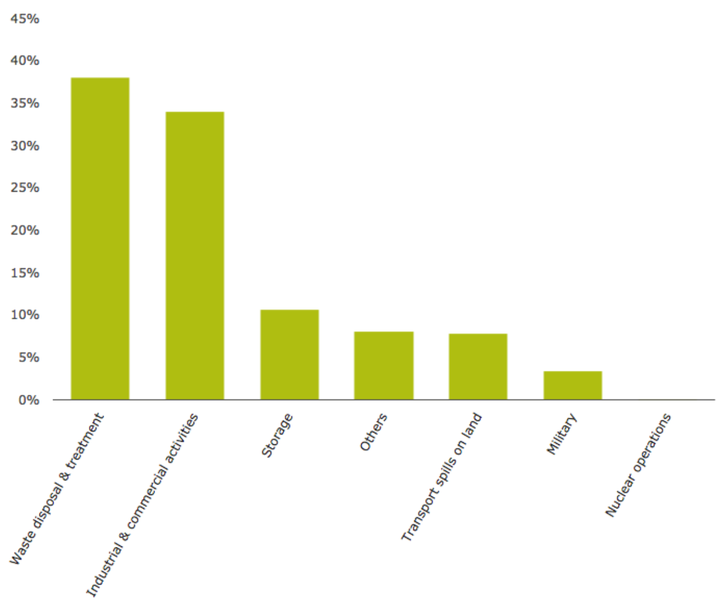

Figure 3. Key sources of soil contamination: the figure shows a breakdown of the main sources causing soil contamination in Europe as % of sources over thet total number of sources identified.

- The large volume of waste production and the widespread use of chemicals during the past decades have left numerous sites with local soil contamination. The dominant major sources of local soil contamination are inadequate or unauthorised waste disposal, unsafe handling of dangerous substances within industrial or commercial processes, and accidents (EEA, 1998).
- The implementation of existing and prospective legislative and regulatory frameworks at EU and national levels should result in fewer inputs of contaminants into soil in the future. However, soil contamination from past activities and newly occurring incidents needs to be dealt with where the risk to health arising from land and groundwater use is unacceptable.. Most European countries have national legislation (or in some cases regional legislation) to deal with local soil contamination, but no legal framework has yet been established at the level of the European Union.

Up to the present, the most common remediation technique has been the excavation of contaminated soil and its disposal as landfill (sometimes referred to as 'dig and dump'). However, increasing regulatory control of landfill operations and associated rising costs, combined with the development of improved ex-situ and in-situ remediation techniques, is altering the pattern of remediation practices. Currently, there is growing interest in developing techniques to reduce levels of organopollutants from contaminated soils by means of selected microorganisms. Bioremediation is an alternative approach that has recently received much attention due to its potential as a cost effective solution and has been successfully applied in full-scale for the treatment of contaminated sites. Bacteria and fungi are the main protagonists of bioremediation.

Fungi play a major role in all ecosystems as decomposers, symbionts and pathogens. Their morphological, physiological and reproductive strategies make them especially suited for terrestrial habitats. Successful use of fungi in soil bioremediation depends on a comprehensive knowledge of their ecology, physiology and enzymology. Along with the ability to degrade a wide range of pollutants, microorganisms useful in soil bioremediation should possess several other features, including the capability to extensively colonize the soil matrix, resist at high concentrations of toxic compounds, survive over a long period in restrictive conditions and compete with the other components of the soil microbiota.

The role of fungi in bioremediation is so important that a new word has been coined MYCOREMEDIATION. This word encompasses any form of bioremediation in which fungi-based technology is used to decontaminate the environment. Fungi have been proven to be a very cheap, effective and environmentally sound way for helping to remove a wide array of toxins from damaged environments or wastewater. The pollutants include heavy metals, persistent organic pollutants, textile dyes, leather tanning industry chemicals and wastewater, petroleum fuels, polycyclic aromatic hydrocarbon, pharmaceuticals and personal care products, pesticides and herbicides in land, sweet water and marine environments. In contrast to bacteria, which need to transform nutrients into their intracellular compartment prior to their utilization, fungal mycelia secrete their enzymes and organic acids into the extracellular environments and transport digested substrates and chelates inside their cells. Moreover, although bacteria are usually faster and more efficient than fungi in utilizing readily assimilable substrates, fungi have evolved extremely efficient enzymatic machineries for the degradation of complex polymers (ligno-cellulose, chitin, etc) which are inaccessible and/or recalcitrant to the majority of prokariotes. The low specificity of many fungal enzymes enables the organisms producing them to co-metabolize structurally diverse compounds belonging to different pollutant classes (Figure 4). Due to this unique features, fungi are considered to play key roles in a number of biogeochemical processes and, more generally, in the cycling of C and other elements.

Moreover the extensive structure of mycelia in soil, the so called " mycosphere", provides ideal logistic networks for transport of bacteria and matter (i.e. pollutants and nutrients) in structurally and chemically heterogeneous soil ecosystems. Mycosphere is indeed a hotspot for contaminant biotransformation by natural consortia established by fungi and bacteria that) form physically and metabolically interdependent consortia with distinct properties from those of the individual components. Moreover, in soil fungi create fungal networks useful to transport contaminants which are otherwise largely immobile in the soil. These living pipelines are therefore crucial to the restoration of impacted areas. On the other hand, the same mycelia act as fungal highways that play a crucial role in moving bacteria in the soil providing them access to specific substrates i.e. contaminants. Hence fungal hyphae act as vectors for bacterial transport in soil with mobilization strongly depending on the specific microorganisms chosen.

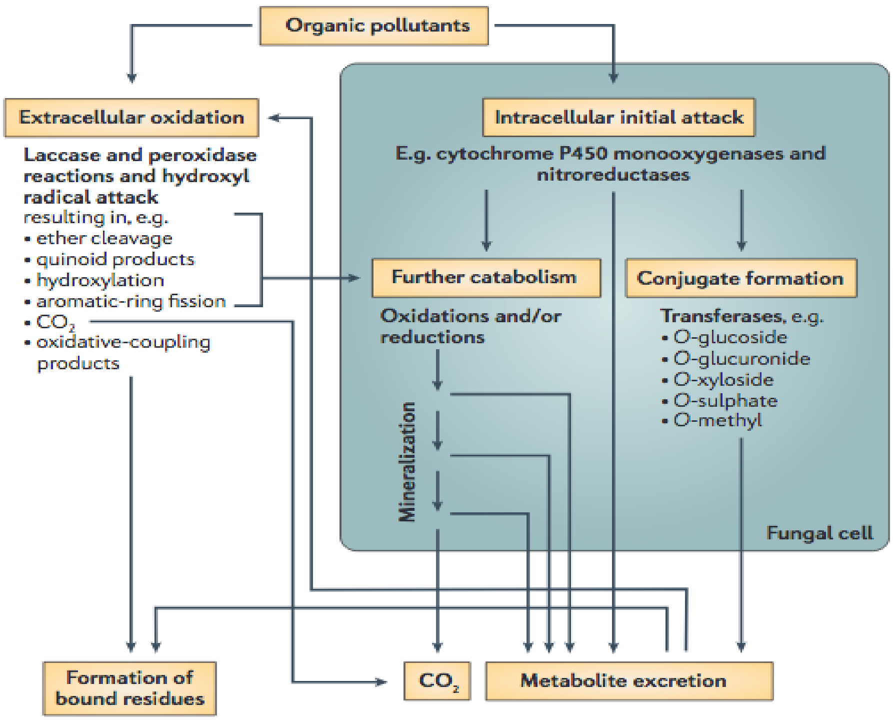

Figure 4. Principal methods used by fungi to degrade organic chemicals (Harms *et al.*, 2011).

On the whole there is no doubt that fungi are strong biological tools for the degradation of persistent organopollutants in soil and also in wastewaters. However till now there are a limited number of successful field trials to support the environmental mycoremediation on the market. In the next future a deeper understanding of the ecology of fungi in natural environment and a detailed knowledge of mycoremediation processes will help us in reaching an effective fungal-based technology.

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Prof. Michael is the director of Steinbeis Innovation Centre of Organismal Mycology and Microbiology, Germany. His scientific interests include fungal diversity, evolution, ecology and systematics. In recent years, he has particularly worked on fungal-plant interactions, with a focus on the Sebacinales, a basidiomycetous group with a broad spectrum of mutualistic (including endophytic) interactions with plant roots and high cryptic biodiversity. Recently, he has become very interested in developing methods to apply soil fungi for sustainable horticulture and agriculture. Michael is a referee in Sydowia, Revista Iberoamericana de Micología, PLoS ONE, Nova Hedwigia, New Phytologist, Mycotaxon, Mycoscience, Mycorrhiza, Mycological Research, Mycological Progress, Mycologia, Molecular Phylogenetics and Evolution, Molecular Ecology, Microbial Ecology, Journal of Basic Microbiology, Fungal Ecology, Fungal Diversity, FEMS Yeast Research, FEMS Microbiology Ecology, Central European Journal of Biology, BMC Evolutionary Biology, Australian Journal of Botany, Applied Microbiology and Biotechnology, Antonie van Leeuwenhoek, American Journal of Botany and Agriculture Ecosystems & Environment.

Session Title
Plenary Session: Beneficial and Harmful Effects

Abstract

Tear down those walls! Why ecological categorisation may prevent us from acknowledging the complexity of fungal-root symbioses

Recent years have seen an impressive accumulation of sequence data related to root and rhizosphere mycobiomes. Now we are in a position where we can analyse and compare mycobiont spectra across roots of a plant specimen, different specimens of a plant species in the same ecosystem, and different ecosystems. However, after assigning sequences to fungal taxa appropriate interpretation of the data may be hampered by long-standing ecological categories (such as „mycorrhizal“, „endophytic“, „saprotrophic“, „parasitic") that were established by research based on classical methods such as fungal isolation, cultivation and re-synthesis experiments. Thus, in mycobiome studies we are in danger only to see what we expect to see, and label taxa that apparently do not fit our expectations simply as contaminants. Now is the time to overcome our prejudices concerning ecological niches of fungi and strive for a less biased view at fungal ecology.
In my talk I will illustrate the problem by focusing on fungal interactions with plant roots, and show possible strategies to tackle it in a time of an ever-growing body of sequence data from root mycobiomes.

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Session Title
Plenary Session: Beneficial and Harmful Effects

Abstract

Ultrastructure of Rust Fungi

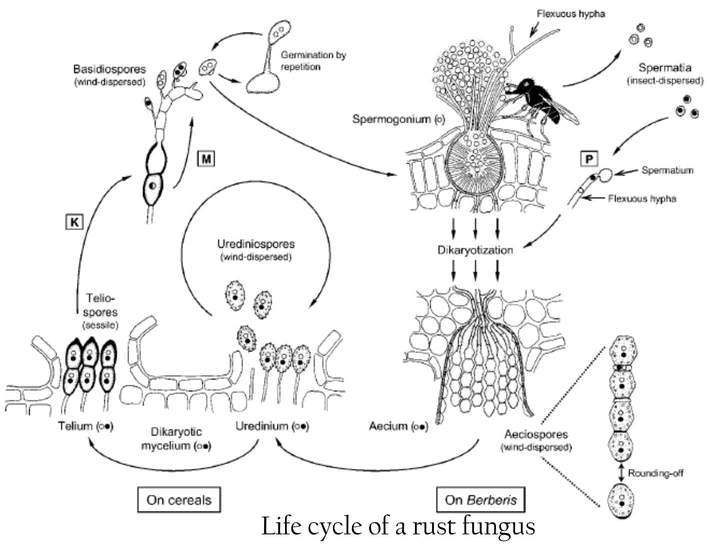
This talk will focus on the following topics:

- What are rust fungi?
- Life cycle of rust fungi.
- Spore stages of rust fungi as seen by SEM.
- Intercellular hyphae of rust fungi as seen by TEM.
- Monokaryotic and Dikaryotic haustoria of rust fungi as seen by TEM.
- The invasion of host vascular tissue by rust fungi as seen by TEM.
- Enzyme localization in the host-rust fungi interaction as seen by TEM.
- Cytochemical localization of carbohydrates in the host-rust fungi interaction as seen by TEM.
- EM autoradiography.

What are rust fungi?

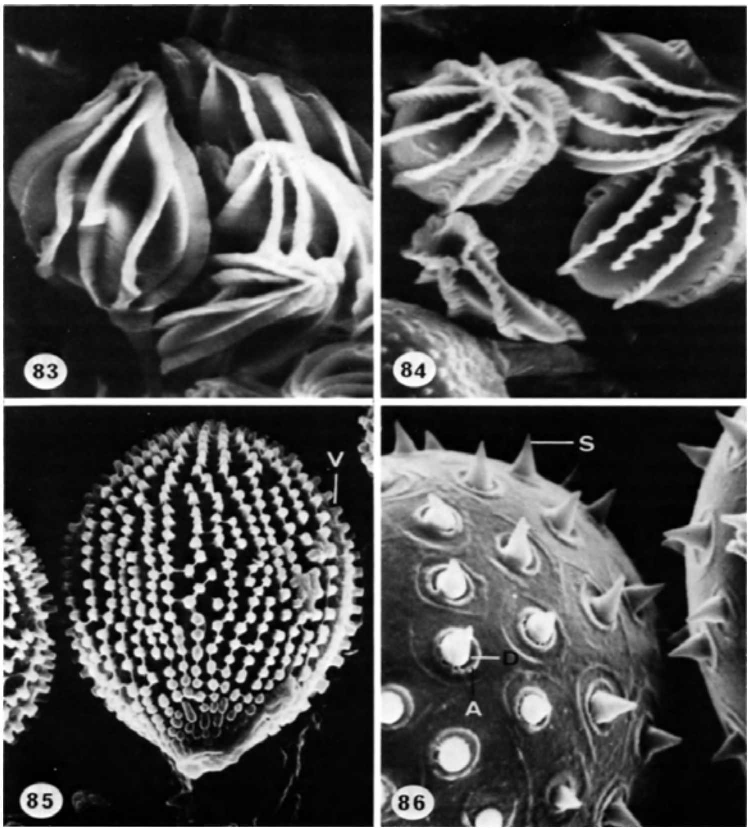
Rust fungi (Uredinales) are a fascinating group of organisms. The life cycle of a typical rust species is among the most complex found anywhere in nature, consisting of five different spore stages on two plant hosts which are taxonomically entirely unrelated to each other. These pathogens infect most groups of vascular plants, including Pteridophytes (ferns), Gymnosperms, and Angiosperms (both monocots and dicots).

2- Life cycle of rust fungi



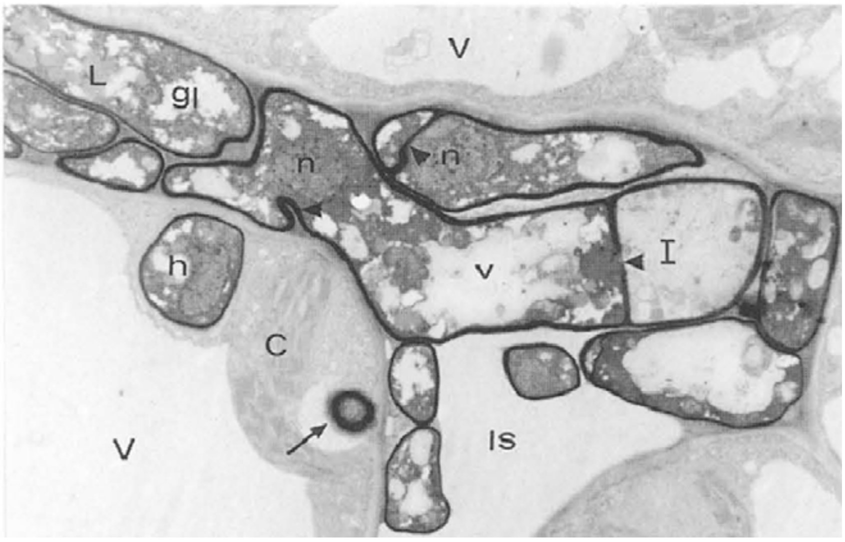
Life cycle of a rust fungus

3- Spore stages of rust fungi as seen by SEM



Surface ornamentations of different types of uredinispores of rust fungi.

4. Intercellular hyphae of rust fungi as seen by TEM



5. Monokaryotic and Dikaryotic haustoria of rust fungi as seen by TEM

There are two types of haustoria in rust fungi: Monokaryotic, filamentous and unspecialized haustorium which developed from pycnial-aecial stages of infection (M-haustorium or P-haustorium) and Dikaryotic, clavate (club-shaped) and specialized haustorium which developed from uredial-telial stages of infection (D-haustorium or U-haustorium).

Characteristics of M- haustorium:
It developed from pycnial-aecial stages of infection (basidiospore) (Fig. 1, a)
The haustorium arises from a terminal intercellular hyphal cell.
There is no differentiation of a specialized haustorial mother cell (HMC).
The wall of the terminal intercellular hyphal cell is continuous with that of the M-haustorium and remains unmodified.
The growth of the M-haustorium is filamentous, and no neck ring is formed.
It always invades the vascular tissue of its host particularly phloem and xylem paranchyma cells.
The ATP-ase activity is present on the extrahaustorial membrane around historium, which is an extension of that of the host cell, and also on the internal host membrane of the haustorium.

Characteristics of D- haustorium
It developed from uredial-telial stages of infection (urediospre) (Fig. 1, b)
The haustorium arises from a specialized haustorial mother cell (HMC).
There is a differentiation of a specialized haustorial mother cell (HMC).
The wall of the terminal intercellular hyphal cell is continuous with that of the D-haustorium and unmodified.
The growth of the D-haustorium is clavate or club-shaped, and a neck ring is formed.
It never invades phloem and xylem paranchyma cells of the host the vascular tissue.
The ATP-ase activity is absent from the extrahaustorial membrane around haustorium, which is an extension of that of the host cell, and also on the internal host membrane of the haustorium.

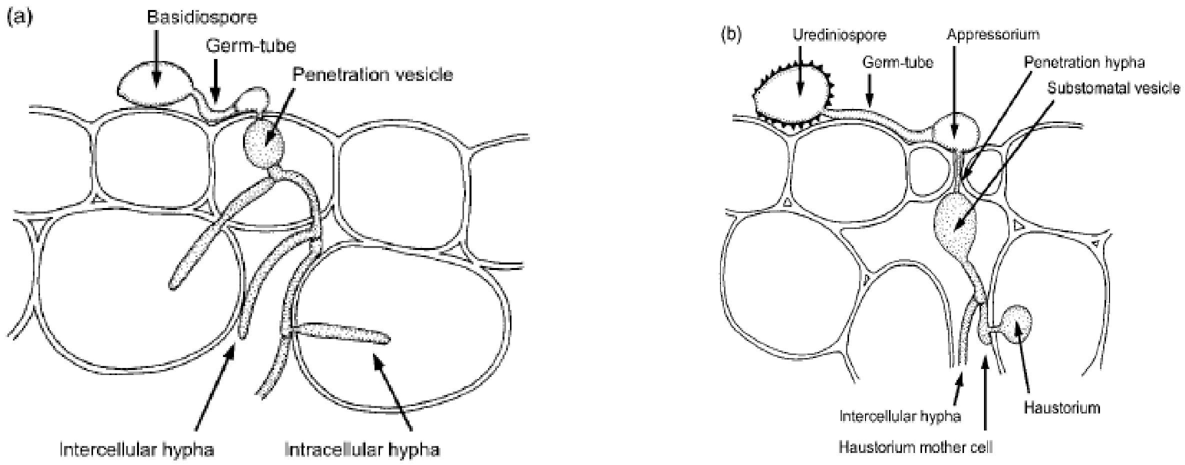


Fig. 1- The mode of M- haustorium (a) and D-haustorium (b) formation

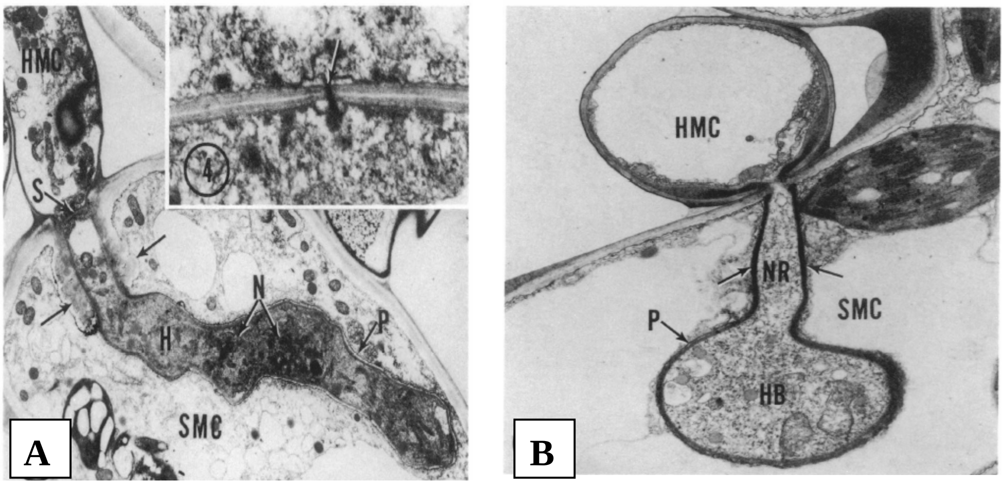
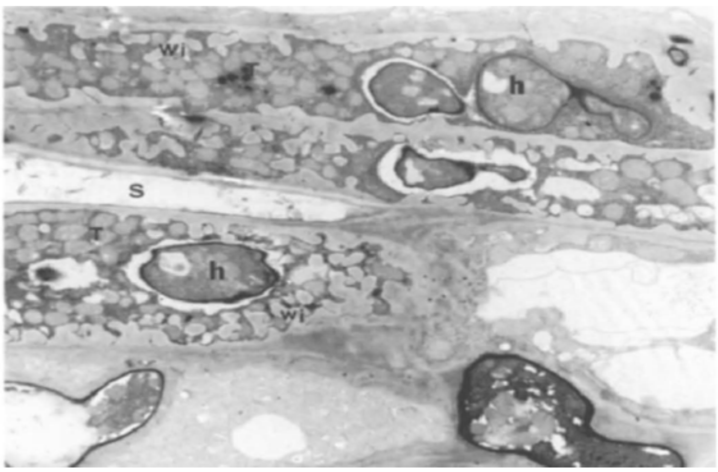


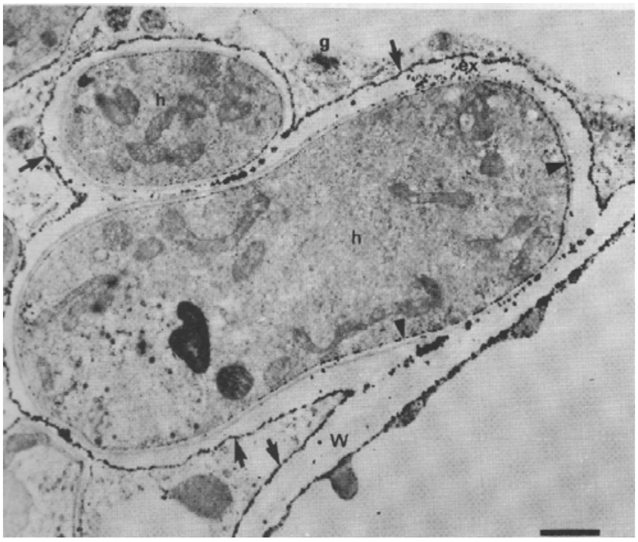
Fig. 2. Comparison between M-haustorium and D- haustorium as seen by TEM. Where: HMC = haustorial mother cell; S = Septum; H = Haustorium; N = Nuclei; arrows = Collar, P = plasma membrane around haustorium; HB = Haustorial body; MC = Mesophyll cell; NR = Neckring.

6- The invasion of host vascular tissue by rust fungi as seen by TEM

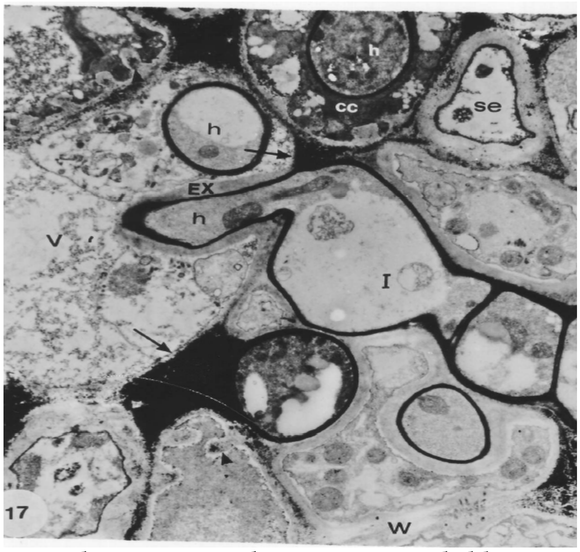


The invasion of host vascular tissue by M-haustorium not D-haustorium where: h = haustorium; wi = wall ingrowths; T = transfer cell; S = sieve tube.

7- Enzyme localization in the host-rust fungi interaction as seen by TEM

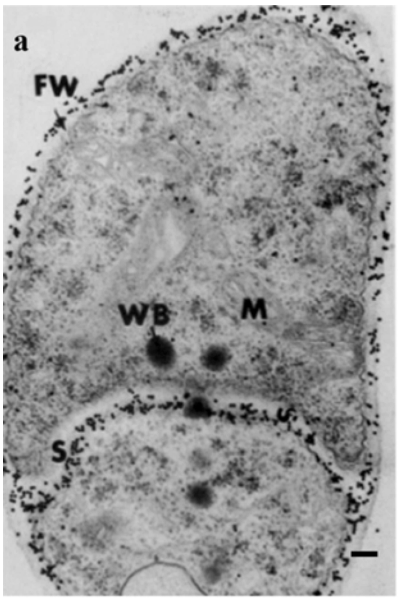


ATP-ase activity on membranes of haustoria and host cell (black spots)



Peroxidase activity in host tissues invaded by rust fungi (black positions)

8- Cytochemical localization of carbohydrates in the host-rust fungi interaction as seen by TEM

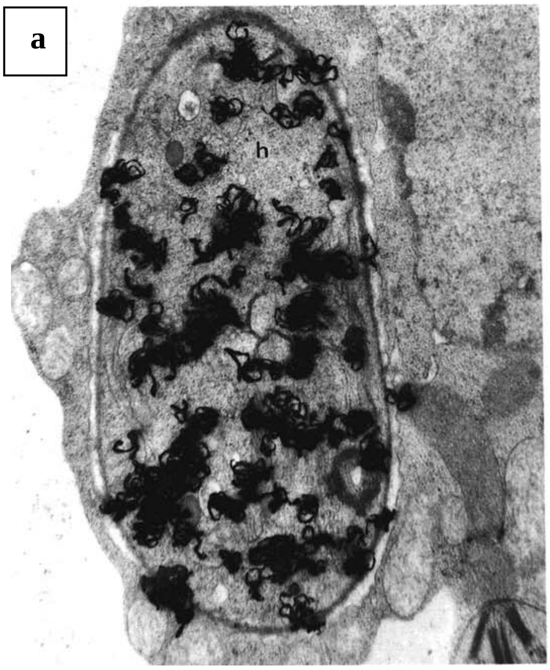


Localization of chitin at the fungal cell wall (black spots). FW = fungal wall; WB = woronian body; S = septum; M = mitochondrion.

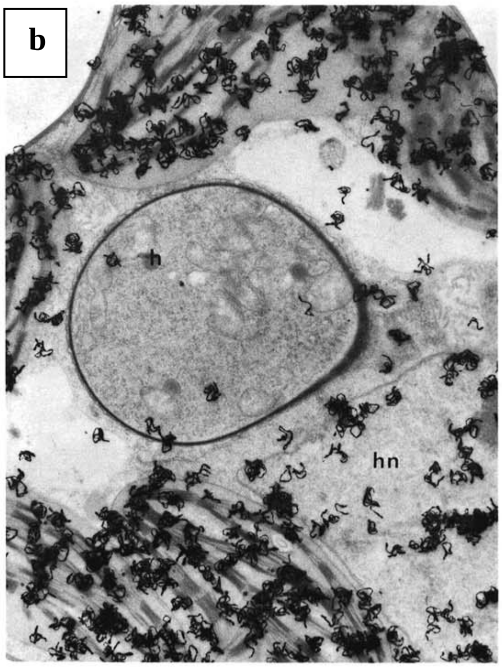
Removal of chitin from fungal cell wall by Streptomyces metabolites. Arrows refers to fungal cell wall; S = septum.

9- EM autoradiography

Autoradiography aims to follow the path of nutrients from host cell to haustoria using isotopes



(a) Accumulation of 3H-lysine in fungal haustorium (black spots).



(b) Accumulation of 3H-glycerol (lipids) in chloroplasts (black spots).

LIST OF ORAL PRESENTERS AND INVITED SPEAKERS

ORAL ABSTRACT SESSIONS

Session Title: Fungal Biotechnology

Abstract

MYCOVIRUSES: MORE UNDERSTANDING FOR MORE APPLICATIONS

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Mycoviruses or fungal viruses are viruses that infect fungi. Firstly reported in 1962 in cultivated mushroom, *Agaricus bisporus*; the infected mushrooms grew slowly, matured early and produced malformed fruiting bodies with serious yield losses. Mycoviruses shared some of the characteristics with animal and plant virus but differ in lacking an extracelluar route for infection and transmitted intercellularly only through cell division, sporulation, and cell fusion Moreover it have no movement protein, which is essential for the life cycle of animal and plant viruses. Because many mycoviruses produce dsRNA or dsRNA replicative intermediates in their fungal hosts, mycoviruses have been classified into seven linear dsRNA families but, the diversity of mycoviruses, has increased rapidly over the last few years and this trend is expected to continue. In fact, mycoviruses are common among fungi but they usually remain latent and seldom induce symptoms. However, some mycoviruses, cause dramatic changes in their hosts, including irregular growth, abnormal pigmentation, and altered sexual reproduction but the most important effect is the reduced virulence (hypovirulence) of plant pathogenic fungi. Nowadays, hypovirulence has attracted much attention because it can be used as alternative biological control agent to reduce the losses of crops and forests caused by plant-pathogenic fungi. Further studies in mycoviruses open a wide door in understanding the basic concepts of interactions between different forms of life by which can be established many benefit applications.

Key words: Agaricus bisporus, Benefits, Egypt, Hypovirulence, Plant-Pathogenic fungi.

Abstract

BIOSYNTHESIS OF NANOSILVER USING CHAETOMIUM GLOBOSUM AND ITS APPLICATION TO CONTROL FUSARIUM WILT OF TOMATO IN THE GREENHOUSE

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Fusarium wilt of tomato (*Lycopersicon esculentum*) caused by Fusarium oxysporum f. sp. lycopersici is one of the most important diseases that affect this crop worldwide. This study aimed to biosynthesise nanosilver (AgNPs) using *Chaetomium globosum*, to evaluate its in vitro antifungal activity against pathogenic *F. oxysporum* and in vivo control of tomato seedlings wilt in the greenhouse. AgNPs was tested for its in vitro antifungal potential against *F. oxysporum* using poisoned food technique on three different growth media, agar well diffusion assay, inhibition of colony formation (CFU), and tested for its potency to control seedlings wilt upon its use at different concentrations (50, 100 and 500 mg/l) and for different incubation periods (0, 1, 2 and 4 h). Results indicated that *C. globosum* succeeded to biosynthesise AgNPs with maximum UV/vis absorbance around 420–450 nm, spherical in shape with particle size of 11–14 nm according to Transmittance electron microscope and displayed high purity recorded through X-ray diffraction (XRD). In vitro studies revealed high antifungal activity of AgNPs against *F. oxysporum* noticed especially at a concentration of 500 mg/l and after incubation period for 4 h. The CFU of *F. oxysporum* on potato dextrose agar (PDA) medium decreased significantly on increasing the concentration and time of incubation with AgNPs. In the greenhouse, AgNPs caused appreciable enhancement in the growth parameters of tomato seedlings such as; root, shoot fresh weight, and height of seedlings in soil infested with F. oxysporum compared with the control. In addition, AgNPs reduced the severity of wilt disease by 90% observed through decreasing the number of wilted seedlings especially after placing their roots in 500 mg/l of AgNPs suspension for 4 h prior to soil infestation with the pathogen. This study recorded that *C. globosum* has the ability to synthesise AgNPs which showed significant in vivo antifungal potential observed through control of *Fusarium* wilt of tomato seedlings, in addition to enhancing their growth parameters in the greenhouse.

Keywords: Disease severity, *Fusarium oxysporum* f. sp. *lycopersici*, X-ray diffraction.

Session Title: Beneficial and Harmful Effects

Abstract

IMPROVING THE SOIL-PLANT ECOSYSTEM FUNCTION AND PRODUCTIVITY THROUGH THE APPLICATIONS OF BIOCHAR AND BENEFICIAL MICROORGANISMS

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Biochar (BC), a cost-effective carbon-based amendment, improves soil fertility and alters microbial decomposition of soil organic matter (SOM). However, feedstock type and pyrolysis condition (*i.e.*, temperature) of BC and the type of soil are crucial for its efficacy on eliminating the toxicity of organic/inorganic contaminants or nano-materials to microorganisms and crops. For instance, BC rehabilitates low buffered coarse-textured soils more apparently compared to fine-textured soils. Biochar neutralizes the acidity improving the availability of nutrients and cation exchange capacity of the soil. In an automated biogeochemical microcosm experiment, BC pyrolyzed at 550 ºC increased the amounts of phospholipid fatty acids (PLFA) and changed microbial community composition in the soil compared to BC pyrolyzed at 300 ºC and untreated soil in a contaminated floodplain soil. Also, BCs produced at various pyrolysis temperatures interacted differently with soil and decreased redox potential (E_H) in a contaminated floodplain soil. In bioassay and incubation experiments, nanomaterials (multiwalled carbon nanotubes, gypsum, TiO_2, and fluorapatite nanoparticles) led to short-term toxicity to cabbage and delayed seed germination. However, BCs eliminated the toxicity of nanomaterials (multiwalled carbon nanotubes, gypsum, TiO_2, and fluorapatite nanoparticles) to cabbage. Furthermore, wood BC or rice husk BC applied at 2.5% with nanoparticles (gypsum & TiO_2) decreased both bioavailable As and Pb in the contaminated soils. Further research is needed to set guidelines and legalization for BC best application rate and method to enhance soil fertility and biological quality.

Key words: Biochar, fluorapatite, PLFA, pyrolysis, soil fertility.

AMELIORATION OF ABIOTIC STRESS TOLERANCE IN PLANTS BY ENDOPHYTIC MICROBIOME

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Catastrophic events and Climate change have contributed to increasing the biotic stresses mainly in the form of fungal and bacterial infection. This lead to the extensive usage of fungicide and bactericide, which disturbed the natural diversity of microbe in soil and plant completely. The final result is a soil that is poor from a natural and healthy consortium of the beneficial microbe. The microbial activities underground affect aboveground ecosystems in the form of eukaryote plant and prokaryote plant interactions. An effect of belowground function over aboveground response constitutes an agroecosystem, which is influenced by ecological interactions among communities. The absence of such microbe results in a weak plant that is susceptible to biotic and abiotic stresses. To follow the international regulation for sustainable agriculture and horticulture production, we will need to re-introduce this microorganism to their natural habitat to re-balancing the soil and plant microbiome to its former hemostasis. Microbial communities at seed- and root-soil interfaces (epiphytes) along with within the plant (endophytes) might improve plant fitness during various environmental growth conditions, such as abiotic stresses like drought, heat, and salinity (Yang *et al*., 2009; Gover *et al*., 2010). The aim is to offer insights into the means by which fungal endophytes can be efficiently used for enhancing growth, health, and adaptation of plants to stress conditions. While recognizing that the majority, if not all plants contain endophytes, many remain not studied for their endophytic diversity or function. Many endophytes may only show a mutualistic interaction for one plant species, but not for another (Hardoim *et al.* 2015). However, the scientific community generally agrees that endophytes are microorganisms that can be detected inside healthy plant tissues and are asymptomatic. However, the increase in the usage of endophytes for enhancing plant adaption, a growing recognition by the scientific community of the potential to annotate new endophytes for the enhancement of crop production. The endophytic fungi actively synthesis many secondary metabolites (Tan and Zou 2001; Gunatilaka 2006), mostly are bioactive compounds expressed as defensive weapons to defend the host plant from diseases and pests. Moreover, these metabolites are specific for the interactions and communications with the plant host. Molecular studies on the endophytic fungi revel that these organisms include gene clusters encoding specific secondary metabolites, many are not expressed under standard laboratory cultivation conditions. Such trigger the question as to which physiological and environmental conditions are essential for endophytic fungi to prompt these secondary metabolites (Brakhage 2013; Netzker *et al.* 2015). Since these endophytic fungi may embrace the key to future opportunities for a sustainable agricultural, we have to work on capturing the benefits of such beneficial microbes with some urgency.

Key words: Climate change, fungi, sustainable agriculture, secondary metabolites.

FUNGAL MYCOTOXINS AND NATURAL ANTIOXIDANTS: TWO SIDES OF THE SAME COIN AND SIGNIFICANCE IN FOOD SAFETY

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The worldwide contamination of feeds and foods with mycotoxins is a significant problem. Mycotoxins pose huge health threat to animals and humans regarding chronic toxicity. As well, mycotoxins bring enormous economic losses in food industry annually. The term Mycotoxin is derived from the Greek word 'mycos' meaning fungus (mould), and the Latin word 'toxicum', which means poison. Today's world challenge is ensuring the safety of food, which has been a major focus of international and national action over the last years. Legislative limits for a range of mycotoxins continue to develop worldwide, due to being carcinogenic to animals and humans, resulting in an increased number of official controls monitoring in the food supply chain deriving from national food safety plans and for food trade purposes.

Mycotoxins are toxic fungal secondary metabolites of enormous chemical diversity which is usually activated by signals from the environment (cold, heat, dryness, fungicide, etc.). Mycotoxins play a significant role in food and feed safety, as well as in medical and environmental microbiology. Fortunately, not all toxic compounds produced by fungi are called mycotoxins. The target and the concentration of the metabolite are both important. Fungal products that are mainly toxic to bacteria (such as penicillin) are usually called antibiotics. Fungal products that are toxic to plants are called phytotoxins and other low-molecular weight fungal metabolites such as ethanol that are toxic only in high concentrations are not considered mycotoxins. Mycotoxins are made by fungi and are toxic to vertebrates and other animal groups in low concentrations.

Mycotoxicoses is poisoning by natural means, and thus are analogous to the pathologies caused by exposure to pesticides or heavy metal residues. The symptoms of a mycotoxicosis depend on the type of mycotoxin, the amount and duration of the exposure, the age, health, and sex of the exposed individual; and many poorly understood synergistic effects involving genetics, dietary status, and interactions with other toxic insults. Thus, the severity of mycotoxin poisoning can be compounded by factors such as vitamin deficiency, caloric deprivation, alcohol abuse, and infectious disease status. In turn, mycotoxicoses can heighten vulnerability to microbial diseases, worsen the effects of malnutrition, and interact synergistically with other toxins.

In the next decades, industry will have to face a new "mycotoxins scenario": the so-called "masked/bounded forms". In fact, many factors (e.g., heat, pressure, pH, enzymatic activities, food constituents) must be considered during processing, since the release of native forms as well as formation of conjugated ones by reactions with macromolecular components (such as sugars, proteins or lipids) may be induced. Therefore, nowadays, the food industry clearly demonstrates the need for both rapid screening techniques, which could be also used outside the laboratory environment, and high sensitivity-precision methods for confirmatory purposes. Taking into consideration that, approximately 25% of the crops are contaminated by molds: the incidence can vary considerably depending on many factors, such as weather conditions, agricultural practices, packaging, transport and storage. Results show that almost 100% of these crops are contaminated with one or more mycotoxins. The relation between geographical origin and reported mycotoxin combinations is presented in Fig. 1, which cannot be stable in a changing world.

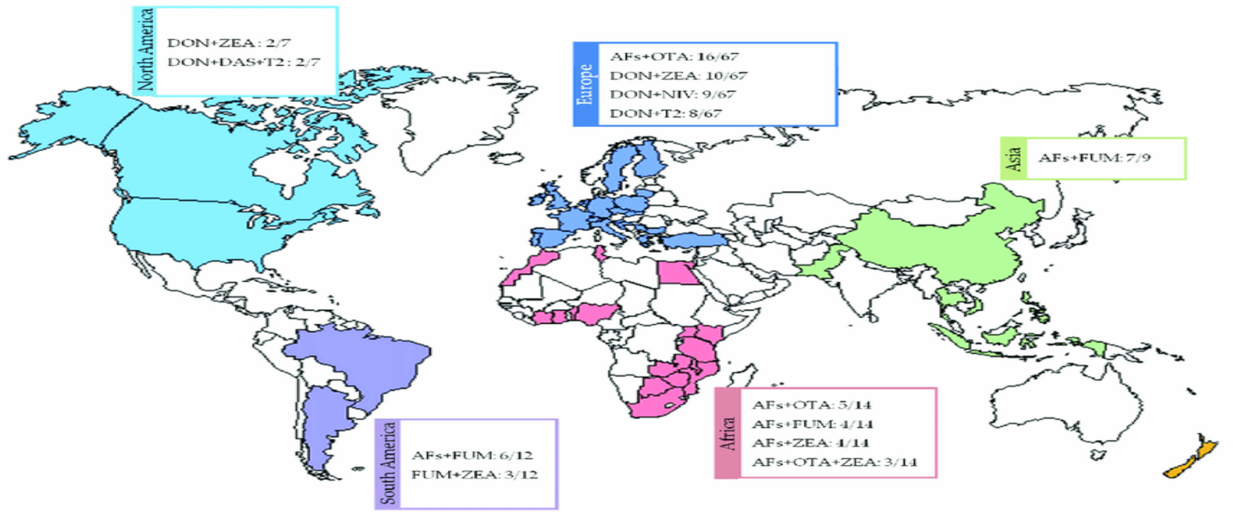

Figure 1. Main mycotoxin mixtures quoted in the papers depending on their geographic origin, Abbreviations: aflatoxins (AFs); ochratoxin A (OTA); trichothecenes (TCTs); deoxynivalenol (DON); nivalenol (NIV); T-2 toxin (T-2); HT-2 toxin (HT2); diacetoxyscirpenol (DAS); zearalenone (ZEA); fumonisins (FUM).

The need for regulations imposing limits to the concentration of mycotoxins in foods and feeds are generally recognized in developed countries and most of them have specific mycotoxin regulations. Several factors, both of a scientific and socio-economic nature, may influence the establishment of mycotoxin limits and regulations depend on availability of toxicological data, data on the occurrence of mycotoxins in various commodities, availability of methods of sampling and analysis, implications for inter-country trade and the existence of sufficient food supply. Fig.2. illustrates countries in regard to regulations for mycotoxins in food and feed.

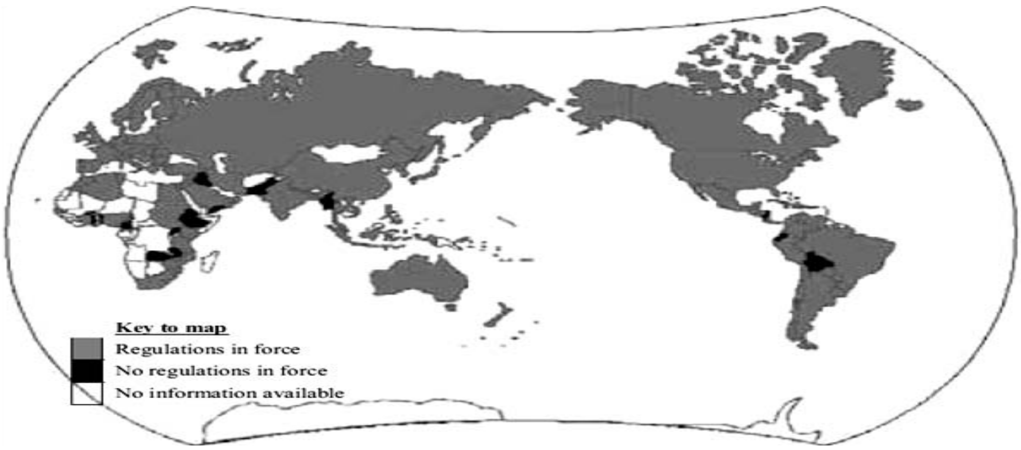

Figure 2. Countries have regulations (gray), unknown whether or not they have regulations (white) and have no specific regulations (black) for mycotoxins in food and feed.

The challenges presented in mycotoxin research are enormous due to the frequency, the complexity and variability in occurrence. Several aspects make the pre- and post-harvest control of mycotoxins difficult, such as: Different fungal species produce mycotoxins, most of the mycotoxin producing fungi are able to produce more than one mycotoxin, mycotoxin levels are influenced by environmental conditions during growth and storage, the presence of modified mycotoxins and the highly complex influence of environmental factors on the biosynthesis of mycotoxins by fungi. Other aspects related to human and animal health also contribute to the complexity in mycotoxin research, e.g.; the lack of suitable biomarkers to assess exposure of humans and animals, the need for guidance levels of mycotoxins in animal body fluids, the efficacy and safety testing of mycotoxin detoxifiers, knowledge about toxicokinetics in men and animals and exposure is not the same due to different levels of contamination and dietary habits in various parts of the world. The risk analysis framework for food safety is illustrated in Fig. 3.

Figure 3. Risk analysis framework for food safety.

Many studies have been performed in order to clarify the mechanisms of mycotoxin-induced toxicity. In many cases, the mycotoxin induced the lipid peroxidation by generation of free radicals and subsequent oxidative stress mediated structural and functional changes in the hepatocytes, as the main organs for the metabolism of mycotoxins are liver and kidney. Moreover, the multiple mycotoxins contaminated diet may cause more serious damage than the single or pure mycotoxin. Free radicals such as reactive oxygen species (ROS) are highly reactive, short-lived, toxic molecules that have one or more unpaired electrons and can damage DNA, proteins, lipids, and carbohydrates within the tissue, leading to many common diseases like atherosclerosis, cancer, and many others. Antioxidants are the molecules, which prevent cellular damage by reducing the oxidative stress and therefore have a beneficial effect on human health could result in liver damage. Delicate balance between antioxidants and pro-oxidants in the body in general and specifically in the cell is responsible for regulation of various metabolic pathways leading to maintenance of immunocompetence, growth and development and protection against stress conditions. This balance can be regulated by dietary antioxidants.

Strategies to eliminate or inactivate mycotoxins in food and feed are urgently needed. Physical and chemical degradation methods have some limitations such as limited efficacy, safety issues, and losses in the nutritional value, as well as the expensive equipment required to implement these techniques. Biological degradation of mycotoxins has shown promise because it works under mild, environmentally friendly conditions. Active metabolites isolated from microbial systems can convert mycotoxins with varied efficiency to non- or less toxic products. Fungi are remarkably a diverse group including approximately 1.5 million species, which can potentially produce a diverse array of secondary metabolites such as alkaloids, benzoquinones, flavanoids, phenols, steroids, terpenoids, tetralones, xanthones and anthraquinones, which have a tremendous impact on society and are exploited as antioxidants serve as the defensive factor against free radicals in the body. Researchers focused to screen and expand the spectrum of fungi having antioxidant potentials and to optimize the culture conditions to enhance their activities in pharmaceutical applications, in addition to safety considerations.

Plant Endophytic fungi are a group of microorganisms living within plant internal tissues or organs without causing any apparent symptoms or diseases in the hosts; on contrary they protect their host from infectious agents and adverse conditions by chemically synthesize bioactive secondary metabolites such as alkaloids, terpenoids, steroids, quinones, isocoumarin derivatives, flavanoids, phenols, phenolic acids, and peptides, in addition to other compounds that can be utilized industrially such as enzymes, beside their ability to produce the same or similar kind of compounds of from their originated host plants. Fig. 4 illustrates the beneficial relationships established by the endophytic fungi to their host medicinal plants including enhancing the growth and resistance of their host plants, as well as promoting the accumulation of secondary metabolites. Thus, the host itself has naturally served as a selection system for fungal species having bioactive molecules with reduced toxicity toward higher organisms of eukaryotic system. Endophytes are now considered as an important component of biodiversity. Many bioactive potential of endophytes have been proven, such as antiviral, anticancer, antidiabetic, antimicrobial effects, and antioxidant capacity. As a part of ongoing efforts towards finding novel antioxidant agents from natural resources, extracts of Endophytic fungi from all plants, either medicinal, rainforest or halophyte plants have attracted more attention as potential antioxidant resources in medicine, agriculture and industries.

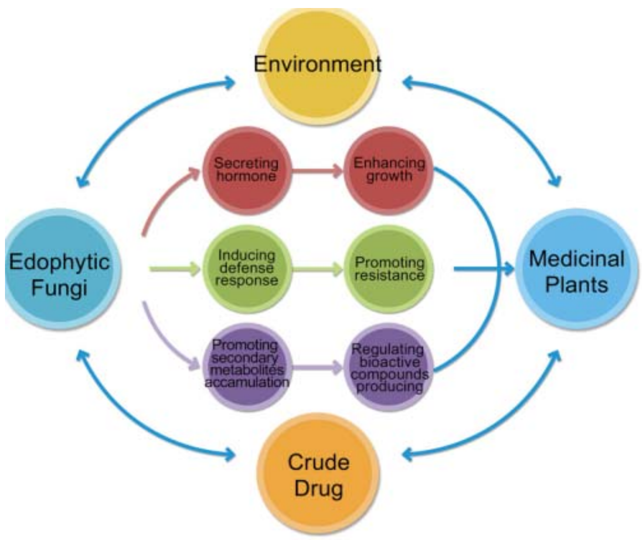

Figure 4. The beneficial relationships established by the endophytic fungi to their host medicinal plants.

In today's changing world, safety and security have remained basic human needs, and securing safe food has been a major focus of international government action over the last years. Thus, Sustainable Development Goals (SDGs) 2030 target zero hunger, good health and well-being. Of both microbiological and chemical hazards, mycotoxins currently form a major food safety concern, for having serious effects on man and animals, which have led many countries to establish regulations on mycotoxins in food and feed to safeguard the health of humans and the food chain. The setting of mycotoxin regulations is a complex activity, which involves many factors and parties since the first limits for mycotoxins were lunched in the late 1960s for the aflatoxins. The need for new and useful compounds to provide assistance and relief in all aspects of the human condition is ever growing. Added to this are enormous difficulties in raising enough food on certain areas to support local human populations. Fungal endophytes constitute a major part of the unexplored fungal diversity. Therefore, there is a great necessity for further studies evaluating, managing and communicating the issue of mycotoxins of significant economic importance, with the goal of elucidating the public health risks.

Abstract

IMMUNOTOXICOPATHOLOGICAL EFFECT OF EXPERIMENTAL OCHRATOXICOSIS ON BROILERS

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The immunopathological responses of broiler chicks under ingestion of Ochratoxin A(OTA), a fungal metabolite contaminated feed, was studied in, one day old, 42 broiler chicks divided into seven groups (A to G) fed OTA contaminated diet at 0.1, 0.3, 0.5, 0.7, 0.9 and 1.1 mg/Kg feed, respectively, for 21 days.Hematologic profile and histopathological alterations were studied. Serum concentration of IgY and Ig A were measured for the determination of humoral immune response. Gross pathological lesions on liver and kidneys included lighter in coloration, friable and hemorrhagic. Histopathologically, liver and kidneys of chicks showed degenerative and infiltrative changes while spleen, bursa and thymus showed marked reduction of lymphoid cell. Hematological profile indicated significant decrease in hematocrit, erythrocytes, hemoglobin, leukocytes and lymphocytes, while significant increase in heterophils and monocytes ($p<0.05$). Eosinophils were detected in chicks treated with higher doses of 0.9 and 1.1 mg/kg of feed. Level of IgY and IgA was significantly decreased ($p<0.05$) in all OTA treated groups in a dose dependent. Thus suggesting that there were immunopathological effects from OTA in the chicks kept on various levels of OTA-contaminated diet even OTA @ 0.1mg/kg of feed.

Keywords: Immunotoxicopathology, degeneration, lymphoid organs, hematology.

MOLECULAR CHARACTERIZATION OF MALASSEZIA FURFUR USING ITS GENE AS A GENETIC MARKER IN NUCLEAR DNA

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Humans' skin is the outer covering of the body; it has multiple layers of ectodermic tissue and guards the underlying muscles, bones, ligaments and internal organs, so it represents the largest organ of the integumentary system. *Pityriasis versicolor* is a skin disorder causes either hyper- or hypopigmentation scales and itchiness, it's caused when *Malassezia furfur* population grow over the control levels. DNA sequencing of *M. furfur* is so importance to determine which strains are related to *Pityriasis versicolor* and distribution of these strains with patients´ sex, body site and origin of the population. This study included skin scraps and swabs collected from 120 individuals (60 patients with *Pityriasis versicolor* and 60 healthy volunteers) were used for direct examination (KOH and lacto phenol cotton blue), indirect examination (Cultural methods) and molecular methods (Conventional PCR and

PCR-Sequencing). PCR was performed with primer pair targeted Internal Transcribed Spacer (ITS) gene of *Malassezia furfur* as genetic marker, then the PCR products was subjected for PCR- sequencing to detect the substitution mutation of ITS gene. According to Direct, indirect examination and molecular methods, the positive result was 20 out of 60 *Pityriasis versicolor* patients (33.3%) whereas 26 out of 60 healthy volunteers (21.7%). The PCR product of ITS gene with a molecular weight (~509bp). PCR- sequencing result showed existence of different substitution mutations at different positions which were N44Y, T79R, T79M, S105F, S109F, N44I, R131M, V159E, N44Y, R131M, V159M and S109C for ITS gene. The obtainable results of this study by each of conventional and molecular detection methods were the same, although molecular methods still the best, because it is the less timing consuming one in comparison with culture methods which took 3-30 days.
Keywords: *Malassezia furfur*, *Pityriasis versicolor*, molecular methods.

Abstract

PRODUCTION OF L-ASPARAGINASE ENZYME FROM ENDOPHYTIC LASIODIPLODIA THEOBROMAE HOSTED TEUCRIUM POLIUM

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Endophytic fungi usually live inside plant tissues and considered as a source of different important bioactive compounds including enzymes. L-Asparaginase enzyme considered as one of the most important anti-leukemic enzymes, which have been used recently at the treatment of Acute Lymphoplastic Leukemia (ALL). Endophytic Lasiodiplodia theobromae have been isiolated from Teucrium polium plant tissues collected from Saint Katherine Protectorate and screened for the production of L-Asparaginas enzyme by a qualitative method using modified liquid Czapex dox's media and quantitatively using Nesslerization reaction. Further more the crude enzyme has been partially purified using gel-filtration sephadex G-100. Enzyme activities have been recorded before and after the purification step and compared together. Lasiodiplodia theobromae found to be an alternative safe biological way for the production of L-Asparaginase enzyme.

Keywords: Anti-leukemic - Egypt- Saint Katherine- Sephadex G-100.

Abstract

MYCOBIOTA AND AFLATOXINS IN SOME EGYPTIAN DAIRY PRODUCTS

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Mycobiota are a group of fungi present in a particular geographic region (Ex. the mycobiota of Alexandria, Egypt) or habitat type (Ex. the mycobiota of dairy products), and their secondary metabolites named mycotoxins. Aflatoxins are a group of mycotoxins that are highly toxic, immunosuppressive, mutagenic, teratogenic, and carcinogenic compounds. The current work is carried out to investigate the incidence of mycobiota and aflatoxins in some Egyptian dairy products and the incidence relation between them. One-hundred and fifty samples of Kareish, Damietta, Ras, processed cheese, table and cooking butter (twenty-five of each) were collected from supermarkets, groceries and street vendors at Alexandria City, Egypt. Surface plating on Sabouraud Dextrose Agar (SDA) and Thin Layer Chromatography (TLC) used for detection of mycobiota and aflatoxins, respectively. Molds occurred in 60, 60, 76, 88, 76 and 88 % whereas yeasts existed in 96, 64, 60, 4, 36 and 84% of examined Kareish, Damietta, Ras, processed cheese, table and cooking butter, respectively. High incidence of aflatoxins was detected in Ras cheese whilst all processed cheese and butter samples were free. The most predominant mold species were *Penicillium* and *Aspergillus*. We could conclude that the presence of mycobiota and/or aflatoxins in such products indicates improper hygienic conditions during their production, storage and may constitute a public health concern. The high incidence of mycobiota in the examined products is not associated with the presence of aflatoxins.

Key words: Aflatoxins, dairy products, Kareish, Mycobiota, Ras cheese.

Session Title: Fungi and Climate Changes

Abstract

EFFECT OF CLIMATE CHANGE ON PLANTS AND FUNGI: A SPECIAL IMPACT ON PHENYLPROPANOID PATHWAY

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Climate changes considerably altering plants and fungi including mushrooms, toadstools and other fungi. The number of the Egyptian fungi recorded till now is about 2477 taxa. They provide vital ecosystem services for the welfare of native trees and other plants, and are the natural recyclers of the planet, but until now their response to global climate change has not been examined intensively. Climate change can be assessed in terms of changes in ultraviolet radiations (UV-A, UV-B) and carbon dioxide levels. UV radiation (UVR) from the sun has always played important roles in our environment, and affects nearly all-living organisms biologically. UV radiation at different wavelengths differs in its effects, wavelengths of ultraviolet (UV) radiation that reaches the Earth's surface is in between 280 and 400 nm are of two ranges UV-B (from 280–320 nm) and UV-A (from 320–400 nm). Ozone depletion increases the levels of UV-A and UV-B levels. UVR have deleterious and damaging effects on all biological systems because of short waves with high frequencies are extremely energetic. Under high levels of UV, plants and fungi altered structurally and functionally in which DNA damaged. However, in response to enhanced levels of UVR plants and fungi accumulates phenolic compounds to absorb UVR (known as UV-absorbing compounds), or passively screen out UVR (known as UV-screening compounds). UV-absorbing/screening compound are produced through activation of phenylpropanoid pathway and enhanced expression of the key enzyme phenylalanine ammonia lyase (PAL). The phenylpropanoid metabolism generates an immense array of second metabolites. Fungi, accumulate the mycosporine-like-amino-acids (MAAs) as a main UV-Absorbing compounds. These are a small molecules (<400 Da) and more than 30 MAAs have been resolved all contains the cyclohexenimine ring. MAAs are a potent UV-absorbing compounds and can absorb UVR from 310 to 340 nm protecting plants and fungi from its damaging effects. In the current review we cover the most relevant UV-protective compounds (e.g. mycosporine-like amino acids MAAs in fungi and UV-absorbing compounds in plants) giving an account on their protective role against the damaging effects of enhanced levels of UVR.

Key words: Climate change, mycosporine-like amino acids, phenylpropanoid, ultraviolet.

Abstract

AN ASSESSMENT OF MACRO FUNGAL DIVERSITY ON THE MALTESE ISLANDS

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The study of fungal diversity is very limited on the islands, with a handful of people contributing to researching, recording, publishing and taking an active interest in the subject. There are no natural forests, trees are being cut down on a daily basis to make way for new buildings with the latter being a major threat to macro fungi. Finding fungi can be challenging, but in view of all this, along with the lack of rain, there still persists a healthy diversity albeit small.

Malta Mycological Association was created to generate public interest and research. A series of lectures will commence on a monthly basis from the 28th September 2018, along with forays to further knowledge on the importance of fungi in our environment. Through the facebook group, members are encouraged to record their finds and to share so that our database is kept up to-date. All information given through lectures, forays and MMA is to be kept simple so that the general public's interest is established which in turn will, hopefully, make people more aware about the importance of fungi and respect for the environment is further developed.

An assessment of records from 1906 (Flora Melitensis Nova-58 species) until now (Michael Briffa, Edwin Lanfranco - 251 species, Carmel Sammut, Stephen Mifsud and myself - 85 species) has been collated and we now have a fair idea on the array of these organisms, a proper fungal map and a national database. These records have been updated with current nomenclature according to Index Fungorum.

The floral and faunal population are highly threatened on the islands due to the complete destruction of habitat by the construction industry along with population growth. With the main resource on the islands being tourism, on a daily basis natural habitats are disappearing making way for new apartments and hotels. Although there are some special nominated reserves1 under[1] the Environment and Resources Authority (ERA), still these areas face threat. Along with this no fungal species are listed in any of the publications.

1. *Abortiporus biennis*
2. *Boletopsis grisea* (Bern Convention)
3. *Sarcosphaera coronaria* (Bern Convention)
4. *Boletopsis leucomelaena*
5. *Phallus impudicus*
6. *Montagnea arenaria*
7. *Battarrea phalloides*
8. *Coprinopsis cinerea*
9. *Ascobolus geophilus*

[1] https://era.org.mt/en/Documents/Background%20note%20on%20the%20status%20of%20selected%20taxonomic%20groups%202005.pdf

10. *Geoglossum dunense*
11. *Morchella galilea*
12. *Hortiboletus rubellus*
13. *Peziza vesiculosa*
14. *Cheilymenia granulata*
15. *Lycoperdon lividum*
16. *Cryptomarasmius corbariensis*
17. *Agaricus iodosmus*
18. *Coprinopsis nivea*
19. *Tricholoma terreum*
20. *Crepidotus variabilis*

There are still undiscovered species and every effort is now being made to ensure that these are found, recorded and updated in MMA's database. This database will also help current and future generations with any environmental studies they might wish to partake in.

The Maltese Islands are the 10th smallest islands[2] with just 316 km^2 of land area and an estimated population of 475,700[3] making them also one of the world's most densely populated countries, around 1,600 people/sq km. They lie 97 km south of Sicily, 284 km east of Tunisia, 333 km north of Libya and 745 km west of Greece, 1520 km south-west of Egypt. The archipelago consists of three inhabited islands: Malta (246.5 km^2), Gozo (65.8 km^2) and Comino (2.9 km^2). These are composed of oligo-miocene sedimentary rock and along with Sicily are part of the African continental plate.

Total Population				
	Population 1.1.2017 (in 1 000)	Population 1.1.2018 (in 1 000)	Change 2018/2017 (per 1 000)	Share in EU population, 2018
EU	511 521.7	512 596.4	2.1	100%
Malta	460.3	475.7	32.9	0.1%

Another factor to take into consideration is the fact that Malta's has had the highest increase of CO_2 emissions in 2017, this being recorded at (+12.8%).[4] According to the Eurostat Report these are mainly influenced by climate conditions, economic growth, population growth, transport and industrial activities. The numbers of vehicles on the roads is one of the major contributors, with Malta having the second highest number of cars per inhabitant in the European Union. According to the Eurostat report, Malta has 634 passenger cars per 1000 people.[5]

Therefore it is imperative that studies continue, these can be presented to authorities in the hope that what species we have species are preserved, encourage more environmental awareness with a special focus on fungi and with the assistance of

[2] https://www.worldatlas.com/articles/the-10-smallest-countries-in-the-world.html
[3] https://www.timesofmalta.com/articles/view/20180710/local/increase-in-malta-population-more-than-15-times-that-of-the-eu.684039
[4] https://ec.europa.eu/eurostat/documents/2995521/8869789/8-04052018-BP-EN.pdf/e7891594-5ee1-4cb0-a530-c4a631efec19
[5] http://www.independent.com.mt/articles/2017-06-20/local-news/Malta-ranks-second-for-highest-number-of-cars-per-inhabitant-in-EU-6736175688

international mycological associations raise the importance of fungal research on the islands.

Key words: Climate change, conservation, Maltese fungi, threaten taxa.

Session Title
Arab Society for Fungal Conservation (Students and Volunteers Section)

Abstract

MYCOTOXINS AND CANCER: AWARENESS AMONGST CHILDREN AND YOUTH

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Ingestion of food is the major route of human exposure to chemical and biological contaminants, especially mycotoxins. Food additives have been used throughout history to perform specific functions in foods. A comprehensive framework of legislation is in place within Europe to control the use of additives in the food supply and ensure they pose no risk to human health. Further to this, exposure assessments are regularly carried out to monitor population intakes and verify that intakes are not above acceptable levels (acceptable daily intakes). Considering their toxic and carcinogenic effects, mycotoxins exposure assessment assumes particular importance, especially when vulnerable populations as children, are involved. Although there are increasing evidences of mycotoxins co-contamination in food, scarce data are available concerning children exposure to multiple mycotoxins, their bioaccessibility and the potential toxic effects resulting from intestinal exposure. Young children may have a higher dietary exposure to chemicals than adults due to a combination of rapid growth rates and distinct food intake patterns. One of the most widely investigated unfavourable health effects associated with food additive intake in preschool-aged children are suggested adverse behavioural effects. Research that has examined this relationship has reported a variety of responses, with many noting an increase in hyperactivity as reported by parents. Addressing these considerations, my presentation objectives are to: characterize Egyptian children exposure to multiple food additives and mycotoxins through food consumption; determine mycotoxins bioaccessibility in foods usually consumed by children; shed the light on volunteering activities to increase the national awareness amongst children and youth about mycotoxins and cancer and the role of Baheya hospital in that.

Key words: Baheya hospital, Carcinogens, Egyptian School Children, hyperactivity.

Abstract

EGYPTIAN ENDOPHYTES-MINES OF PHARMACOLOGICAL THERAPEUTICS

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Endophytic fungi hosted the healthy tissues of plants. With increasing incidence of antimicrobial resistance and multidrug resistant strains of microbes presenting a major worldwide health threat, the search for new antimicrobials has intensified. Medicinal plants from arid environments and high elevated mountains accumulate a wealth of bioactive compounds. Any endophyte that is able to colonize these plants must cope with their chemical weapons that will restrict any successful microbial invasion. During the long period of coevolution, a relationship was formed between endophytes and their host plants and endophytes have the ability to produce the same or similar bioactive compounds as those originated from their host plants. These pronounced stress conditions (dry and altitude) are expected to favour unusual endophytes that will give rise to likewise unusual metabolites (novel antibiotics). In this presentation, many important, well-studied areas regarding endophytic fungi and their potential secondary metabolites are presented. This source of noble compound (secondary metabolites) would bring the endophytic fungi to light to be utilized in the field of pharmacy and medicine.

Key words: Coevolution, medicines, pharmacy, pharmaceutics.

Abstract

SAVING THE FORGOTTEN KINGDOM IN EGYPT

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Egypt is a distinct geographical area characterized by temperatures and elements suitable for the growth of large number of biota. Egypt characterized by a very specific biodiversity distributed among kingdoms of living organisms. Among these kingdoms, kingdom FUNGI is overlooked and forgotten in Egypt. Up till now this great kingdom (came second after insects) and still treated under the kingdom of planta. How can a more than 100 000 species comprising three kingdoms still treated under plants in Egypt? In the ancient Pharaonic era, Pharaohs used mushroom as a royal food, coloring temples by colors extracted from lichens, mummification and other uses. However, beside their major basic positive role in the cycling of minerals, organic matter and mobilizing insoluble nutrients, fungi have also other beneficial impacts. They are considered as good sources of food and active agents for a number of industrial processes involving fermentation mechanisms as in the bread, wine and beer industry. A number of fungi also produce biologically important metabolites such as enzymes, vitamins, antibiotics and several products of important pharmaceutical use; still others are involved in the production of single cell proteins. The economic value of these marked positive activities has been estimated as approximating to trillions of US dollars. With regard to the edible fungi, P. Kirk recently underlined that China presently exports these products to an estimate annual value of US$ 3.8 billion while its internal production of the same have reached a level of 268.3 billion Chinese Yuan ¥ (Personal Communication). The importance of fungi to the health and welfare of the planet is no longer in any doubt and the days of suspicion when most fungi were considered poisonous are over. Fungi are now being embraced and conserved for their beauty, their contribution to nutrient cycling and soil fertility, as a source of medicines and other valuable chemicals, as a food source and as a substantial part of the Earth's biodiversity. The need is greater than ever for a better appreciation and understanding of these intriguing organisms and an ambitious yet achievable strategy to provide a sound framework to take forward the conservation of fungi in Egypt. Given the limited resources available, the Arab Society for Fungal Conservation has joined together with other NGOs, mycologists, scientists, universities, international mycological societies and Egyptian Environment Affair Agency to co-ordinate their work of raising awareness of fungi – perhaps the one kingdom of the living world that is least widely understood.

Key words: Antibiotics, EEAA, enzymes, fungal conservation, Save Fungi.

Abstract

WHY EGYPT'S NATIONAL FUNGUS DAY?

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20th of February is celebrated as Egypt's National Fungus Day as the second country all over the world after UK. In 2014 and 2016 Abdel-Azeem "the founder of Arab Society for Fungal Conservation" proposed a good candidate for celebration of Egypt's National Fungus Day on the 20th of February. This is due to the role of ancient Egyptians in documentation and conservation of fungi since ancient time and Ramses II is one of the famous pharaohs and solar event in The Great Temple at Abu Simbel is a cosmopolitan one. Abdel-Azeem with the help of international societies, agencies and mycologists decreed the Egypt's National Fungus Day in Bibliotheca Alexandrina in the 20th of February 2016 for the first time. Arab Society for Fungal Conservation (ASFC) is helping to stage a number of public engagement events all over Egypt to help shed light on this mysterious and misunderstood kingdom. As part of this day to raise awareness of the importance of fungi and the fungal kingdom, the Society suggests five reasons why fungi have shaped, and still are shaping the world around us, highlighting some major facts that we should all take notice of. I will discuss in my speech what have been done since 2016 to put the fungi on the map of biodiversity in Egypt?

Key words: Ancient Egyptian, ASFC, raise awarness, Ramses II.

Abstract

HOW MANY SPECIES OF LICHENS ARE THERE IN EGYPT?

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Records of fungi in Egypt scattered in many literatures and preliminary annotated checklists which is published in Egypt since 1931. Recently Abdel-Azeem (Personal Communication) mentioned that the number of FUNGI in Egypt includes 2477 species. Serious scientific interest (studies) in the fungi of Egypt started at the beginning of the 19th century basically on their lichen forms by Delile (1813a, 1813b), Nylander (1876, 1864), Müller (1880a, 1880b, 1880c, 1884), Stizenberger (1891, 1890) and (Steiner (1893). In the early 20th century, Stizenberger (1901) and Steiner (1916) provided information on several collections of lichens made in Egypt in the 19th and the beginning (early) of the 20th Century. This talk presents data on the expected numbers of lichens in Egypt and why study of lichens started to overlook during the mid of the past century? Values of relative species richness of different systematic and ecological groups in Egypt compared to values of the same groups worldwide, show that our knowledge of Egyptian fungi is fragmentary, especially for certain systematic and ecological groups such as Agaricales, Glomeromycota, and lichenized, nematode-trapping, entomopathogenic, marine, aquatic and coprophilous fungi, and also yeasts. From these data, one must conclude that enormous numbers of unrecognized lichenized fungi in Egypt should be the target of Egyptian mycologists as the potential fungal resources of Egypt are globally important and there are vast areas that are still unexplored. At present, Egypt needs more investigators and funds to explore and develop this research field and, therefore, the extensive collection of fungi in unexplored areas remains a priority.

Key words: Abdel-Azeem, check-lists, lichens, unexplored habitats.

Abstract

CONSERVE THE PLANT PATHOGENIC FUNGUS GANODERMA: AN INTRODUCTION TO A BUSINESS OPPORTUNITY IN EGYPT

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Ganoderma is a cosmopolitan genus with a wide distribution in tropical and temperate habitats and described in 1881 by Karsten to accommodate a single species, Ganoderma lucidum (Curtis) P. Karst. The diversity and the biogeography of *Ganoderma* species are underestimated. In Egypt Abdel-Azeem recorded seven species of *Ganoderma* namely: G. *adspersum* (Schulzer) Donk, *G. applanatum* (Pers.) Pat., *G. carnosum* Pat., G. colossus (Fr.) C.F. Baker, *G. lucidum* (Curtis) P. Karst., *G. mbrekobenum* E.C. Otto, Blanchette, Held, C.W. Barnes & Obodai, and *G. resinaceum*. Among cultivated mushrooms, *G. lucidum* is unique in that its pharmaceutical rather than nutritional value is paramount. A variety of commercial G. lucidum products are available in various forms, such as powders, dietary supplements, and tea. These are produced from different parts of the mushroom, including mycelia, spores, and fruit body. The specific applications and attributed health benefits of lingzhi include control of blood glucose levels, modulation of the immune system, hepatoprotection, bacteriostasis, and more. The various beliefs regarding the health benefits of G. lucidum are based largely on anecdotal evidence, traditional use, and cultural mores. However, recent reports provide scientific support to some of the ancient claims of the health benefits of lingzhi. The cultivation of *Ganoderma* in Egypt not started yet or limited, small scale by shyness from producer. My speech will discuss how the ministries of Agriculture and Social Affairs in Egypt need to approve the scheme proposed by Arab Society for Fungal Conservation of product development framework “Products edible mushrooms and medicinal mushrooms.” Want mushroom truly become key products in the future and towards exports by the help of Alphay, in addition to building the good seed, the training of human resources, increase income and technical training to farmers will play a crucial role too.

Key words: Coffee, dietary supplement, income, linghizi, tea.

Session Title
Fungi, Biotechnology and Cultural Heritage

Abstract

FUNGI AND THE SECOND CEREMONIAL BOAT OF THE PHARAOH CHEOPS

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In 1954, the excavation around the Great (Cheops) Pyramid of Giza led to the discovery of two rectangular pits adjacent to the southern face of this massive monument. The pits were digged in an east-west direction. They were concealed and securely protected by the remnants of a stone wall; the latter is thought to have originally also enclosed this Great Pyramid. Interest in the eastern pit began by removing the plastered lid made of 41 limestone blocks. These were found to measure around 4.50 m in length, 1.80 m in width, and 0.85 m in thickness and weighs about 18 Tones each. The last slab was finally removed on January 28, 1955, and the eastern pit was thus declared open. On the other hand, the western pit remained untouched until the most appropriate and safest probing method would be devised in order to explore the interior without undue harm to its anticipated contents. In 1987 the second pit was examined by the American National Geographic Society in association with the Egyptian Office for Historical Monuments. A hole was then drilled through the limestone beams enclosing the boat. This allowed the introduction of a camera and some measuring equipment in the internal atmosphere in which the boat had been maintained for long. The boat and its surroundings were then photographed and some air measurements were also performed before resealing again the pit. At that time it was thought the latter had been so well sealed that the air inside should have not endured any change subsequent to the construction of the storage device by the ancient Egyptians. Sadly, however, such was not the case, as air had leaked into the pit and contaminated the internal atmosphere. This continuous supply of fresh air has probably allowed several insects to invade the system and concomitantly endanger some parts of the wooden beams. Khufu's second solar boat pit has been covered by 41 blocks, weighing 16 tonnes each, for the last 4,500 years. We studied the microfungi that might be present in the pit of Khufu's second boat and the surrounding hangar. We were able to isolate a large number of living strains (2250 CFU) from seven sites along the hangar and the pit. Their identification proved they simply relate to 26 species. Among the latter 23 units represent anamorphic Ascomycota (88.46 % of the total) while the remaining ones are either two Zygomycetes (7.69 %) and a single teleomorphic Ascomycota (3.84 %). The outcoming spectrum of the species identified assessed their connection to simply twelve genera. In terms of species numbers, the genus *Aspergillus* (9 species) proved to be better represented than the genus *Penicillium* (7 species). All the other recorded genera were each represented by one species. Besides, the most commonly encountered fungi were *Aspergillus niger*, *A. flavus*, *A. tamarii* and *Penicillium corylophilum*. On the other hand, from the unveiled pit of the second boat the living strains of eight fungi could be recovered; these fungi proved to be members of the genera *Alternaria*, *Aspergillus*, *Penicillium* and *Rhizopus*. The detection of several elements of these specific genera may be the consequence of a marked level of the parameters humidity and temperature which had already deteriorated the archeological wood.

Key words: Archeological wood, deteriorated wood, *Aspergillus*, *Penicillium*.

Abstract

FUNGI AND THE MUMMIFIED BODY OF PHARAOHS RAMESSES II: A SUMMARY

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The most outstanding recent case of biological degradation of cultural material by micro-organisms is materialized by the case of the mummified body of the famous Pharaohs RAMESSES II present in the Royal Mummy' Collection, Cairo Egyptian Museum of Antiquities. In September 1976, this royal mummy, 'travelled' to Paris for conservation treatment at the 'Musée de I' Homme'. After extensive documentation of the mummy and its condition, the infestation by a fungal species, *Daedalea biennis* Fries, was identified as the major cause of its biological deterioration. During the conservation work that followed, the mummy was placed in a custom-designed display case equipped with a special ventilator and was sterilized with gamma-ray radiation using cobalt-60. Numerous evidences for a physical and biological degradation of this notable Pharaonic mummy were presented in this study. The mechanical deterioration of the transformed body proved to be mainly due to the pronounced variations in temperature and humidity to which it has been subjected since late XIX century. The fluctuation of these physical parameters in conjunction with the exposition of the royal mummies to the public and the activity of surrounding insects proved to be behind the deterioration process of this transformed human corps. Fungi were identified as the main agents of the biological degradation of the latter. Traces of their development are apparent on the mummy and in the material filling in part its abdominal cavity; their presence have also been assessed around and under the transformed body in its oak coffin of presentation. A detailed examination of the mummified body had indeed confirmed the existence of several recent fungal infection loci with the most serious ones being located on the back and on the left side; these infection sites resulted from the development of several fungi. Furthermore, the microbiological analyses of some fragments of the mummy collected in the oak coffin and a sample of its abdominal material disclosed the presence of a dense fungal population: allover 370 living strains representing 89 species could be isolated and identified. The disclosed fungal biota was found to be particularly rich in species pertaining to the genera *Aspergillus* and *Penicillium* with the former comprising most of the more frequently isolated taxa; the prevalence of the Aspergilli clearly reflects the main features of the environment in which this mummy has been generally maintained: moderately high temperature and less pronounced humidity. Anamorphic Ascomycota were common in the final spectrum of the fungi recorded; however comparatively less true ascomycetes and species of basidiomycetes were then recorded. Finally, some representatives of these three taxonomic fungal groups proved to be new additions to the Egyptian mycobiota at the time of their isolation by Mouchacca (1985).

Key words: *Daedalea biennis*, mummy, *Aspergillus*, *Penicillium*.

LIST OF POSTER SESSION PRESENTERS

- Ahmed ABDEL-AZEEM.......................... (Suez Canal University, Egypt)
- Mohamed ABDEL-AZEEM................... (Sinai University, Egypt)
- Marym ABU-ALKHAIR........................ (Suez Canal University, Egypt)
- Esam ALI .... (Assiut University, Egypt)
- Eman ATTIA .... (Suez Canal University, Egypt)
- Bassem BALBOOL.................................... (MSA University, Egypt)
- Aisha ELATTAR.. (Alexandria University, Egypt)
- Hend El-Shahat .... (Suez Canal University, Egypt)
- Heba HASSAN .... (Suez Canal University, Egypt)
- Muhammad HAQUE.............................. (Bangladesh Agricultural University, Bangladesh)
- Amna IMRAN.. (University of the Punjab, Pakistan)
- Hanady KAMEL .... (Suez Canal University, Egypt)
- Sanjeev KUMAR...................................... (Jammu University, India)
- Safaa MANSOUR.................................... (Suez Canal University, Egypt)
- Mariam MOUSSA.................................... (Suez Canal University, Egypt)
- Sadiaa MUNIER....................................... (Pakistan Museum of Natural History, Pakistan)
- Fady SHAWKY....................................... (Suez Canal University, Egypt)
- Dalia YOUSSEF....................................... (ASFC, Canal University, Egypt)

Poster NO 01801
Poster Title

EGYPT: THE CRADLE OF MYCOLOGY AND CLIMATE CHANGES

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In addition to civilization, Egypt considered the cradle of mycology in which documentation of the world fungi may be dated back to 5619 B.C., when ancient Egyptians produced a number of hieroglyphic depictions of psychedelic fungi on walls and within texts throughout Egypt. Temples with countless pillars are shaped like huge mushrooms with tall stems and umbrella caps, these are shaped like Amanita sporophores, and some like *Psilocybe*. In the Egyptian Book of the Dead, mushrooms are called "the food of the gods," or "celestial food" and "the flesh of the gods." The Egyptian White and Triple Crowns were originally primordia of the entheogenic *Psilocybe* (*Stropharia*) *cubensis*. Recently the total number of the Egyptian fungi recorded is 2477 taxa. In ancient ages, Egypt was considered as one of the forest zones, as supported by many justifications, mainly the excavations and the monuments found in Assiut governorate, Saqqara Necropolis and Tel Al-Amarna in Upper Egypt. Deforestation in Egypt was done by man in Ayyubids era and due to climatic changes and as a result Egyptian fungi completely affected e.g. *Ganoderma applanatum*, *Morchella esculenta*, *M. vulgaris*, desert truffles and *Peziza repanda* are considered as highly threatened through out the country. The issue of fungal conservation in Egypt ignored or overlooked and the challenges involved predictably and daunting. The Egyptian mycologists still have great difficulties representing to the scientific community the importance of fungi and their fundamental role in the conservation and safeguard of the ecosystems. It's even more difficult to obtain attention on mycological problems from politicians. The Egyptian legislative actions and funds are usually more oriented towards the safeguard of threatened habitats, plant communities and/or animals while fungi are still considered as neglected components of the ecosystems. In order to solve such problems a synergy between mycologists, mycological amateur groups, fungal conservation societies, regional natural Parks and environmental affair agencies should be activated.

Key words: Deforesteration, *Morchella esculenta*, *M. vulgaris*, desert truffles, *Peziza repanda*

Poster NO 01802
Poster Title

EGYPTIAN ENDOPHYTIC FUNGI FOR SUSTAINABLE PHARMACEUTICAL INDUSTRIES

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Endophytic fungi inhabit plant tissues asymptomatically and confer a high diversity. They are polyphyletic in nature and primarily belong to the division Ascomycota. Endophytes are an important component of sustainable development in community ecology as they support the rich biodiversity and bioremediation of organic pollutants, wastewater, poisonous gases, industrial sewage, and heavy metals or in agricultural sufficiency. Endophytes are known to produce different kinds of secondary metabolites, and many of them are similar to what the host plants produce. Around 80% of the world's population, mostly those in the developing countries, still rely on herbal medicines for their primary healthcare. Fungal enzymes are one of them which are used in pharmaceutics, food, beverages, confectionaries, textiles and leather industries. They are often more stable than enzymes derived from other sources. Twenty one fungal species hosted six medicinal plants collected from Saint Katherine Protectorate were recovered and screened for nine extracellular enzymes namely: amylase, cellulase, chitinase, esterase, laccase, lipase, pectinase, protease and tyrosinase on solid media. Sixty one percent of fungi (13 isolates) showed positive activity for amylase, 92% for cellulase, 30% chitinase, 23% esterase, 53% laccase, 46% lipase, 53% pectinase, 76% protease, and only 30% showed positive for tyrosinase. This work investigated that the Egyptian endophytic fungi are a continuous sustainable source to produce a large number of pharmaceutical and industrial enzymes and more investigation and production on commercial scale is urgently needed.

Key words: Cellulase, chitinase, fungal enzymes, laccase, Saint Katherine Protectorate.

Poster NO 01803
Poster Title

STUDY OF NOSOCOMIAL FUNGAL DISEASES IN SUEZ CANAL UNIVERSITY SPECIALIZED HOSPITAL

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Nosocomial fungal infections are defined as those acquired in a healthcare setting, and are almost always opportunistic mycoses. This study aims to investigate the nosocomial fungal diseases in Suez Canal University specialized hospital (~100 bed) to indicate the incidence of fungal diseases, identify the main etiologic fungal agents, determine the proper diagnostic tests that should be applied, and recommend the protective measures that should be undertaken to control and manage such diseases. From different units in the hospital under investigation, 140 samples were collected from 100 patients. Sputum, urine, blood and pus samples were collected according standard techniques. Samples were cultivated on general and selective medium. The cultures were followed up for a period of 24-72 hours and the reproductions were evaluated. Cultures were incubated for fourteen days at 37°C and 28°C degrees. Taxonomic identification of isolated fungi using phenotypic approach down to the species level on standard media was carried on by relevant identification keys. In *Candida* identification, VITEK 2 compact system (BiomMerieux, France) was used to benefit from their biochemical characteristics. All of the isolates were purified by a single colony culture and kept in cryostorage tubes including tryptic soy broth with 15% glycerin at -32°C. *Candida* is by far the most common cause of nosocomial fungal infections in Suez Canal University Specialized Hospital. Our results showed that about 42% of patient population was infected by *Candida*. Two patients only were infected by *Candida* in blood stream. The risk groups in the hospitalized patients were found in immune compromised patients mostly above 50 years old males admitted in intensive care unit.

Key words: Nosocomial fungal infections, *Candida* spp, Hospitalized patients, Suez Canal University.

Poster NO 01804
Poster Title

BIODIVERSITY OF AQUATIC HYPHOMYCETES AND THEIR BIOREMEDIABILITY OF INDUSTRIAL DYES

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Aquatic hyphomycetes are fungal groups that have a dominant role in decomposition of plant litters in clean and even polluted streams. Pollutants stress surly affect the diversity of the aquatic hyphomycetes in their ecosystem. Resistance or attenuation ability of aquatic fungi to anthropogenic pollutants is becoming increasingly important. High tolerance traits of these fungi to pollutants may be due to their efficiency of external and intracellular detoxification system. This research aimed to study the biodiversity of aquatic hyphomycetes in sewage waste water in two canals in Assuit Governorate, Egypt (Arab Elmadabegh irrigation canal and Elebrahimia canal in Bani Qurra village) and evaluate their potentiality to remove xenobiotic compounds as industrial dyes. A total of thirty five fungal species were recovered from this study of which *Anguillospora longissima*, *A. furtiva*, *Triscelophorus acuminatus*, *T. monosporus*, *Heliscus submersus*, *Flagellospora penicillioides*, *F. fusarioides*, and *Sigmoidea aurantiaca* were recorded in high occurrence. *Flagellospora penicillioides* proved high efficiency to remove some industrial dyes such as congo red, methylene blue, light green and malachite green. Such results revealed that, *Flagellospora penicillioides* had a potential application for wastewater treatment and industrial pollutants removal from aquatic environments.

Key words: Aquatic hyphomycetes, *Flagellospora*, pollutants, industrial dyes, methylene blue.

Poster NO 01805
Poster Title

ANTIMICROBIAL ACTIVITY AND CHEMICAL ANALYSIS OF PUNICA GRANTANUM (POMEGRANATE) PEEL USING GC-MS

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Medicinal plants are considered as a rich source of antimicrobial compounds. These plants contain secondary metabolites such as alkaloids, flavonoids, steroids, phenolics, terpenes and volatile oils. So, this study bioprospected for the extraction of antimicrobial components from Pomegranate peel and determine their effects in vitro against some pathogenic bacteria and fungi. Also we determine the chemical composition of ethanolic peel extract and phytochemical compounds screened by GC-MS. By using the diffusion agar method *Punica granatum* extract at a concentration 1g / ml with different volume from

(100 -400 µl) were highly active against *Staphylococcus aureus* ATCC29213 and *Klebsiella pneumonia* ATCC13883. The diameters of inhibition zones ranged from 4.3±0.33mm to 8.3 ±0.33mm for all treatments. However the same extract concentration not active against fungi as *Aspergillus niger*, *Candida albicans* ATCC10231, and *Candida pelliculosa* MH248066. Ethanolic extract of *Punica granatum* at a concentration of 2 g/ml from (100 -400 µl) showed marked inhibition against all the tested fungal species. The zone of inhibition was compared with different standard antibiotics. All the bioactive phytochemical compounds were identified in the ethanolic extract of *Punica granatum*. The identification of phytochemical compounds is based on the peak area, retention time and molecular weight. GC-MS analysis of *Punica granatum* revealed the existence of the Ethanol (CAS). Methane, nitroso- Propanoic acid, 2-hydroxy-, ethyl ester (CAS), DIMETHYLAMINE-D1, Methane, nitroso- (CAS), Benzene, (1-propylnonyl)-, ISOMERIC DODECYLBENZENE, Benzene, (1-ethyldecyl), Benzene, (1-methylundecyl)(CAS, Pentacosane, 13-phenyl, Pentacosane, 13-phenyl- (CAS), and a lot of many other components .

Key words: Pomegranate peel, antifungal, antibacterial, GC-MS analysis.

Poster NO 01806
Poster Title

SCREENING OF L-ASPARAGINASE PRODUCING ENDOPHYTES ISOLATED FROM ARID SINAI- EGYPT

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Endophytic fungi are unique reservoirs of secondary bioactive metabolites. Our research targeted endophytic fungi that produced L-asparaginase enzyme. Twenty three plants have been selected as host plants located at Saint Katherine protectorate. Endophytes producing L-Asparaginase have been detected by the appearance of blue color in liquid media; during the process of asparagine hydrolyses to aspartic acid and ammonia by L-Asparaginase which lead to the conversion bromothymol blue dye indicator from yellow color (acidic condition) to blue color (alkaline condition).Quantification of L- Asparaginase enzyme activity determined via Nesslerization reaction, out of total of 25 fungal species isolated, only 4 of these species showed L asparaginase activity ranging from; .75101 and 5.53 U/ml, species showed activity was mostly *Fusarium oxysporum*. Our study confirmed that endophytic fungi would be a good alternative source of active secondary metabolites other than medicinal plants.

Key words: Bromothymol blue, *Fusarium oxysporum*, Nesslerization, Saint Katherine Protectorate.

Poster NO 01807
Poster Title

OYSTER MUSHROOM AS FUNCTIONAL FOODS AND DIETARY SUPPLEMENTS: SAFETY AND EFFICACY

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In modern terms, edible mushrooms be considered as functional foods which can provide health benefits beyond the traditional nutrients they contain.The oyster mushroom, belongs to the genus *Pleurotus*, can grow on virtually any agricultural waste substrate and has a high saporphytic colonizing ability. In the current study oyster mushroom had been cultivated using different agricultural wastes including rice straw, wheat straw, saw dust, and water hyacinth, alone or mixed with wheat straw at ratio of 1:1 (w/w).The products had been evaluated to determine their effect on taste and mass production. Dehydrated powder had been examined in terms of chemical, nutritional values, antibacterial and antioxidant activities. The product cultivated on mix of rice straw and wheat straw had the highest score of yield as well as the overall acceptability in the comparison with other mentioned treatments. It was rich source of proteins, minerals and fibers. It contains many different bioactive compounds with diverse biological activity for food and pharmaceutical industrial applications. *Pleurotus* extract was also observed for antimicrobial activity, the extracts being effective against some strains of pathogenic potential for humans. Our study showed that the Oyster mushroom cultivated on mix of rice straw+wheat straw represented a major source of phenols and flavonoids. It could be recommended that oyster mushroom grown on mix of rice straw and wheat straw is nutritious as well as a rich source of antioxidants in pharmaceutical-type products. As a future impact, using of mushroom extract as prebiotic in fermented dairy products will save huge funds and help for producing one of functional foods.

Key words: Oyster mushroom *Pleurotus ostreatus*, Agriculture wastes, biochemical tests, antimicrobial activity, antioxidant activity, antioxidant components

Poster NO 01808
Poster Title

WILL EONDOPHYTIC FUNGI ISOLATED FROM STRESSED LOCATIONS IN EGYPT BE ABLE TO CONFER ABIOTIC STRESS TOLERANCE IN MAIZE?

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Maize (*Zea mays*) is the most-produced cereal worldwide. In Africa alone, more than 300 million people depend on maize as their main food crop. Also, maize is very important as feed for farm animals. Currently, approximately 1 billion tons of maize is grown in more than 170 countries on about 180 million hectares of land. Abiotic stress is the primary cause of crop loss worldwide, reducing average yields for most major crop plants by more than 50%. Abiotic stress leads to a series of morphological, physiological, biochemical and molecular changes that adversely affect plant growth and productivity. Evolutionarily, plants require some specialized microbial partners in order to adapt to certain ecological niches and maintain their normal growth and development. It has become apparent that at least some plants are unable to tolerate habitat-imposed abiotic and biotic stresses in the absence of fungal endophytes. In this study, we seek to improve maize yields and interested in learning how plant hosts and their growing environments influence endophyte diversity and complexity. This survey focuses on field-grown maize in Egypt of diverse lineage as the source of aboveground tissues for characterizing culturable and unculturable fungal endophyte communities. Learning more about these endophyte communities is expected to lead to crop strains with increased plant health and optimal biomass production. Our long-term goal is to find an endophytic fungus or group of endophytic fungi that can be made available to farmers as a seed inoculants or seedling treatment to protect maize against disease and abiotic stress conditions.

Key words: Biomass, culturable fungi, endophyte communities, *Zea mays*.

Poster NO 01809
Poster Title

ENDOPHYTIC FUNGI HOSTED EGYPTIAN PLANTS AS A SUSTAINABLE CARRIER OF POTENTIL ANTIOXIDANTS AGAINST OXIDATIVE STRESS

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The asymptomatic association of fungi with plants is termed as endophytes. These plant-hosted microfungi are a promising source of bioactive natural products. Metabolites released by endophytes not only possess many important functions but also supply antioxidant compounds, which are expected to fight disease due to its anti-aging properties. Due to hectic lifestyle and stressful environment excessive free radicals have been released in the human body and create a destructive process in the body cells which leads to various chronic diseases and deleterious effects. Antioxidants are the chemical moieties that engulf free radicals which are followed by delaying cell damages and health disorders. Antioxidant moieties are generally synthesized by both plants and other microorganisms to survive adverse situations such as harmful radiations and abiotic and biotic stress. Hence, they are beneficial to both plants and animals which fed on the plant, thereby decreasing the reactive oxygen species level which are elevated in their normal metabolism process. Collectively, they help us to properly detoxify the body from these harmful molecules. This proposal will discuss about endophytic fungi hosted Egyptian plants as a source of natural antioxidants in comparison with synthetic antioxidant compounds which being used, but due to their side effects and less bioavailability, they are not widely accepted. Therefore endophytes could prove to be a natural resource for sustainable antioxidant.

Key words: Endophytic fungi, antioxidants, culturable fungi, free radicals.

Poster NO 01810
Poster Title

MORPHOLOGICAL CHARACTERIZATION OF COLLETOTRICHUM CAPSICI ISOLATES AND THEIR DIVERSITY ANALYSIS THROUGH RAPD MARKERS

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Colletotrichum capsici causes considerable yield loss by anthracnose disease in chilli. In this study, 10 different samples/isolates (S, S1, S3, S5, S6, S9, S10, S11, S14,S15) of were collected from three different regions of Bangladesh to study their morphological characters under microscope and genetic diversity by Random Amplified Polymorphic DNA (RAPD) markers. The isolates were isolated from anthragnose disease lesions on chilli fruits without visible sporulation. Isolates were identified and categorized based on colony morphology, and size and shape of appressoria and conidia. For genetic diversity recognition, five out of 15 random primers showed good amplification of genomic DNA in these selected samples. The five primers (OPAB06, S1234, S1155, OPA02, and OPAB02) generated 64 distinct bands of which 54 were considered as polymorphic. The percentage of polymorphic loci was 81.25% indicating a higher level of polymorphism. The percentage of polymorphic loci were 50% for OPAB06, 100% for S1234, 71.43% for S1155, 94.44% for OPA02 and 78.57% for OPAB02 and the average being 81.25% indicating high level of heterozygocity. The highest Inter variety similarity Index (Sij) value was recognized between S11 Vs S15 (84.4%) and the lowest similarity value was between S Vs S10 (53%). The Nei's genetic distance (GD) between S1 and S11 was the highest (0.8630) and that between S11 and S15 was the lowest (0.2469). It revealed that there were wide variability among 10 isolates. Dendrogram based on Nei's genetic distance using Unweighted Pair Group Method with Arithmetic Means (UPGMA) indicated segregation of 10 isolates and genotypes into two distinct clades which potentially supports two different species. The correlation between morphological and marker-based clustering demonstrated the genetic relationships among the isolates and species of *Colletotrichum* and indicated that data relating band scores were potentially useful. RAPD assay was proved as an effective method in estimation of genetic polymorphism among *Colletotrichum capsici* samples. Finally, molecular identification of the isolates was carried out by two pathogen specific SSR primers (CcapF/CcapR and CC1F1/CC2R2) that amplified products of 394bp and 447bp, respectively and confirmed the pathogen to be *Colletotrichum capsici*. The findings have potential application in development of anthracnose resistant chilli.

Keywords: RAPD, polymorphism, similarity index, genetic distance, *Colletotrichum capsici*.

Poster NO 01811
Poster Title

MOLECULAR IDENTIFICATION OF AMANITA FRITILLARIA AND AMANITA FLAVOCONIA FROM HIMALAYAN TEMPERATE FORESTS OF PAKISTAN

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Himalayan moist temperate forests of Pakistan are rich in fungal diversity because of ideal climatic conditions and vegetation. In this study, we have examined the diversity of *Amanita* spp. from the Himalayan forests of Pakistan. Genus *Amanita* has a global distribution of more than 600 species worldwide which include some of the world's best known and most beautiful fungi. Sampling was done in August, 2017 and specimens were photographed in field. Molecular identification was achieved by employing genetic marker viz., Internal Transcribed Spacer region (ITS) of the nuclear ribosomal DNA. Based on ITS1/5.8S/ITS2 gene regions and microscopic studies, taxonomy and phylogeny of *Amanita fritillaria* and *Amanita flavoconia* are described for first time from Pakistan. Inter and intraspecific polymorphisms and phylogenetic relationships of these two species were also observed. *A. fritillaria*, is characterized by having dark brown or blackish Pileus with rimose margins, aerolate surface, basidiospores are dark brown, ellipsoid or spherical, thick walled, smooth with a prominent apiculus. *A. flavoconia* had yellow to bright yellow pileus with parabolic, incurved margins, surface texture was scrobiculate, with ovoid, thin-walled basidiospores. This study has increased the number of *Amanita* species to 17 which have been reported from Pakistan.

Keywords: Fungal diversity, taxonomy, maximum liklihood, barcoding.

Poster NO 01812
Poster Title

ANTIFUNGAL EFFECT OF MYCOGENIC ZINC OXIDE NANOPARTICLES ON SOME PATHOGENIC FUNGI ISOLATED FROM ANIMALS AND HUMAN IN EGYPT

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Antimicrobial resistance and especially antifungal resistance is, nowadays, one of the major global economic and healthcare concerns. However intensive researches have been done on new molecules, the pipeline for new drugs yield scarce or none. In the field of Nanoscience, the synthesis of various Nanoparticles e,g. ZNO NPs by mycogenic green synthesis method represent safer and more environmental friendly frameworks. The aim of this work is to determine the antifungal effect of mycogenic synthesized ZNO NPs on some pathogenic fungi isolated from pet animals and human being in Egypt. Research hypothesis divided into four pillars as follows: (1) mycosynthesis, characterization of ZNO NPs,(2)Application and determination of its antifungal effect on pathogenic isolates,(3) Comparison of ZNO NPs antifungal potentiality with some of the conventionally used antifungal in the Egyptian market and (4)Molecular identification of promising taxa producing ZNO NPs. It is expected to have a new, cost effective and far lower side effect antifungal drug that can be used for treatment of human and animals against fungal infection.

Keywords: Antimicrobial resistance, bioavailability, nanomaterials, green synthesis, ZNO Nanoparticles

Poster NO 01813
Poster Title

WILD MUSHROOMS DIVERSITY AND THEIR UTILIZATION JAMMU AND KASHMIR, INDIA

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Macrofungal studies have long been of interest to scientists in India and elsewhere as well as the community due to their significant roles in human life, their use in the pharmaceutical industry, and the mass production of cultivated fungi in the food industry as well as their vital role in biodegradation. Surveys of macrofungi were reported by different researchers but little information is known about ethnomycology of macrofungi in Indian in general and Jammu and Kashmir in particular. The aim of this study was to

determine and provide more data on the ethnomycology. We carried out an ethnomycological study in various locations of Jammu and Kashmir state during the period 2005-2017, in order to develop a database on mushroom diversity and traditional uses. In this study 90 wild mushrooms which are distributed in 39 genera. These includes *Agaricus* spp., *Amanita* spp., *Astreaus* sp., *Auricularia* spp., *Boletus* spp., *Cantharellus* spp., *Calvatia* spp., *Clavaria* sp., *Clavulina* spp., *Coprinus* spp., *Flammulina* sp., *Ganoderma* spp., *Geopora* spp., *Geastrum* spp., *Gymnopilus* sp., *Gyromitra* spp., *Helvella* spp., *Hygrocybe* spp., *Inocybe* spp., *Lactarius* spp., *Lepiota* sp., *Lentinus* spp., *Macrolepiota* sp., *Morchella* spp., *Peziza* spp., *Pleurotus* spp., *Ramaria* spp., *Russula* spp., *Rhizopogon* spp., *Sarcoscypha* sp., *Scleroderma* spp., *Scutellina* spp.., *Sepultaria* spp., *Sparassis* spp., *Strobilomyces* spp., *Suillus* sp., *Termitomyces* spp. and *Verpa* sp.. During survey, it has also been noticed that the state has the largest concentration of forest dwellers, comprising of about one-fourth of the population of the state. Several tribes and villagers subsist largely on non-traditional and wild food sources especially wild edible mushrooms. In order to ensure continued production of these wild edible mushrooms from their natural habitat effective conservation methods and proper harvesting techniques is recommended.

Keywords: Biodegradation, ethnomycology, edible, macrofungi.

Poster NO 01814
Poster Title

HIGHER FUNGI AS A SUSTAINABLE SOURCE OF LACCASE ENZYME

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Laccase is a copper-containing polyphenol oxidase that acts on a wide range of substrates, and it's one of the three main ligninases that differs from the others in its ability to catalyze the oxidation of lignin components. Laccases have widespread applications, ranging from effluent decolouration and detoxification to pulp bleaching, removal of phenolics from wines and dye transfer blocking functions in detergents and washing powders. The biotechnological application of laccase has been expanded by the introduction of laccase-mediator systems, which are able to oxidize non-phenolic compounds that are otherwise not attacked and are thus able to degrade lignin in kraft pulps. The present work was carried out to isolate potential laccase producing taxa from degraded wood samples from different resources in Egypt. Samples were collected aseptically from different sites in Nile Delta and Suez Canal University Agricultural farm. Taxa were recovered by direct isolation technique from either fruit bodies or degraded wood on different isolation media. Six native taxa namely: *Ganoderma lucidum* (115-SCUF-Ismailia), *Ganoderma lucidum* (55-SCUF-Damietta), *Coprinus calyptratus* (1965-SCUF-Damietta), *Bjerkandra adusta* (SCUF-512), *Ganoderma lucidum* (SCUF-513) and *Ganoderma lucidum* (SCUF- Mansoura) were recovered and compared with non-native taxa to evaluate their laccase potentiality. Qualtiative estimation of laccase producing fungi was carried on guaiacol supplemented PDA medium. Results showed that native taxa were potent in production of laccase compared with

Pleurotus ostreatus (Grey Dove-USA) as a positive control. Further experiments will be carried on for studying the physiological parameters control the enzyme high production.

Keywords: Nile Delta, wood degrading fungi, guaicol, Ganoderma, Egypt.

Poster NO 01815
Poster Title

DECOLOURIZATION AND DEGRADATION OF INDUSTRIAL DYES AND INSECTICIDE BY SOME NATIVE FUNGAL ISOLATES

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Among wastewaters, dye and insecticide wastewater from textile, agricultural activities and dyestuff industries is one of the most difficult to treat. This is because dyes usually have a synthetic origin and complex aromatic molecular structures which make them more stable and more difficult to be biodegraded. More than 100,000 different synthetic dyes available on the market have been recorded and produced in over 700,000 tons annually worldwide. They are used in different industries e.g. textile, paper, cosmetics, food and pharmaceutical industries. Some of them are possible toxic and carcinogenic. Among the numerous water treatment technologies, research interest in the fungal bioremediation, i.e. decolourization and degradation of synthetic dyes, has increased significantly in the last three decades. The work aims to produce a prototype of a **highly compact five stages bioreactor** for the treatment of the simulated dye wastewater from textile, dyestuff and agricultural activities by Egyptian native fungi. In addition to, reaction conditions such as dye concentration, pH, temperature and efficiency of photostimulation using monochromatic red polarized light and UV radiations will be optimized and assed for high degradation and complete removal of dyes and insecticide by fungi.

Keywords: *Aspergillus niger*, *A. flavus*, azodyes, malachite green, methylene blue.

Poster NO 01816
Poster Title

DIVERSITY OF MYCOBIOTA IN NORTH – EASTERN REGION OF PAKISTAN

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The study was conducted during the years of 2017 - 2018 in different seasons to collect the mycobiota. The aim of the study is to contribute to the knowledge of mycobiota biodiversity from different North – Eastern region of Pakistan. The studied area contains different types of mountains, forest and varieties of harb shrub and trees. Comparison of dense forest in relation to plant biodiversity and successional stages after cut down trees,

dead wood logs and burn forest of selected areas where overall environment is humid suitable substrate resulting in the growth of variety of mushroom. Mostly species grows in this region in Family *Bjerkanderaceae, Phaeolaceae, Ganodermataceae, Hymenochaetaceae, Fomitaceae, Perenniporiaceae, Coriolaceae, Schizophyllaceae, auriculariaceae, peniophoraceae*, these are the common families which are identified upto species level, but some fragile and delicate mushroom could not be identified at the level of species because further molecular studies needed. It is a new science and new line studies in Pakistan to explore the worth of mycobiota varieties in Pakistan

Keywords: *Bjerkanderaceae, Phaeolaceae, Ganodermataceae, Hymenochaetaceae.*

Poster NO 01817
Poster Title

DIVERSITY OF LICHENS IN EGYPT

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Lichens are unique living associations being composed of two to three different organisms living together in a mutualistic relationship in which the fungal partner develops the external structure. Egypt has many kinds of Lichens, which have not been studied so far and suffer from neglect, despite the many benefits that come back to us after studying and determine the types. The Egyptian lichens have received the attention of many European researchers since the early 1800s. Seaward and Sipman (2006) published the first updated check-list on lichens of Egypt. At the present time the total of the lichen names recorded in Egypt amounts to **158**: 150 species and 8 infraspecific taxa. This marked figure resulted from an exhaustive revision of all the existing literature and information sources established since the year 1813 up to the middle of the current one by Abdel-Azeem. Foliose lichens are very scarce in Egypt; they are simply represented by the two genera *Xanthoria* (7 species) and *Physcia* (one species). The fruticose growth form is relatively better represented; it includes members of the genera *Ramalina*, *Roccella*, *Seirophora*, *Tornabea* and *Usnea*. At the family level, the Teloschistaceae comprises a fair proportion of the taxa recorded (39); this is followed by the family Roccellaceae (16 species) and the twelve members of the family Physciaceae. The present study highlights the biodiversity of lichens species recorded in Egypt and why lichens overlooked in mycological studies in Egypt?

Keywords: Biodiversity, *Ramalina*, Teloschistaceae, *Usnea*, *Xanthoria.*

Poster NO 01818
Poster Title

LACK OF AWARENESS OF THE DANGERS POSED BY MYCOTOXIN CONTAMINATION IN EGYPT

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Lack of awareness of the dangers posed by mycotoxins contamination of produce is a major factor responsible for its high incidence in Nigeria. Majority of farmers produce and food handlers and/or processors are illiterate with virtually no knowledge of the implications of toxigenic mould growth. The Arab Society for Fungal Conservation Society of Egypt has done a lot to reverse this trend. Fungal biology is a topic often neglected in high school in Egypt, mainly because the time in the official curriculum dedicated to work on fungi is very short. 300 Egyptian schoolchildren from a range of age groups within the governmental and private school systems were asked a series of questions about fungi and the mycotoxins. The results were mixed, and suggest that a great deal more needs to be done to bring awareness issues home to these young people. Several awareness campaigns have been carried by my team at different schools and NGOS in Ismailia Governorate to shed the light on the side effects of mycotoxins on health, contaminated foods and associated risks especially cancer. My team will present examples of alternative resources to teaching fungi and their mycotoxins that we are using in school extracurricular activities in Ismailia to increase the interest in hazardous effects of fungi.

Keywords: Awareness campaigns, cancer, extracurricular activities, food, mycotoxins.

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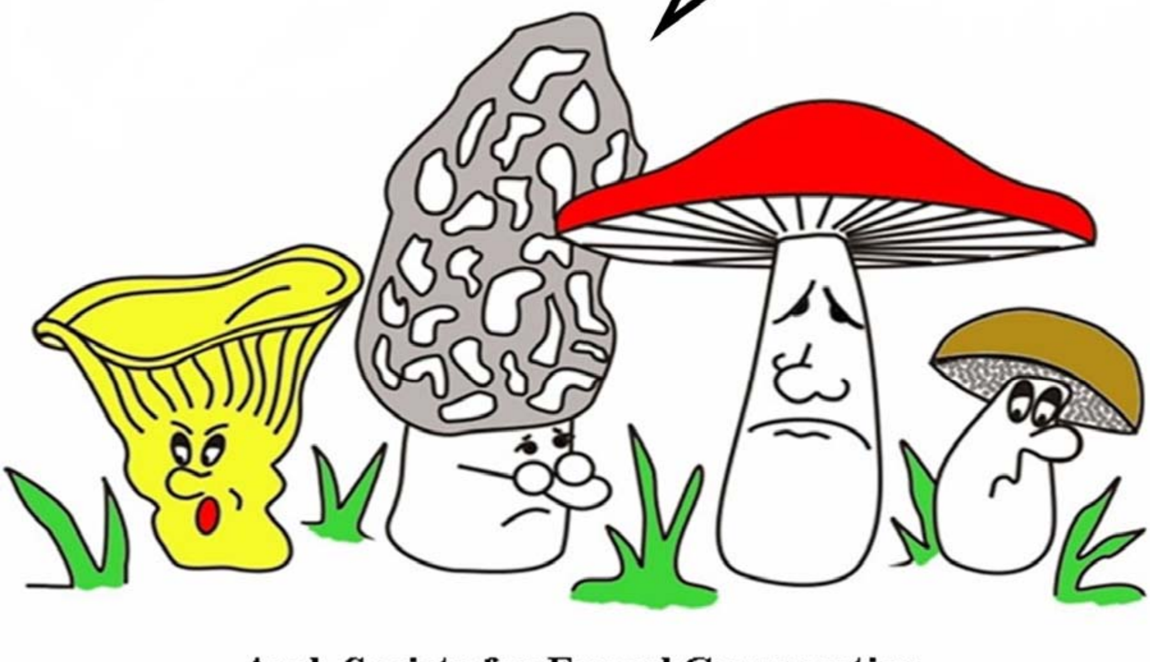

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We Never Forget You

Dedicated to late Professor Abdel-Al H. Moubasher

"It was a great shock for me to learn of Professor Moubasher's passing. He was a regular visitor to the International (formerly Commonwealth(Mycological Institute at Kew, with which he had a relationship from the early 1960s. I met him there many times, and he first invited me to visit and teach in Assiut in 1985. He then sent two of his team to the Institute for more intensive training. As a scholar, he had a substantial output of research papers, and his 1993 well-illustrated and carefully documented book on soil fungi in Arab countries was a truely tremendous achievement. But he was always keen to promote diverse aspects of mycology. When I last visited in 2007, I was amazed to see the new Mycological Centre building with teaching labs and collections of cultures and specimens running, and the range of courses starting to be offered; what an evolution from those early days! I feel honoured to have known such a warm and inspirational figure, who has demonstrated through his life just how much an be achieved by just one person with sufficient dedication and vision. His legacy will be the Centre he created, which I trust will go from strength to strength in the years ahead and become an increasingly important resource in the region". **Professor David L Hawksworth CBE, Honorary President, International Mycological Association.**

"I was sorry to learn that Prof. Moubasher has passed away. He was a pre-eminent figure of Egyptian mycology in particular, and Arab mycology in general. His achievements were many and impressive. They included a ground-breaking book on mycology of Qatar, and the establishment of an important centre for mycology in Assiut. His laboratory gave rise to several generations of mycologists not only in Egypt but also throughout the Arab world. His legacy will be felt for many years to come." **Dr. David W. Minter**, **President of International Society for Fungal Conservation.**

"The late Prof. A.H. Moubasher is, without contest, at the origin of the development of the science of soil mycology at the Middle East level, a theme of research to which he devoted himself after his doctoral thesis on fungi in relation with the major plant crop in Egypt, namely the cotton plant. After his Ph.D. degree from Cairo University he went on a leave to the International Mycological Institute. There he discovered the 'tools and the dimension of the magic world of fungal taxonomy'. Upon his return and establishment at the new University of Assiut in Southern Egypt, he devoted his energy to the progress of our knowledge of this group of living organisms in this part of the world. His global scientific production is overwhelming but more important is his high level education activity judging by the fair number of young students he invested in this field of natural science. His success in the establishment of the Assiut University Mycological Centre at the turn of the last century is a keystone of his achievements. It makes no doubt his mycological companions will maintain and perpetuate his noteworthy scientific spirit". **Dr. Jean Mouchacca, Institute of Systematic, Evolution & Biodiversity, Natural History Museum, Paris, France**.

"No real mycology in Egypt before Moubasher and indeed the credit for initiating real research concerned with Egyptian fungi must be given to late Professor Abdel-Al H. Moubasher (Botany Department, Faculty of Science, Assiut University). In the early 1960s, with colleagues and students, he broadened the scope of mycological research in Egypt by conducting many studies on fungi. These included aspects such as: cellulose-decomposition, thermophily, osmophily, seed and grain mycobiota, phylloplane fungi, mycotoxins, and aquatic fungi. Moubasher, with his colleagues and students, have published more than 250 scientific papers to date, and in 1993 he published his major contribution to mycology in the Arabic World, the lavishly illustrated Soil fungi of Qatar and other Arab Countries. He examined my PhD thesis in 2003 and his recommendation not for me but for all mycologists in Egypt is the road map till now. We lost a real scientists and humble professor, God bless his soul". **A. Professor Ahmed M. Abdel-Azeem, University of Suez Canal, President of Arab Society for Fungal Conservation, International Mycological Association.**

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