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Book of Abstracts

(Draft)

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Note from the Chair

I would like to express my sincere gratitude to the leadership of Ben-Gurion University of the Negev for their generous financial support and for providing the facilities that made FUNGA fest 2025 possible. I wish to thank Prof. Raz Jelinek, Vice-President and Dean for R&D, and Prof. Yaniv Gelbstein, Dean of the Faculty of Engineering Sciences, as well as Prof. Hanna Rappaport, Chair of the Department of Biotechnology Engineering, for their continuous support and trust in this initiative.

I also warmly thank our institutional and industrial partners for their valuable contributions, including Tel-Hai College, Hylabs, Solid State Fermentation, AMS, and ADAMA, whose support was essential to ensuring a smooth and successful event.

My sincere appreciation is extended to Warlie Rull for the outstanding graphic design, to Mr. Gal Carmeli, Coordinator of FUNGA fest 2025, for his exceptional dedication and leadership in organizing the conference, to my laboratory members, and to Elana and the administrative team of the Department of Biotechnology Engineering for their tireless efforts behind the scenes.

This collective effort reflects a shared commitment to the world of fungi, a research field that has rapidly gained scientific prominence and increasing recognition across many non-academic and applied disciplines. FUNGA fest 2025 stands as a testament to what true collaboration can achieve.

Kudos to all for your invaluable support.

Prof. Robert S. Marks

Chair, FUNGA fest 2025

Day 1 – Sunday, 7 Dec 2025

Reminiscences Lecture:

The Pioneer Mycologist Prof. Zehara Avizohar-Hershenzon

Lewinsohn D.[1]*

[1]*Mycology Unit, Shamir Research Institute, University of Haifa, Kazerin, Israel*

*dalial@gri.org.il

Prof. Zehara Avizohar-Hershenzon, phytopathologist and pioneer Mycologist of Israel, was born on September 24, 1910, in Lausanne, Switzerland. The family immigrated to Palestine in 1920. She completed the Hebrew Gymnasium (high school) in Jerusalem in 1928. In 1931, she commenced studies in botany, zoology, and microbiology at The Hebrew University of Jerusalem, completing her work for the M.Sc. degree in 1935. From 1935 to 1938, Zehara Avizohar conducted research in plant pathology at the Sorbonne and was awarded the Ph.D. degree. In 1938, she returned as a research scientist in mycology and phytopathology to The Volcani Center. During 1959—1960, she spent a 14-month sabbatical at the University of Minnesota, USA, on a National Academy of Sciences grant. In 1963, Dr. Hershenzon was appointed Lecturer in mycology in the Department of Botany at Tel-Aviv University, and in 1971, she was promoted to Associate Professor. During her career, she was a consultant on toxic fungi of the Israel National Public Health Committee for Toxicology and served as the referee regarding mushroom poisoning. Prof. Hershenzon had numerous contacts abroad with many countries. She participated in many international congresses and was a member of two local and four international scientific societies. Prof. Hershenzon published more than 60 works in scientific journals, as well as many popular articles on mushrooms in Israel and abroad. She also focused on the ecology and identification of higher fungi in Israel, especially those belonging to the genus Cortinarius, the family Boletaceae, and the order Pezizales. During 2008, Dr. Dalia Lewinsohn, who was Prof. Hershenzon's student and friend, published a new guide (Carta) to edible and poisonous mushrooms of Israel, which she dedicated to the memory of Prof. Hershenzon. Lately (2025), Dr. Alona Yu. Biketova and other researchers have described a new species of *Hortiboletus* from Israel and named it *Hortiboletus hershenzoniae*. Prof. Hershenzon was a very affable person and much sought after by those nature lovers who displayed an interest in macrofungi. Her interest in the wild macrofungi of Israel extended over half a century, and for about 20 years, from the early 1950s, not only was she preeminent in that field in Israel, but was almost alone, being the standard bearer, so to speak. For her fine personality and her scientific achievements, and as a remarkable woman and friend, she will be fondly remembered and sorely missed. Prof. Hershenzon married David Hershenzon in 1940; he died in 1972. She is survived by a son, Nachman [Hershenzon] Sharon, a daughter, Naomi Barkan, and six grandchildren. She passed away on August 2, 1994.

Keywords: reminiscences, Israeli mycologist, women in science

SHORT BIOGRAPHY

Dr. Dalia Lewinsohn, born in Tivon, Israel. Mycologist, emeritus researcher at the Shamir Research Institute. Graduated from the Faculty of Agriculture, specializing in plant diseases. She learned mycology from Prof. Avizohar Hershenzon, one of the pioneers of mushroom research in Israel. Has a master's degree from the Department of Forestry at the University of Idaho in the USA in the field of forest tree diseases. During her PhD at the Institute of Evolution, Haifa University, she studied the Pleurotus eryngii complex mushroom in Israel from the ecological, morphological, and genetic aspects. She published articles in many scientific journals and in various magazines. Chairman of the committee at the Academy of Languages at the Hebrew University that deals with giving common Hebrew names to wild mushrooms in Israel. A consultant for the Poisons Center at Rambam Hospital for over 26 years. The author of the three editions of the Carta Guide to Edible and Poisonous Mushrooms in Israel. Qualified tour guide and engaged in professional training

of nature and mushroom tours, and a lecturer in this field. Dalia won the 2001 Rice Prize for Israeli Mushroom Research.

Plenary Lecture:

On the Shoulders of Giants: The Wassons and the Genesis of Ethnomycology

Shavit E.[1*]

[1]*North American Mycological Association (NAMA)*

*elinoar@elinoarshavit.com

ABSTRACT

Ethnomycology, the study of the relationships between people and fungi, emerged as a defined field of inquiry through the vision, dedication, experiences, and pioneering work of Dr. Valentina Pavlovna Wasson (a pediatrician) and her husband, R. Gordon Wasson (a banker). My talk will frame the Wassons' historical contributions to the field of mycology through their personal observations and experiences, in particular with Mexican "Magic Mushrooms," a term coined by the Wassons. The goal is to illuminate the evolution and contemporary significance of Ethnomycology in biocultural conservation and the preservation and safeguarding of traditional knowledge in a world of declining biocultural diversity.

Keywords: Ethnomycology, Valentina Wasson, Gordon Wasson, Magic-Mushrooms, Maria Sabina

SHORT BIOGRAPHY

Elinoar Shavit is an American ethnomycologist specializing in research on the history and traditional use of mushrooms among indigenous peoples worldwide. She has led numerous interdisciplinary projects to better understand how the loss of mushroom habitats and traditional indigenous cultures affects community sustainability. Shavit is particularly known for her extensive studies on the history and use of desert truffles by Bedouins and other desert-dwelling communities. Her work underscores the significance of preserving both the habitats of unique fungi and the fragile traditions of the peoples who use and depend on them. Shavit's research has been published in scientific papers and book chapters, and she frequently speaks at international and domestic conferences. She serves as a contributing editor at FUNGI Magazine, sits on the Executive Board of the North American Mycological Association (NAMA), chairs NAMA's Ethnomycological Committee, is past Chair of NAMA's Medicinal Mushrooms Committee, and is a past President of the New York Mycological Society.

Session 1 – Mycotechnology & Industry

Chair: Liudmila Kalitukha

Solid-state Fermentation: An Old Solution to New Problems

Dror B.[1*]

[1]*Solid Fermentation Innovation, Israel*

*barak@solid-fermentation.com

ABSTRACT

Solid-state fermentation (SSF) represents one of the oldest yet most innovative biotechnological processes, relying on the cultivation of filamentous fungi and other microorganisms on moist solid substrates without free water. While traditionally used in food fermentations such as tempeh or koji, SSF is now being revisited with modern analytical and process tools for applications across food, feed, enzyme production, agriculture, and biomaterials. The rationale behind renewed interest in SSF is its unique ability to mimic natural microbial habitats, enable efficient use of agro-industrial residues, and achieve high product yields with low water and energy inputs. In this presentation, I will introduce the fundamental principles of SSF, including substrate preparation, microbial selection, and key parameters such as moisture, aeration, and particle size. I will then highlight several application domains: the production of alternative proteins; enzyme and metabolite generation for the feed and agriculture sectors; and novel uses in biopolymer and biomaterial development. Case studies from both industry and research will be presented to illustrate how SSF can transform low-value sidestreams into high-value products in a circular bioeconomy framework. I will also discuss the challenges of scaling SSF processes, including process monitoring, heterogeneity management, and regulatory considerations, and suggest how lessons from related industries can support industrial adoption. By bridging traditional knowledge with modern bioprocessing and sustainability goals, SSF offers an adaptable and powerful platform with significant implications for the future of food, agriculture, and sustainable materials.

Keywords: solid-state fermentation, fungi, circular bioeconomy

SHORT BIOGRAPHY

Dr. Barak Dror is a biotechnologist and entrepreneur specializing in solid-state fermentation (SSF) and its applications across food, agriculture, and biomaterials. He is the founder and CEO of Solid Fermentation Innovation (SFI), a consultancy and contract research company that supports startups, corporates, and research groups in developing SSF-based processes and products. Dr. Dror earned his PhD in Biotechnology from the Hebrew University of Jerusalem and an MBA from the Biomedical Entrepreneurship program. He has over a decade of experience in R&D, including leadership roles in foodtech and agritech companies, where he managed multidisciplinary teams working on fungal biotechnology, fermentation optimization, and product development. Beyond his scientific contributions, Dr. Dror is active in international networks promoting fungi-based innovation and is dedicated to advancing SSF as a cornerstone of the bioeconomy.

Integration of Psilocybin Mushroom Cultivation, Botanical Regulation, and Pharmaceutical Applications

Barnea S.[1*]

[1]*Msics Pharma Ltd., Israel*

*shaked@msicspharma.com

ABSTRACT

This presentation explores the integration between Psilocybin mushroom cultivation, botanical regulatory compliance, and pharmaceutical-scale production. It focuses on bridging the gap between controlled laboratory R&D and commercial cultivation of psilocybin mushrooms for pharmaceutical purposes, ensuring adherence to regulatory standards for botanical products. Key topics include the development and optimization of cultivation protocols, breeding strategies for psilocybin mushroom strains, environmental control and quality assurance, and compliance with Good Agricultural and Collection Practices (GACP). The session will also address challenges in translating laboratory-scale methods to industrial production while maintaining consistency, safety, and efficacy of the final product. By highlighting technological advancements, process monitoring, and regulatory frameworks, this presentation demonstrates how innovation and science-based regulation can be harmonized to produce high-quality psilocybin mushroom products ready for pharmaceutical use.

Keywords: psilocybin, regulation, pharmaceutical applications, industrial-scale cultivation.

SHORT BIOGRAPHY

Shaked Barnea is a mushroom breeding and cultivation specialist with extensive experience in developing and managing large-scale cultivation systems. She currently serves as Head of Mycology at Msics Pharma Ltd., where she focuses on R&D of psilocybin mushrooms for pharmaceutical applications, while managing and overseeing breeding and cultivation processes to ensure consistency, quality, and regulatory compliance with pharmaceutical standards. From 2019 to 2023, she managed the "Otzerot HaYaar" Mushroom Farm, leading research, breeding, and operational optimization initiatives. Her expertise includes project management, process improvement, and the development of cultivation methodologies tailored for medicinal and therapeutic use. Shaked holds a B.A. in Geography from Ben-Gurion University and was nationally recognized as Israel's Breakthrough Young Farmer (2022) at the 13th Israel Agriculture Conference. She is passionate about integrating innovation, sustainability, and science-based regulation in advancing the field of fungal biotechnology.

Optimizing *Pichia pastoris* as a Fermentation Platform for the Production of Alternative Proteins

Shemesh P.[1*], Fishman A.[1]

[1]*Department of Biotechnology and Food Engineering, Technion-Israel Institute of Technology, Haifa 3200003, Israel*

*afishman@technion.ac.il

ABSTRACT

The growing demand for sustainable alternative proteins highlights the need for efficient microbial production systems. *Pichia pastoris* is an established host capable of achieving high cell densities and secreting recombinant proteins directly into the culture medium, simplifying downstream processing. This study aimed to optimize a fermentation platform based on *P. pastoris* and apply it for the production of recombinant plant-derived proteins with food relevance. Three wild-type strains (X-33, NRRL Y-11430, and NRRL Y-7556) were compared for growth and protein expression performance. Process optimization involved developing a defined growth medium, screening carbon sources, and evaluating ploidy level and fermentation conditions. High-cell-density fermentation in a 3.7 L bioreactor using glycerol as the main carbon source yielded over 40 % higher biomass than glucose, with NRRL Y-7556 reaching 244 g DCW L^{-1} within 48 h. The platform was first validated with mCherry and subsequently applied to produce recombinant canola napin (rNapin) and potato patatin. Expression of rNapin under the constitutive GAP promoter resulted in a 2.4-fold increase (5.9 ± 0.1 g L^{-1}) compared to AOX1, while the diploid NRRL Y-11430 strain further enhanced production to 8.8 ± 0.1 g L^{-1}. The rNapin displayed strong solubility and emulsifying activity under acidic conditions but limited foaming capacity. The successful expression of patatin demonstrated the platform's versatility and robustness. These findings establish an efficient and scalable fermentation framework that advances sustainable production of alternative proteins for food applications.

Keywords: *Pichia pastoris*, fermentation, alternative proteins, napin, patatin

SHORT BIOGRAPHY

Paz Shemesh is a Ph.D. candidate in the Department of Biotechnology and Food Engineering at the Technion- Israel Institute of Technology, under the supervision of Professor Ayelet Fishman. Her research focuses on developing high-cell-density fermentation processes in *P. pastoris* for the sustainable production of recombinant plant proteins such as rapeseed napin and potato patatin, aiming to reproduce their natural plant characteristics. Before her Ph.D., she gained six years of industry experience as a senior R&D researcher specializing in yeast fermentation. Paz is committed to advancing sustainable food biotechnology and serves as a teaching assistant in food microbiology, where she encourages curiosity and precision in experimental work.

Session 2 – Applied Mycology

Chair: Tomislav Ivankovic, Evgeni Eltzov, Eyal Kurzbaum

Extending Capillary Biofilm Motility to Bacterial–Fungal Consortia

Ivankovic T.[1*], Schlichter Kadosh Y.[2], Rosanda P.[1], Hadad U.[2], and Kushmaro A.[2]

[1]*Department of Biology, Faculty of Science of the University of Zagreb, Croatia*

[2]*Avram and Stella Goldstein-Goren Department of Biotechnology Engineering, Faculty of Engineering Sciences, Ben Gurion University of the Negev, Israel*

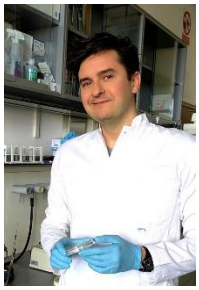
*tomislav.ivankovic@biol.pmf.hr

ABSTRACT

Biofilms at the air–liquid interface present dynamic microbial systems that can facilitate a specific type of bacterial motility known as capillary-driven migration. This type of motility has been described for pure bacterial cultures, but here we investigated the formation and development of a multispecies biofilm composed of the yeasts *Candida albicans* and *Saccharomyces cerevisiae*, and the bacteria *Acinetobacter baumannii*, *Acinetobacter junii*, *Bacillus cereus*, and *Staphylococcus aureus*. While bacterial migration along glass slides was consistent with capillary biofilm movement, yeasts in pure culture were unable to migrate. However, in mixed populations, yeast cells were frequently observed surrounded by bacterial colonies, embedded in extracellular polymeric substances, and carried along with bacterial populations, suggesting cooperative expansion and spatial structuring of the biofilm. Thus, it seems that the presence of bacteria enabled the migration and spreading of yeast cells. These findings extend the concept of capillary biofilm motility to mixed bacterial–fungal communities and highlight a rarely described ecological symbiosis, where bacteria facilitate fungal movement, complementing the well-described "fungal highways", in which fungi promote bacterial dispersal.

Keywords: Capillary biofilm motility, Multispecies biofilms, Bacterial–fungal interactions, Yeast dispersal, Air–liquid interface

SHORT BIOGRAPHY



Tomislav Ivankovic graduated with a degree in Molecular Biology from the Faculty of Science at the University of Zagreb. He obtained a PhD degree in 2012 on the topic of bacterial immobilization on mineral carriers. After the PhD, Tomislav continued his scientific career on the topic of bacterial biofilm, and did a postdoc position at Université Grenoble-Alpes, imaging bacterial biofilms by using X-ray Microtomography. In 2021, Tomislav got a position as an Associate Professor at the Biology Department, Faculty of Science in Zagreb, where he is currently employed. Tomislav lectures on several courses in General Microbiology, Bioremediation, and Wastewater Treatment Technology. His scientific interests are bacterial biofilms, biotechnology, bioremediation, and antibiotic resistance in the environment.

Inhibition of *Athelia rolfsii*-Induced Stem Rot in Tomatoes Using Secretions from the Black Soldier Fly

Dafny Yelin M.[1]*, Opatovsky I.[2], Greber A.[1], Farhat S.[1], Palevsky E.[3], and Shaltel Harpaz L.[1]

[1]*Northern R&D, Migal, Tel-Hai University on the rise, Israel*

[2]*Lab of Insect Nutrition and Metabolism, Migal, Tel-Hai University on the rise, Israel*

[3] *Newe Yaar Research Center, Agricultural Research Organization, Israel*

*merydy@migal.org.il/ merydy@gmail.com

ABSTRACT

The soil-borne fungus *Athelia rolfsii* is a major pathogen causing stem and collar rot in industrial tomato crops. With a broad host range, it poses a significant threat to summer crops in Israel's Northern Valleys. Frass from black soldier fly (*Hermetia illucens*) larvae, comprising excrement, exoskeletons, and undigested feed, is rich in organic matter and beneficial microorganisms, making it a promising tool for soil health and disease suppression. This study evaluated the efficacy of frass in controlling *A. rolfsii* infection. The primary frass tested was derived from larvae fed a mixture of ca. 50% apple waste, wet malt, and baker's yeast. Two additional frass samples labeled "O" and "P" were also examined. Only the non-sterile extract from frass "O" significantly inhibited *A. rolfsii* mycelial growth on PDA plates. This treatment also improved in pot trial canopy coverage and shoot biomass in infected tomato plants. Field trials confirmed that frass-treated plants exhibited significantly greater canopy and root development compared to untreated controls. A strong correlation was observed between frass application rate (1–2 L/m²) and plant height and node number. Notably, frass that had not undergone heat treatment significantly reduced disease progression compared to both untreated controls and frass treated at 70°C, with no significant difference between frass treatments. The beneficial effects of frass may result from direct pathogen inhibition via its microbiome, changes in soil chemistry, or enhanced plant resistance.

Keywords: Soil-borne fungal pathogens, Plant disease, Frass, Tomato stem rot, Sustainable agriculture

SHORT BIOGRAPHY

Dr. Mery Dafny Yelin is a phytopathologist and senior researcher at Northern R&D, MIGAL – Galilee Research Institute, affiliated with the emerging Tel-Hai University in northern Israel. Her research focuses on applied plant pathology and integrated pest management (IPM) for fruit trees, grapevines, and field crops. Dr. Dafny Yelin combines laboratory and field approaches to develop sustainable solutions for fungal and bacterial diseases. Her work integrates resistant cultivars, innovative antimicrobial strategies, and ecological methods to enhance crop resilience and productivity. She has pioneered the use of directed enzyme evolution to disrupt quorum sensing in plant pathogens and plays a key role in advancing disease management strategies in Israel's Northern Valleys. Dr. Dafny Yelin is dedicated to supporting local agriculture and fostering interdisciplinary collaboration and community engagement.

Exploring a Green Alga Isolated from the Negev Desert for Sustainable Biological Control of Fungal Phytopathogens

Nomo S.D.[1 2*], Frenkel O.[1], Goldberg I.K.[2], and Ranan H.[1]

[1]*Plant Pathology, Volcanic Institute, Ministry of Agriculture, Israel-Gilat*

[2]*The Jacob Blaustein Institute for Desert Research, Ben Gurion University of the Negev, Israel*

*nomosam@post.bgu.ac.il

ABSTRACT

The application of biological control agents (BCAs) offers a promising path toward reducing chemical pesticide use in sustainable agriculture. Nevertheless, the complex interactions between BCAs and their biotic and abiotic environments pose significant challenges to developing effective solutions. Utilizing a resilient BCA along with a better understanding of how environmental factors influence its antifungal activity may increase the chances of successful implementation of the BCA in the field. A green alga isolated from desert biological soil crusts shows a remarkable ability to withstand harsh environmental conditions. Preliminary findings indicated that this alga significantly inhibits the growth, viability, and melanin production of several pathogenic fungi. Among these, *Rhizoctonia solani* was selected as a model organism due to its susceptibility. Our results demonstrate that varying abiotic factors such as salinity, carbon, light, and temperature levels impact the alga's antifungal activity. Notably, supplementing the growth medium with 0.1M NaCl significantly enhances its antifungal effect, suppressing growth and melanin production. Building on these findings, this study aims to examine the ability of the microalga to inhibit the pathogenic activity of *Rhizoctonia solani* in plants and to elucidate the inhibition mechanism of the antifungal compounds. In parallel, we are trying to isolate and characterize the antifungal compound. This research seeks to advance our understanding of algae-fungi interactions in the soil and the influence of environmental conditions on this interaction. Ultimately, this will allow the successful implementation of sustainable solutions for managing soil-borne pathogenic fungi.

Keywords: Biological control agents (BCAs); green algae; *Rhizoctonia solani*; antifungal activity

SHORT BIOGRAPHY

My name is Samuel D. Nomo, and I am a PhD candidate at the faculty of Jacob Blaustein Institutes for Desert Research, Ben Gurion University of the Negev. My research focuses on desert ecological studies with a particular interest in plant protection through environmentally friendly biocontrol strategies. I am investigating the use of green algae as a potential biocontrol agent against plant pathogens that threaten agricultural productivity, especially in arid and semi-arid environments. My work employs an aspect of microbial ecology, plant pathology, and applied biotechnology to explore sustainable alternatives to chemical pesticides. Through this research, I aim to contribute to the advancement of eco-friendly plant disease management and promote sustainable agricultural practices to address global challenges in food security and environmental conservation.

The Culturable Mycobiome of the Red Sea Coral *Stylophora pistillata*: Friends and Foes?

Granit L.[1], Levi R.[1], Lifshitz N.[1], Banc-Prandi G.[2], Zelinger E.[3], Ronen B.[4], Kraut-Cohen J.[5], Naqib A.[6], Green S.J.[7], Fine M.[4], and Yarden O.[1*]

[1]1 Department of Plant Pathology and Microbiology, The Robert H. Smith Faculty of Agriculture Food and Environment, The Hebrew University of Jerusalem, Rehovot, Israel & The Interuniversity Institute of Marine Sciences, Eilat, Israel. 2 Laboratory for Biological Geochemistry, School of Architecture, Civil and Environmental Engineering, École Polytechnique Fédérale de Lausanne (EPFL), 1015, Lausanne, Switzerland 3 Centre for Scientific Imaging, The Robert H. Smith Faculty of Agriculture, Food and Environment, The Hebrew University of Jerusalem, Rehovot, Israel. 4 Department of Ecology, Evolution and Behavior, The Alexander Silberman Institute of Life Sciences, The Hebrew University of Jerusalem, Jerusalem, Israel & The Interuniversity Institute for Marine Sciences, Eilat, Israel 5 Institute of Soil, Water and Environmental Sciences, Agricultural Research Organization, Volcani Center, Rishon LeZion 7505101, Israel 6 Rush Research Bioinformatics Core Facility, Rush University, Chicago, IL, USA 7 Genomics and Microbiome Core Facility, Rush University, Chicago, IL, USA

*oded.yarden@mail.huji.ac.il

ABSTRACT

The role of fungi in the coral microbiome is increasingly recognized, yet their potential impact on the holobiont's health, particularly under stress conditions, remains underexplored. To address this gap, we isolated over 200 strains (predominantly Ascomycota) from the common scleractinian Red Sea coral *Stylophora pistillata*. Using conidia from a rare (*Stachybotrys chlorohalonata*) and a common (*Cladosporium halotolerans*) fungal symbiont, we investigated their effects on coral fragments maintained at ambient (25°C) and elevated (33°C) sea temperatures. Inoculation with *S. chlorohalonata* resulted in significant tissue loss across both water temperature treatments. In contrast, inoculation with *C. halotolerans* did not result in visible effects at ambient temperature, but mitigated tissue loss at elevated temperature. This protective effect was accompanied by reduced expression of stress-induced peroxiredoxin-6 and Rad51 host genes, yet not that of Hsp70. Additionally, potential algal symbiont photosynthetic efficiency was higher by over 25% in the elevated temperature treatment, concurrent with higher bacterial diversity, including a marked reduction (>3-fold) in the proliferation of Vibrionaceae in the *C. halotolerans*-treated coral nubbins. These findings reveal the contrasting impacts of fungal symbionts on coral health, highlighting the dual roles of the mycobiome in influencing holobiont resilience under environmental stress.

Keywords: *Cladosporium*, *Stachybotrys*, marine fungi

SHORT BIOGRAPHY

Dr. Oded Yarden is a professor of fungal biology at the Hebrew University of Jerusalem. His research focus includes fungal genetics and development, and fungal interactions with other organisms. He is a former president of the Israeli Phytopathological Society and a current member of the Fungal Genetics Policy Committee (affiliated with the Genetics Society of America).

Phagocytic Chemiluminescent Fingerprints to Monitor and Screen Bioactive Compounds in Mushroom Extracts

Carmeli G.[1 †], Vunduk J.[2 †], Kokojka F.[1] and Marks R.S.[1,*]

[1]*Avram and Stella Goldstein-Goren Department of Biotechnology Engineering, Ben-Gurion University of the Negev, Be'er-Sheva 84105, Israel*

[2]*Institute of General and Physical Chemistry, Studentski trg 12/V, 11158 Belgrade, Serbia*

*rsmarks@bgu.ac.il

ABSTRACT

Toxic wild-forgotten mushrooms consumption is a recurrent cause of accidental poisoning worldwide. Their consumption can lead to self-limiting gastroenteritis, fulminant hepatic or renal failure, and even death. Common approaches to evaluating mushroom toxicity rely mainly on analytical methods and animal studies. These approaches can be costly, time-consuming, and pose ethical challenges. To overcome this issue, we developed a rapid and sensitive in vitro assay using luminol-enhanced chemiluminescence (CL) to evaluate the immunomodulatory and potentially toxic effects of mushroom extracts on phagocytes. Porcine-blood-derived phagocytes were isolated using Lymphoprep™ gradient medium and centrifugation in SepMate™-15 tubes. The isolated phagocytes were induced using *Zymosan A* from *Saccharomyces cerevisiae* or *N-formyl-Met-Leu-Phe* (fMLP). Reactive oxygen species (ROS) production, indicative of the respiratory burst and the phagocytes' activity, was measured indirectly by the chemiluminescent reaction of luminol oxidation by the ROS, over 60 minutes, using a microplate reader. We hypothesized that toxic mushroom extracts would either inhibit or enhance the phagocytes' responses and ROS production compared to edible mushroom extracts, which would be reflected by different kinetic patterns and relative light units (RLU) intensities. The assay revealed different RLU_{max} values between the various samples, which were interpreted as induction factors (IF). This assay demonstrates a promising screening tool for evaluating mushrooms' bioactivity and toxicity, with various potential applications.

Keywords: luminol-enhanced chemiluminescence, phagocytic oxidative burst, mushroom toxicity screening, porcine phagocytes, bioactive fungal metabolites, reactive oxygen species

SHORT BIOGRAPHY

Gal Carmeli is an M.Sc. student in the Department of Biotechnology Engineering at Ben-Gurion University of the Negev, working in Prof. Robert S. Marks' Biosensors Laboratory. His research focuses on the development of portable fiber-optic biosensors and biosensing platforms for toxicological studies, with a particular emphasis on bioluminescent and chemiluminescent tools. He recently published a peer-reviewed article in *Biosensors* (MDPI) about the development of a first-generation dispatchable fiber-optic biosensor for real-time, on-site water and sediment toxicity assessments, and continues to work on the second-generation upgrade of that device. Gal has also been actively involved in organizing FUNGA fest 2025, serving as the coordinator of the event.

Whole-Cell Bioreporter-Based Assay for Detecting Fungal-Derived ß-Lactamase Inhibitors

Benou R.[1], Marks R.S.[1,2], Sivan A.[1,†], Kramarsky-Winter E.[1], Golberg K.[1,3], Kushmaro A.[1,2,4 *]

[1]*Avram and Stella Goldstein-Goren, Department of Biotechnology Engineering, Faculty of Engineering Sciences, Ben Gurion University of the Negev, Beer-Sheva 84105, Israel*

[2] *The Ilse Katz Centre for Nanoscale Science and Technology, Ben-Gurion University of the Negev, Beer-Sheva 84105, Israel*

[3] *Department of Life Sciences, Achva Academic College, 79804, Israel*

[4] *School of Sustainability and Climate Change, Ben-Gurion University of the Negev, Beer-Sheva 84105, Israel*

*arielkus@bgu.ac.il

ABSTRACT

β-lactams are an important family of antibiotics that are prone to undergo resistance inhibition through the production of β-lactamases by some microorganisms. To combat this resistance and preserve the efficacy of β-lactam antibiotics, we developed a strategy for the discovery of such β-lactamase inhibitors. When combined with β-lactams, these inhibitors allow the antibiotics to be effective and prevent resistance. To date, the development of such combinatory drugs is limited due to the complexity of screening for new β-lactamase inhibitors. Therefore, to facilitate this development, it was essential to find sensitive assays to effectively screen for lactamase inhibitory compounds. To this end, a novel bioassay utilizing bioluminescent indicator bacteria as bioreporters was developed. The assay was first optimized using commercial antibiotics together with known β-lactamase inhibitors. Using this bioassay, we then screened for novel natural β-lactamase inhibitors derived from coral-associated fungi. We showed that the fungus *Penicillium spinulosum*, originating from the coral *Pocillopora* sp. from the Gulf of Aqaba, Eilat, produced compounds with anti-β-lactamase activity. We further demonstrate that the bioreporter bacteria used here responded to the combined antibiotics and β-lactamase inhibitors in a concentration-dependent manner, indicating their usefulness for β-lactamase-inhibiting compounds discovery.

Keywords: antibiotics; β-lactam; β-lactamase; β-lactamase inhibitors; novel bioassay bioreporter; bioluminescence.

SHORT BIOGRAPHY

Prof. Ariel Kushmaro, environmental and clinical microbiologist at BGU, Israel, Biotechnology Engineering Department. His research activities focus on the development of various techniques for environmental sensing, bioremediation, environmental microbiology, biofilms, and drug discovery, including novel antibiotics and quorum-sensing inhibitors.

Bioluminescent Whole-Cell Bioreporter Bacterial Panel for Screening and Discovery of Bioactive Compounds Derived from Mushrooms

Trif C. [1,†], Vunduk J. [2,†] , Parcharoen Y. [3], Bualuang A. [3] and Marks R.S [1,*]

[1] *Avram and Stella Goldstein-Goren Department of Biotechnology Engineering, Ben-Gurion University of the Negev, Be'er-Sheva 84105, Israel*

[2] *Institute of General and Physical Chemistry, Studentski trg 12/V, 11158 Belgrade, Serbia*

[3] *Chulabhorn International College of Medicine, Thammasat University, Pathum Thani 12120, Thailand*

*rsmarks@post.bgu.ac.il

ABSTRACT

This study presents a rapid and comprehensive method for screening mushroom extracts for the putative discovery of bioactive molecules, including those exhibiting antimicrobial activity. This approach utilizes a panel of bioluminescent bacteria, whose light production is a sensitive indicator of various cellular effects triggered by the extracts, including disruption of bacterial communication (quorum sensing), protein and DNA damage, fatty acid metabolism alterations, and oxidative stress induction. The bioassay's strength is its ability to efficiently analyze a large number of extracts simultaneously while also assessing several different mechanisms of toxicity, significantly reducing screening time. All samples analyzed exhibited more than one cellular effect, as indicated by the reporter bacteria. Four samples (*C. cornucopioides, F. fomentarius, I. obliquus, and M. giganteus)* displayed the highest number (six) of possible mechanisms of antibacterial activity. Additionally, combining extraction and purification protocols with a bioluminescent bacterial panel enables simultaneous improvement of the desired antimicrobial properties of the extracts. The presented approach offers a valuable tool for uncovering the diverse antimicrobial mechanisms of mushroom extracts.

Keywords: antimicrobial activity, bioluminescence, medicinal mushrooms, toxicity, whole cell bioreporter bacteria, quorum sensing

SHORT BIOGRAPHY

Prof. Robert S. Marks is a full professor in the Department of Biotechnology Engineering at Ben-Gurion University of the Negev, where he founded the university's Biosensors Laboratory. He has authored over 235 scientific publications, edited eight books, and holds multiple patents. His work has contributed to the creation of several startups in Israel, the US, and Singapore. Prof. Marks has chaired more than 20 international scientific conferences and serves on various editorial boards and advisory panels. He also created and teaches Ben-Gurion University's Ethnomycology course, which explores the cultural and biomedical relevance of fungi — a passion that helped inspire the launch of Funga Fest.

Microplastic Removal and Biodegradation by Native Mediterranean Fungus *Alternaria alternata*

Schindler Azut Y.[1*], Zucker I.[1,2]

[1]*School of Mechanical Engineering, Faculty of Engineering, Tel Aviv University, Tel Aviv, Israel*

[2]*Porter School of Earth and Environmental Studies, Faculty of Exact Sciences, Tel Aviv University, Tel Aviv, Israel*

*ya.schindler@gmail.com

ABSTRACT

The threat and predominance of microplastics (MPs) in marine environments have prompted a growing interest in their interactions with microorganisms that naturally colonize them (i.e., the plastisphere). This study investigates the interaction of *Alternaria alternata*—a fungus native to the Mediterranean Sea—with polystyrene (PS) MPs, focusing on the potential of the fungus to remove and degrade MPs in seawater. We first designed and constructed a custom laboratory setup in which an immobilized benthic fungal mat, contained in temperature-controlled glass vials, was exposed to ~1.7 µm weathered MPs ranging in size from 0.45 to 30 µm. This scenario emulates environmental conditions occurring in the benthic layer of seagrass habitats. We observed a 96% reduction in PS MP particle concentration within 24 h in the presence of a live fungus, which was significantly higher than the removal of the MP from sedimentation or exposure to an inactivated fungus. Micro- and nanoscale visualizations illustrate the capture and entrapment of MPs within the fungal biomass. The fungus displayed selectivity, favoring PS over polyethylene terephthalate (PET) and polypropylene (PP). Further analyses indicated the formation of a transformation product following interaction between the fungus and PS MPs, indicating that active fungal interaction, rather than gravitational settling, was the dominant driver of MP removal. In addition, thermogravimetric analysis revealed structural alterations within the fungal cell wall upon exposure to PS-based MPs, further supporting the hypothesis of PS utilization by the fungus. Overall, this study offers new insights into the use of the fungus *A. alternata* for the biological decomposition of PS MPs and serves as an effective natural method for removing MPs from seawater without disrupting the ecological balance.

Keywords: microplastic, marine fungi, mycoremediation, Mediterranean Sea, fungal plastisphere, Alternaria alternata

SHORT BIOGRAPHY

Yarden Schindler Azut is the Microbiology R&D Lead at Cooling Crops, where she leads research on Cyanobacteria applications in Agrotech and environmental sustainability. She holds a B.Sc. in Biotechnology Engineering from Ben-Gurion University and an M.Sc. in Environmental Engineering from Tel Aviv University. Her master's research explored the interactions between marine fungi and microplastics, resulting in a peer-reviewed publication. During her undergraduate studies, she initiated an innovative home diagnostic test for vulvovaginal *Candida albicans*, leading to a patent submission. Her scientific interest lies in integrating microbiology and mycology research to advance sustainable biotechnological solutions for environmental challenges.

Metarhizium brunneum Blastospores as a Promising Cost-Effective Biopesticide: Insights into Virulence, Tolerance, and Efficacy

Finkelstein S.[1,2], Brichka M.[2,3], Davidovitz M.[1], Ostrov Y.[3], Mechrez G.[3], Rav-David D.[1], Elad Y.[1], and Ment D.[1*]

[1] *Institute of Plant Protection, Volcani Institute, Agricultural Research Organisation, Israel.*

[2] *Department of Agroecology and Plant Health, The Robert H. Smith Faculty of Agriculture, Food and Environment, The Hebrew University of Jerusalem, Israel.*

[3] *Institute of Postharvest and Food Sciences, Volcani Institute, Agricultural Research Organisation, Israel.*

*danam@volcani.agri.gov.il

ABSTRACT

Biological pest control using entomopathogenic fungi has traditionally relied on conidia as the active ingredient in commercial products. However, time-consuming fermentation processes and limitations in industrial infrastructure have prompted the exploration of alternative forms of active ingredients, with recent research focusing on blastospores as a substitute. Blastospores are hyphal fragments that develop by budding in the arthropod host's hemolymph once the fungus has invaded, and they can be commercially produced within 3 days using precision fermentation. To promote more cost-effective production of a native Metarhizium brunneum strain (Mb7), we developed a protocol for blastospore fermentation and analysed the secondary metabolite profile of the growing media. Mb7 blastospores and conidia were characterised for morphology and pathogenic development using confocal microscopy and RNA-seq, while virulence was assessed towards *Galleria mellonella* larvae. UV radiation tolerance was evaluated in an irradiation cabin using CFU formation assessment, and efficacy against tomato pests was measured in greenhouse experiments using a novel Pickering emulsion formulation. Results showed that Mb7 blastospores varied in size and were twice as large as conidia. While the virulence of conidia and blastospores was similar, the mortality rate dynamics of conidia were superior, though survival following UVC radiation exposure was comparable between both forms. Notably, foliar application of blastospores formulated in Pickering emulsion on tomato plants resulted in over 60% reduction of the pest *Tuta absoluta*, equivalent to commercial biopesticides. These findings indicate that Mb7 blastospores yield promising results for further commercialisation as an alternative active ingredient to conidia.

Keywords: Entomopathogenic fungi, Blastospores, Biopesticides, Precision fermentation.

SHORT BIOGRAPHY

Shany Finkelstein Shatz is a master's student at The Robert H. Smith Faculty of Agriculture, Food and Environment, The Hebrew University of Jerusalem, Israel, conducting her research in Dr. Dana Ment's lab at the Volcani Institute, Agricultural Research Organisation, Israel. At our lab, we focus on microbial pest control using insect pathogens, including bacteria, fungi, and nematodes. We examine the host-pathogen interaction as a whole and the ecological aspects of entomopathogenic microorganisms. Understanding the ecological functions enables enhancing its role as a biocontrol agent in agriculture and natural habitats. Shany is an experienced agronomist specialising in integrated pest management (IPM) and pollination. She currently serves as Chief Agronomist and Head of Innovation at Biobest Israel (Polyam) and is a strong advocate of biopesticides.

Early Detection of Quiescent Fungal Pathogens in Crops for Effective Disease Management

Eltzov E.[1]

[1]*Department of Postharvest Science, Institute of Postharvest and Food Science, Volcani Institute, Agricultural Research Organization, Rishon LeZion 7505101, Israel.*

*eltzov@volcani.agri.gov.il

ABSTRACT

The problem of postharvest food losses is a major issue, having been estimated at 40% to 50% of harvested crops worldwide, mostly due to rots caused by fungi. After penetrating the unripe fruit, pathogenic fungi remain quiescent ("sleeping") until the fruit ripens. The quiescent infections are microscopic and cannot be visually detected during packaging or subsequent transport. Thus, there is a need to design assays that allow the identification of the fungi at an initial quiescent stage of infection to prevent potential fruit decay during the supply chain and consumer storage. A rapid and easy-to-use paper-based LAMP assay was designed for detecting quiescent markers of pathogen fungi. The developed method requires a cheap cellulose membrane and heat block, enabling this method to be employed in resource-limited settings. Additionally, a 384-well plate application was also developed for high-throughput detection, enabling simultaneous analysis of many pathogens across multiple samples. This high-throughput capability is crucial for rapid screening and identification, significantly reducing the time and resources required for large-scale pathogen surveillance and ensuring comprehensive and timely intervention in disease management strategies. Both assays demonstrated high specificity for the quiescent stage of fungal pathogens, achieving an analytical sensitivity of 0.5 pg of total extracted RNA and delivering results within 40 minutes from sampling. The unique ability of the proposed system to detect and recognize the fungus during the quiescent (latent) stage will decrease food losses by allowing improved postharvest management. For example, fruit with a high inoculum rate will be sold to the local market or as processed food, whereas fruit with low inoculum rates can be stored for long periods or exported.

Keywords: loop-mediated isothermal amplification (LAMP), mRNA, fungal pathogen, fruit, point of care technology (POCT), paper-based analytic devices (PADs).

SHORT BIOGRAPHY

Evgeni Eltzov is a researcher in the Department of Postharvest and Food Sciences, Volcani Center, Israel. He completed his Ph.D. in the Environmental Engineering department at Ben-Gurion University. Dr. Eltzov leads the Biosensors Research Group, which focuses on the development and miniaturization of advanced biosensor platforms for applications in food safety and agriculture. His work integrates novel micro-/nano-structures with biorecognition elements such as DNA, antibodies, enzymes, and whole cells to create innovative diagnostic devices. Key areas of his research include biosensor and bioassay development, point-of-care (POC) diagnostics, real-time multianalyte monitoring systems, and the application of nanotechnology in biosensing.

dsRNA as a Promising Eco-Friendly Treatment to Control Postharvest Diseases

Chowdhary P.[1], Duanis-Assaf D.[1,2*], Duanis-Assaf T.[3], Davydov O.[4], Maurer D.[1], Feygenberg O.[1], Poverenov E.[1], Bar Lavan Y.[4], Fluhr R.[5], and Alkan N.[1*]

[1]Department of Postharvest Science, ARO Volcani Institute, Israel; [2]Robert H. Smith Faculty of Agriculture, Food and Environment, Israel; [3]Department of Chemistry, The Hebrew University, Israel; [4]HarvestR, Israel; 5Department of Plant and Environmental Sciences, Weizmann Institute, Israel.

*noamal@volcani.agri.gov.il

ABSTRACT

Pathogenic fungi are a main cause of postharvest loss. The most effective treatment against postharvest diseases is chemical fungicides. However, due to growing concern for their harmful influences, there is a need to develop new strategies. One of the new environmentally friendly approaches is the use of dsRNA. By designing a dsRNA construct that targets essential genes in pathogenic fungi, we were able to reduce decay development. However, the dsRNA treatment suffers from two major disadvantages: not all fungal species have the propensity to uptake dsRNA, and the low stability of dsRNA in the natural environment. By examining the uptake of cy5-labeled dsRNA by various pathogenic fungi, we demonstrated that the uptake of dsRNA by *Botrytis cinerea* occurs in the emergence zone of the germination tube, whereas *Colletotrichum gloeosporioides* presented no uptake. We studied the fungi's mechanical properties using atomic force microscopy. The elastic moduli measured for both conidia and germination tubes of *C. gloeosporioides* were remarkably higher than for *B. cinerea*, indicating that dsRNA penetration to the fungi is dependent on the fungi's stiffness. Upon this observation, we developed new techniques that allowed the penetration of the dsRNA into *C. gloeosporioides*. Next, to overcome the instability of the dsRNA, it was loaded onto layered double-hydroxide (LDH), which protected the dsRNA from degradation and served as a slow-release device. The dsRNA is a selective treatment, specifically targeting the desired fungi without affecting other species during storage. The LDH-dsRNA complex had a prolonged effect and maintained its efficiency in decreasing decay development up to six weeks post-treatment. Storage conditions as high humidity and CO_2, accelerated the release of the dsRNA from the LDH. Overall, this study advances the use of dsRNA one step closer to an applicable, eco-friendly alternative to the conventional postharvest fungicides.

Keywords: Postharvest, dsRNA, LDH, Spray-induced gene silencing, HarvestR.

SHORT BIOGRAPHY

Dr. Noam Alkan has been a PI at the Agriculture Research Organization, Volcani Institute, since 2013. Dr. Alkan's research combines advanced methods from biotechnology, plant diseases, and agriculture to preserve the quality of harvested fruits and find alternatives to chemical fungicides. Alkan's lab focuses on studying fungus-fruit interactions, inducing defense responses, using dsRNA against fungal diseases, postharvest studies, and reducing losses in agricultural produce. Noam Alkan has published more than 65 articles in peer-reviewed journals, 13 reviews and book chapters, 18 articles in agricultural journals, and has 10 patents, which have led to the creation of two companies. Noam has received numerous awards, including Researcher of the Year at Volcani Institute and Promising Young Researcher. His research team was honored as the Outstanding Team of the Volcani Institute. To date, he has successfully mentored 16 students and postdoctoral fellows, five of whom have established research labs in Israel and abroad.

Pleurotus ostreatus: not just an edible mushroom

Hadar Y.[1*]

[1]*Department of Plant Pathology and Microbiology, Faculty of Agriculture, Food and Environment, The Hebrew University of Jerusalem, Israel*

*yitzhak.hadar@mail.huji.ac.il

ABSTRACT

P. ostreatus, the oyster mushroom, is a commercial edible fungus, delicious, safe, and has medicinal properties. It is a white-rot fungus, a selective lignin degrader, and has a unique ligninolytic oxidative enzymatic system that can be exploited. Here are a few examples: (i)It is well established that manganese-amended soil increases lignin degradation. Similarly, the azo dye Orange II decolorizing enzymes belong to the Mn peroxidases family; indeed, OII decolorization was inhibited in *mnp*-silenced strains and was not decolorized under manganese deficiency. (ii) Carbamazepine and lamotrigine are stable pharmaceuticals detected in treated wastewater, and in edible plants irrigated with these waters. In the case of CBZ, it was found that the first metabolite is EP-CBZ, oxidized by Cytochrome P450, and oxidized to and diOH-CBZ that can be further metabolized, but only in the presence of lignocellulosic substrate, such as cotton stalks. In synthetic media, diOH-CBZ is a dead-end product. Lamotrigine was not degraded but was detoxified via intracellular conjugate formation. (iii) Hydroxy methyl furfural is produced during wood hydrolysis in the biofuel production process, and it is toxic to yeast. HMF induces expression of Aryl alcohol oxidase (AAO) and dehydrogenase in P. ostreatus; these enzymes are involved in the detoxification of HMF. Small secreted proteins (SSPs) expression was induced after exposure to HMF. Knockdown of SSP1 resulted in reduced expression of *aao* and aad; overexpression of SSP1 resulted in elevated expression of these genes. It can be concluded that *P. odtreatous* is able to degrade and hopefully remediate a wide range of aromatic natural and synthetic compounds, some of which are toxic pollutants.

SHORT BIOGRAPHY

Yitzhak Hadar is an Emeritus Professor of microbiology. Hadar accepted a lecturer position at the Hebrew University, Faculty of Agriculture in 1981, and was appointed to the rank of Professor in 1995. Hadar was teaching courses in general microbiology, environmental microbiology and treatment and recycling of agricultural wastes He served as Dean of the Faculty of Agriculture, Food and Environment (2001 – 2005), Head of the Department of Microbiology and Plant Pathology (2006-2010), President of the Israeli Society for Microbiology (2006- 2008), Hadar's research interest is in environmental microbiology. Topics Hadar, together with graduate students he supervised, studied include: The use of agricultural and municipal wastes for the production of disease suppressive composts for horticulture. Mechanism of degradation of lignocellulose by white rot fungi with emphasis on the mushroom *Pleurotus ostreatus*. The degradation and remediation of toxic xenobiotics by white rot fungi. Structure and function of microbial communities in plant roots.

Day 2 – Monday, 8 Dec 2025

Session 3 – Plant Pathology

Chair: Shay Covo, Maya Bar

Fungal Dynamics in Maize Late Wilt Disease: Intra-Species Interactions and Crosstalk with *Fusarium verticillioides*

Degani O.[1,2*] and Shofman G.[1,2]

[1]*Faculty of Sciences and Technology, Tel-Hai Academic College, Israel*

[2]*Department of Plant Sciences, MIGAL Galilee Research Institute, Israel*

*ofird@telhai.ac.il; d-ofir@migal.org.il

ABSTRACT

Maize late wilt disease, caused by the fungus *Magnaporthiopsis maydis*, represents a significant threat to susceptible cultivars. This study demonstrates that *M. maydis* populations in Israel exhibit various aggressiveness levels independent of geographic origin. Distinct subspecies groups were identified: some primarily disrupted plant growth, while others induced wilting symptoms, suggesting both biotrophic and necrotrophic pathogenic strategies. In pathogenicity assays, weakly virulent strains impacted the susceptible Prelude cultivar. In contrast, the resistant cultivar 'Royalty' was only affected by highly aggressive isolates, resulting in a 7% growth reduction and 11% mortality at harvest. Interestingly, early-stage inoculation with a mixture of the two most virulent isolates initially reduced disease severity, but this effect was reversed by harvest. Moreover, including a weakly virulent strain in the inoculum significantly worsened disease outcomes, with a 23% reduction in plant growth, 71% decline in plant health, and high *M. maydis* colonization. Compared with *Fusarium verticillioides*, another stalk rot pathogen affecting maize after flowering, *M. maydis* showed markedly higher aggressiveness, with only 40% plant survival and up to 1,000-fold greater fungal DNA accumulation in the roots. However, co-inoculation with both pathogens increased the proportion of healthy plants from 10% (with *M. maydis* alone) to 30%. Furthermore, sequential infection with *F. verticillioides* before *M. maydis* reduced symptom severity and pathogen colonization, though plant growth remained suboptimal. These findings highlight the complex intra- and interspecific interactions shaping the damages caused by late wilt disease and provide new ecological insights into pathogen dynamics under multifactorial infection scenarios.

Keywords: Crop protection, Fungus, *Harpophora maydis*, Microbiome, Pathogenicity, Real-time PCR

SHORT BIOGRAPHY

Dr. Ofir Degani completed his Ph.D. at the Technion-Israel Institute of Technology (Haifa, Israel), specializing in genetic engineering approaches in phytopathology. He carried out his post-doctoral studies at the Migal-Galilee Research Institute (Israel). Currently, Dr. Degani serves as the research group director of the Phytopathology Laboratory at this institute and a senior staff member at Tel-Hai Academic College (Israel). His research integrates molecular, biochemical, and microbiological tools to advance the understanding and management of plant fungal diseases. His group focuses on: 1) Developing biological, chemical, and agrotechnical strategies to control major plant diseases such as maize late wilt and stalk rot, cotton charcoal rot, and onion basal rot. 2) Engineering and utilizing the plant microbiome to create eco-friendly solutions for crop protection. 3) Investigating pathogen-pathogen interactions and their implications in plant pathology to enhance integrated disease management practices.

Exploring Premature Field Collapse During Late Growth Stage in Spring Session Potatoes in the Western Negev, Israel

Kebede D.[1,2*], Rachmilevitch S.[1], Raanan H.[2]

[1] *The Jacob Blaustein Institute for Desert Research, Ben-Gurion University of the Negev, Israel*

[2] *Volcani Institute, Ministry of Agriculture, Israel*

*denberuk@post.bgu.ac.il

ABSTRACT

In recent years, potato cultivation in the Western Negev of Israel has been encountering an increase in premature field collapse during the late growth stages in the spring season, resulting in significant crop damage and yield reduction. The initial stages of this phenomenon are marked by necrotic spots on the leaves, resembling symptoms caused by *Alternaria alternata*. However, it is uniquely characterized by the rapid collapse of all plants within 10 to 20 days after the initial symptoms appear and cannot be effectively managed with common fungicide applications. The underlying cause remains unknown. Therefore, this study aims to determine the actual cause and to identify effective fungicides for its control. A total of forty farms (19 during the winter and 21 during the spring seasons) were monitored weekly throughout the 2024/25 growing season. *Alternaria alternata* isolates from collapsing potato plants were tested under greenhouse conditions via foliar inoculation. The efficacy of twelve fungicidal compounds was evaluated both under laboratory and field conditions. Although the initial symptoms were observed in both growing seasons, the collapse occurred exclusively during the spring and was not evident in the winter. During the spring, approximately 45% of the farms experienced collapses, which significantly affected yield (P=0.007). *Alternata alternata* was the most frequent pathogen isolated from field-collected samples. However, it failed to cause the full plant collapse after artificial inoculation. The commonly used fungicides polyoxin, azoxystrobin, and chlorothalonil exhibited low efficacy, with ED_{50} values of 196.934, 129.7308, and 104.4385 ppm, respectively. Conversely, newer fungicides, including difenoconazole, Boscalid + Pyraclostrobin, and Pydiflumetofen + difenoconazole, markedly suppressed *A. alternata* and significantly reduced the field collapse. These results suggest that *A. alternata* might not be the main cause of the collapse, pointing to other possible factors or fungal species and emphasizing the need for wider pathogen identification.

SHORT BIOGRAPHY

Mr. Denberu Kebede is a PhD scholar at Ben-Gurion University of the Negev, specializing in plant-microbe interaction. He earned his MSc in Applied Microbiology from Addis Ababa University, Ethiopia. His current research focuses on investigating the causes and contributing factors of a newly emerging phenomenon known as potato premature field collapse. As part of his PhD work, he integrates remote sensing data with ground-based observations to develop cost- and time-effective methods for monitoring the spatial and temporal distribution of this collapse. He is highly passionate about scientific research and has presented his work in different conferences, including the Israeli Phytopathological Society and the Israeli Society for Microbiology.

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Prevalence of Mycotoxigenic Fungi and Ochratoxin A in Green Coffee Beans (*Coffea arabica* L.)

Atsbeha L.H.[1*], Meseret G.I.[2] and Ketema B.B.[2]

[1]*Food Science and Nutrition, Ethiopian Institute of Agricultural Research, Ethiopia*

[2]*Biology, Natural Sciences, Jimma University, Ethiopia*

*legehagos@gmail.com

ABSTRACT

Contamination of food and crops with Ochratoxin A has become a growing public concern and is getting more attention among researchers and food producers. This study aimed to assess the prevalence of mycotoxigenic fungi and Ochratoxin A in coffee bean samples collected from the soil surface, wet-processed, and dry-processed. A total of 77 coffee samples were collected from Mana, Goma, Gera, and Limu Kosa districts of Jimma zone, Oromia Regional State of Ethiopia. Malt Extract Agar (MEA) was used for the isolation and identification of fungi using macro and microscopic characteristics, and HPLC was used to detect and quantify Ochratoxin A in green coffee beans. Different fungal genres, including *Aspergillus*, *Fusarium*, *Penicilium*, and *Rhizopus*, were found associated with coffee beans from different coffee processing methods. Accordingly, *Aspergillus* spp (84.74 %), *Fusarium* spp (8.75%), *Penicillium* spp (5.49%), and *Rhizopus* spp (1.02%) were recorded. The mean ochratoxin A (OTA) detected from different coffee samples was: 6.24 µg/kg, 2.05 µg/kg, and 1.2 µg/kg from coffee bean samples collected from the soil surface, dry, and wet processed samples, respectively. In the present study, it was observed that coffee is contaminated by various filamentous molds during postharvest phases. The highest contamination level of mycotoxigenic fungi was found among coffee samples collected from the soil surface, while the lowest contamination was from wet-processed coffee from soil, and the lowest fungal incidence was observed in wet-processed coffee beans.

Keywords: Coffee, HPLC, Mycotoxigenic fungi, Ochratoxin A.

SHORT BIOGRAPHY

Legese Hagos is a Microbiology researcher at the Ethiopian Institute of Agricultural Research, National Fishery and Aquatic Lives Research Center. His research interests include food microbiology, Food Safety, antimicrobial activities, and environmental microbiology.

Fungicide Resistance in *Stemphylium vesicarium*, Cause of Stemphylium Leaf Blight of Garlic and Onion in Israel

Nitzan N.[1*] and Dafni M.

[1]*Unit of Plant Pathology, Valley of Springs Research & Extension Center, Beit She'an*

*nitzan_nadav@yahoo.com

ABSTRACT

Onion and garlic are cornerstone crops in Israel, especially in the Jezreel and Beit She'an Valleys. Over the past decade, these crops have suffered from Stemphylium leaf blight, caused by the ascomycete fungus *Stemphylium vesicarium*. The disease kills foliage, reducing photosynthesis and ultimately bulb yield. Our working hypothesis is that the recent increase in disease severity stems from reduced sensitivity of the pathogen population to the fungicides currently used commercially. Therefore, profiling the pathogen's fungicide sensitivity is essential for fine-tuning and improving spray programs. We evaluated the efficacy of boscalid (an SDHI) and the triazoles difenoconazole and cyproconazole. Cyproconazole was found to be at the brink of failure, and boscalid efficacy was limited. In contrast, difenoconazole remained effective, although some isolates showed reduced sensitivity. Overall, Israeli isolates exhibited EC_{50} values up to ten-fold higher than those reported in the literature. The isolates split into two sensitivity groups: "Group 1" was more sensitive to boscalid but more resistant to cypro- and difenoconazole; "Group 2" was more resistant to boscalid but more sensitive to the triazoles. It is therefore recommended to discontinue cyproconazole use for now and to limit boscalid applications. Nevertheless, applying boscalid in combination with difenoconazole is advised to control both sensitivity groups simultaneously in the field.

Keywords: Onion, phytopathogens, Stemphylium, fungicide, resistance

SHORT BIOGRAPHY

Dr. Nadav Nitzan is an extension and research plant pathologist with The Valley of Springs Research & Extension Center. He has 20 years of applied agriculture R&D experience from Washington State University, USDA-ARS, and commercial companies. He is skilled with soil-, seed-, foliar-borne, and postharvest diseases of potatoes, tomatoes, carrots, onions, garlic, sweet basil, grapes, table beet, sweet potato, and postharvest of fresh produce. His research encompasses plant epidemiology, etiology, development of disease management protocols, disease forecasting systems, breeding potato and sweet basil varieties for disease resistance, fungicide insensitivity monitoring, teaching, and mentoring of students.

Characterization of Fungal Pathogens Causing Decay in Cold-Stored Carrots and Development of Sustainable Control Strategies

Nadav S.[1,2], Ginat R.[1], Nadav N.[3], and Carmit Z.[1*]

[1]*Department of Postharvest Science, Agricultural Research Organization, Volcani Institute, Israel.*

[2]*The Institute of Agroecology & Plant Health, the Faculty of Agriculture, Food and Environment, HUJI, Israel*

[3]*The Valley of Springs Agricultural R&E Center, Israel.*

*Carmit.Ziv@volcani.agri.gov.il

ABSTRACT

Long-term cold storage of carrots (0–2°C for 6–10 months) is frequently compromised by fungal decay, resulting in significant postharvest losses primarily caused by pathogenic fungi. To mitigate this, carrots are typically dipped in fungicides prior to storage. Following the ban of Rovral® (a.i.: Iprodione 50% v/v) in 2020, Scholar® (a.i.: Fludioxonil 230 g/L) was registered as a replacement and entered commercial use in January 2021. This study aimed to elucidate the fungal etiology of postharvest carrot decay and to develop sustainable, integrated management strategies. Between 2022 and 2024, 101 fungal isolates were obtained from symptomatic carrots collected from commercial cold storage facilities across Israel. Fungal identification was carried out using ITS1 and ITS4 primers, followed by species-specific PCR for accurate classification. Koch's postulates confirmed the pathogenicity of multiple isolates, with ten isolates of *Botrytis cinerea* (grey mold) and eleven isolates of *Sclerotinia sclerotiorum* (white mold) identified as the most aggressive at both 5°C and 16°C. Considerable variability in virulence was observed among isolates, and screening revealed differing levels of tolerance to environmental stress and antifungal compounds. Notably, one *S. sclerotiorum* isolate exhibited high resistance to multiple fungicides. Moreover, combining Scholar® with a GRAS (Generally Recognized As Safe) compound enabled a reduction in the required Scholar® concentration from 0.1% to 0.05% v/v, suggesting a promising dipping treatment for packinghouse use. Furthermore, molecular investigations, including genomic mapping and gene expression analysis, were performed to unravel the mechanisms underlying fungicide resistance in *S. sclerotiorum* isolates. Taken together, these findings will support the development of sustainable pest management strategies to reduce postharvest carrot decay in cold storage, while alleviating the selection pressure for resistance development in pathogen populations.

SHORT BIOGRAPHY

Nadav Smila is an M.Sc. student in plant pathology and postharvest sciences at the Hebrew University and Volcani Institute, specializing in postharvest pathology and fungal–host interactions. His current research focuses on the identification and management of fungal pathogens affecting cold-stored carrots, with an emphasis on fungicide resistance mechanisms in *Botrytis cinerea* and *Sclerotinia sclerotiorum*. He has a background in molecular diagnostics, fungicide mode of action, and sustainable disease control strategies, including the use of GRAS compounds and integrated pest management (IPM). Nadav is about to complete a master's degree in plant pathology, where he studied the effects of environmental conditions and chemical treatments on fungal pathogen aggressiveness. Nadav is actively involved in collaborative projects with commercial packinghouses and contributes to the development of science-based solutions for crop protection in Israel. Nadav has been awarded an Excellence Scholarship from the Israeli Phytopathological Society and a full tuition scholarship from ADAMA Agricultural Solutions Ltd.

Uncovering Factors Influencing Host Specificity and Mutualistic Beneficial Plant Interactions of the Phytopathogen *Botrytis cinerea*

Anand G.[1,2,3], Marash I.[1], Leibman-Markus .M[2], Gupta R.[2,3], Benoni C.[2,4], Rav-David D.[2], Elad Y.[2], Bar M.[1,2]*

[1]*Department of Life Sciences, Ben Gurion University of the Negev, Beer Sheva, Israel*

[2]*Institute of Plant Protection, Agricultural Research Organization- Volcani Institute, Rishon Leziyon, Israel*

[3]*Faculty of Agriculture, Hebrew University of Jerusalem, Israel*

[4]*Faculty of Life Sciences, Bar-Ilan University, Ramat-Gan, Israel*

*barm@bgu.ac.il

ABSTRACT

Botrytis spp. generally shows necrotrophic infection behavior, killing the host cell to acquire nutrients. Some *Botrytis* spp. can grow symptomless inside their host, switching to necrotizing infection upon favorable environmental conditions. Extended quiescent phases following infection have also been reported, and *Botrytis* spp. have been isolated from healthy tissues of many plant species. In short, evidence suggests that *Botrytis* spp. can co-exist with plants. While many *Botrytis* species infect a narrow range of hosts, *B. cinerea* stands out with an extremely broad host range. Here, we examined whether agricultural isolates of *B. cinerea* show a preference for their original host, and what factors might influence this preference. We hypothesized that the ability of *Botrytis* spp. to coexist with plants is related to host specificity and that the plant may benefit from this non-pathogenic interaction with *B. cinerea*. To test our hypothesis, we utilized a system of several plant hosts and several corresponding *B. cinerea* isolates. We developed a system to examine co-existence between *B. cinerea* and these host plants and examined the ability of the fungus to survive in the plants, as well as the plants' ability to grow and withstand further infections. In addition to demonstrating a clear host preference of some *B. cinerea* isolates, our results show that *B. cinerea* can survive extensively on plants without causing infection, and that inoculation with *B. cinerea* under non-infectious conditions can increase plant growth and productivity, in addition to strengthening the plant immune system. While it seems unlikely that *B. cinerea* would become a biocontrol agent against itself in agricultural settings, our work adds additional dimensions to *B. cinerea*-host plant interactions and suggests that developing methodologies to control *B. cinerea* in its non-pathogenic phase could be beneficial.

Keywords: *Botrytis cinerea*, host specificity, endophytism, induced resistance, salicylic acid

SHORT BIOGRAPHY

Dr. Maya Bar is an associate professor at Ben Gurion University of the Negev and heads the Phyto-Development-Defense Dynamics lab in the Department of Life Sciences. With a dual background in plant immunity and plant development, she has published over 60 research papers (~2400 citations, h-index 26). The lab is comprised of a diverse group of individuals conducting collaborative basic and applied research, investigating plant communication, immunity priming, development-defense trade-offs, plant-fungus interactions, and chemical and organismal biocontrol of plant disease.

Host Suppression of Stress Signaling in the Maize Pathogen *Cochliobolus heterostrophus*

Horwitz B.A.[1*]

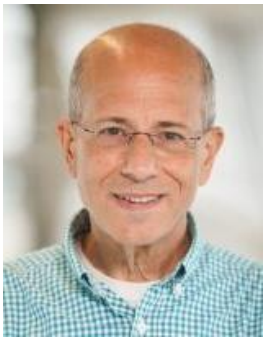
[1]*Faculty of Biology, Technion - Israel Institute of Technology, Haifa, Israel*

ABSTRACT

A phenolic compound abundant in maize, ferulic acid (FA), has far-reaching effects on *Cochliobolus heterostrophus*, the Dothideomycete agent of Southern corn leaf blight. Exposure to FA suppresses phosphorylation of the stress-activated MAP kinase ChHog1, and promotes its sequestration to cytoplasmic foci. FA induces mRNA-containing stress granule formation, overlapping in part with the ChHog1:Gfp foci. FA suppresses ChHog1 activation even under osmotic stress, inhibiting dual phosphorylation, nuclear retention, and the expression of a Hog1-dependent transporter gene, ChMST1. This apparently reversed signaling mode could promote survival during infection by mitigating over-activation of the stress response pathway. On the other hand, it seems unlikely that the inability to respond to stress confers a direct advantage to the pathogen. Rather, host-dependent post-translational regulation of the fungal stress-response pathway could co-exist with a fungal survival response. Comparison of such stress responses across fungal species will test how general they are.

Keywords: fungal, plant, maize, protein kinase, stress

SHORT BIOGRAPHY



Dr. Benjamin A. Horwitz leads a lab at the Faculty of Biology, a diverse unit at the main campus of the Technion – Israel Institute of Technology in Haifa. Coming originally from a background in photobiology of plants and fungi, his group has focused for many years on conserved eukaryotic signaling pathways of filamentous fungi. Environmental and host-derived signals reprogram the fungal cell to withstand stresses and direct growth to optimize nutrient uptake and spore dispersal. The lab uses molecular genetic and physiological approaches to understand how these pathways work. In recent years, the main model studied in the Horwitz lab is the maize-*Cochliobolus heterostrophus* (Southern corn leaf blight) pathosystem. Study of stress-activated MAP kinase pathways led to an unexpected connection to subcellular condensates, which is our main research interest at present. Dr. Horwitz lectured for many years on microbial signaling pathways, general plant science, and genetics labs. He is a founding member of the local molecular mycology (MMM) network.

Session 4 – Medical Mycology

Chair: Daniel Elad, Nir Osherov

Human Activities (Suspected) to Cause Changes in the Epidemiology of Fungal Diseases in Man and Animals

Elad D.[1*]

[1]*Kimron Veterinary Institute, Beit Dagan, Israel*

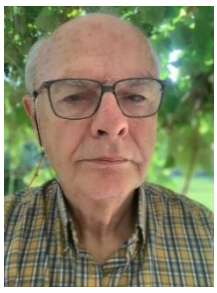
*daniel.elad@mail.huji.ac.il

ABSTRACT

Fungi can cause infections in warm-blooded animals if they can grow at the host's body temperature. Increasing global temperatures might have selected thermotolerant fungal populations, converting them from non-pathogenic to pathogenic, causing the emergence of contemporaneous worldwide morbidity, atypical of other emerging pathogens, as exemplified by *Candida auris*. Climate change, soil disturbance, and travel may have caused the spread of *Histoplasma* spp., *Coccidioides* spp., and *Blastomyces* spp., from their historically endemic areas in the United States. *Coccidioides immitis*, causing coccidioidomycosis, carried by asymptomatic burrow-dwelling rodents, was limited to arid areas of the south-western United States. Upon their death, the fungus develops, and its conidia spread. Recently, cases of coccidioidomycosis have emerged north of the historic area of endemicity. Cycles of intense rain and drought have increased in intensity and frequency due to climate change. During the wet period, the fungus thrives, and conidia in the dust are subsequently disseminated in the dry period by winds. Moreover, carrying rodents abandon their flooded burrows, migrate to dryer areas, where they succumb to the lack of water, completing the cycle. During wildfires, rising hot air disseminates the conidia of *Coccidioides*. The incidence of coccidioidomycosis has increased in firefighters active in contaminated areas. Travel and commerce have led to the emergence of several fungal infections in wildlife, with catastrophic consequences. White Nose, caused by *Pseudogymnoascus destructans*, killed millions of insectivorous bats in the United States. European tourists might have brought the fungus to a cave in the state of New York, from where it spread throughout the United States and Canada. Chytridiomycosis is a lethal infection caused by *Batrachomyces dendrobatidis* in frogs and *B. salamndrivorans* in salamanders, leading to mass extinction of populations worldwide. The commerce of exotic animals is assumed to be the cause of the fungus' spread.

Keywords: Climate, Epidemiology, Travel, *Candida auris*, Dimorphic Fungi, Wildlife

SHORT BIOGRAPHY



After graduating in 1979 from the Faculty of Veterinary Medicine in Milan, Italy, I started working at the Laboratory of Bacteriology at the Kimron Veterinary Institute of Israel (Ministry of Agriculture). I did my PhD on ribosomal vaccines against dermatophytes at Tel Aviv University of Medicine, under the supervision of Prof. Esther Segal, and added veterinary mycology to the laboratory's activities. In the following years, I directed the laboratory and subsequently the Division of Bacteriological Laboratories at the institute. I retired in 2017. In addition, following the establishment of the Koret School of Veterinary Medicine, The Hebrew University, Jerusalem, I was in charge of teaching and organizing the courses of Veterinary Bacteriology and Veterinary Mycology, and was awarded the title of Associated Clinical Professor. My scientific activity focused on the epidemiology of bacterial and mycotic diseases in animals in Israel and antimicrobial resistance.

What Is Hiding in Sand and Seawater in Beaches: Impact on Human Morbidity

Segal E.[1]*

[1]*Gray Faculty of Medicine and Health Sciences, Tel Aviv University*

*segale@tauex.tau.ac.il

ABSTRACT

Studies on the microbial flora of beach sand and water of water bodies around the globe revealed that a variety of microbial species are detected, including fungi. Many of these fungi have a capacity to cause human infections, which may be of great significance for human health, such as the discovery of the antifungal-resistant *Candida auris*, isolated from a marine ecosystem. We focused on the Israeli Mediterranean Coast and surveyed six beaches from North to South: Haifa, Keisaria, Tel Aviv, Palmahim, Ashdot, and Ashkelon. In the study, fungal sand and water contamination were assessed with respect to possible impact on human health and well-being, focusing on three aspects:
(1) Fecal contamination, as judged by the presence of the gastrointestinal commensal, *Candida albicans*, other Candida spp., and Rhodotorula spp.
(2) Contamination by fungi known for involvement in dermal infections, such as dermatophytes or Candida.
(3) Presence in sand of various molds, such as Aspergillus, Penicillium, Fusarium, Mucorales, which may be causes of respiratory allergies, as well as a potential risk factor for invasive infections in immunocompromised individuals.
The great majority of the fungal isolates, 85% (196 out of 232), were isolated from sand, while only ~ 15% were in water. Both sand and water showed that the majority of the isolated fungi were molds: 83% and 92%, respectively. We assessed the susceptibility to antifungal drugs of the isolated yeasts and molds. The assays revealed that the yeasts and molds included resistant isolates. This was also noted by a technique that searches directly for resistant fungi. These studies indicate that monitoring the fungal flora of the maritime ecosystem is of significance for public health.

SHORT BIOGRAPHY

Prof. Esther Segal, Emer., Dep. of Clinical Microbiology and Immunology, Gray Faculty of Medicine and Health Sciences, Tel Aviv University, Israel. Teaching Medical Mycology to students of Medicine, Graduate and Post-Graduate students at Tel Aviv University, and online at international platforms. Prof. Segal's research over the years focused on pathogenesis and immunogenicity of Candida infections, involving experimental vaccinations with ribosomal Candida albicans particles. The current focus of Prof. Segal's research is on environmental fungi. Specifically, focusing on the maritime ecosystem of the Israeli Mediterranean Sea Coast with respect to human morbidity.

The Epidemiology of Wild Mushroom Poisoning in Israel

Lewinsohn D.[1]*, Lurie Y.[2,3], Gaon A.[1], Biketova A.Yu.[4,5], and Bentur Y.[2,3]

[1]Mycology Unit, Shamir Research Institute, University of Haifa, Kazerin, Israel; [2]Israel Poison Information Center, Clinical Pharmacology and Toxicology Section, Rambam Health Care Campus, Haifa, Israel; [3]Rappaport Faculty of Medicine, Technion – Israel Institute of Technology, Haifa, Israel; [4]Jodrell Laboratory, Royal Botanic Gardens, Kew, Richmond TW9 3DS, UK; [5]Institute of Evolution & Department of Evolutionary and Environmental Biology, University of Haifa, Aba Khoushi Ave. 199, Mt. Carmel, Haifa 3498838, Israel

*dalial@gri.org.il

Wild mushroom (macrofungi) picking has become a popular activity in Israel in the last years. Besides the estimated 135 edible species, the mycobiota of Israel also includes around 65 poisonous and potentially dangerous species. We conducted a long-term retrospective study to monitor the frequency, severity, seasonal character, species composition, and geographical distribution of mushroom exposure and poisoning in Israel. Using data collected by the Israel Poison Information Center in Rambam Health Care Campus, Haifa, during the years 2010–2021, we report that only 4% of cases of exposure to biologic agents were caused by mushrooms. Males were significantly ($P < 0.004$) more affected than females. Most cases involved either above 18 years of age (41%) or below the age of 6 years (39%). Most of the children under 6 years of age did not develop signs or symptoms of toxicity. During 2017–2021, 128 cases (82.5%) involved the consumption of raw mushrooms, mostly by children under 6 years of age. The most common season of mushroom exposure was rainy winters ($P < 0.05$). Mushrooms collected from irrigated lawns in the summer also posed a risk. Ingestion of Chlorophyllum molybdites was the leading cause of mushroom ingestion in summer, and that of Inocybe species in winter. Our study contributes to improved awareness of mushroom exposure and poisoning patterns among the Israeli population.

Keywords: *Amanita proxima*; *Chlorophyllum molybdites*; *Inocybe*; wild macrofungi

SHORT BIOGRAPHY

Dr. Dalia Lewinsohn, born in Tivon, Israel. Mycologist, emeritus researcher at the Shamir Research Institute. Graduated from the Faculty of Agriculture, specializing in plant diseases. She learned mycology from Prof. Avizohar Hershenzon, one of the pioneers of mushroom research in Israel. Has a master's degree from the Department of Forestry at the University of Idaho in the USA in the field of forest tree diseases. During her PhD at the Institute of Evolution, Haifa University, she studied the Pleurotus eryngii complex mushroom in Israel from the ecological, morphological, and genetic aspects. She published articles in many scientific journals and in various magazines. Chairman of the committee at the Academy of Languages at the Hebrew University that deals with giving common Hebrew names to wild mushrooms in Israel. A consultant for the Poisons Center at Rambam Hospital for over 26 years. The author of the three editions of the Carta Guide to Edible and Poisonous Mushrooms in Israel. Qualified tour guide and engaged in professional training of nature and mushroom tours, and a lecturer in this field. Dalia won the 2001 Rice Prize for Israeli Mushroom Research.

Development of Azole Resistance in the pathogenic mold *Aspergillus fumigatus*: New Insights

Osherov N.[1*]

[1]*Department of Clinical Microbiology and Immunology, Gray School of Medicine, Tel Aviv University*

*nosherov@tauex.tau.ac.il

ABSTRACT

Aspergillus fumigatus is the leading invasive mold pathogen in humans. The first line of treatment for invasive *A. fumigatus* infections is the triazole antifungals that inhibit Erg11/Cyp51 lanosterol demethylase activity, blocking ergosterol biosynthesis. In recent years, triazole resistance of *A. fumigatus* has been increasingly reported, both as a result of widespread agricultural use of fungicidal triazoles and long-term treatment in patients with chronic aspergillosis. To date, the most common triazole resistance mechanisms in *A. fumigatus* are alterations in the erg11A/ cyp51A gene or promoter, followed by overexpression of efflux pumps and mutations in hmg1, encoding HMG-CoA reductase. To identify novel triazole resistance mechanisms, we passaged *A. fumigatus* wild-type and cyp51A-null strains under increasing concentrations of voriconazole (0.25 µg/ml to 20 µg/ml) to generate resistant strains. Resistant isolates were whole-genome sequenced and compared to untreated controls. We identified known cyp51A and cyp51B mutations, and novel mutations in HMG1 and in previously uncharacterized genes in the ergosterol biosynthesis pathway, as well as several efflux pumps. We identified the contribution of each mutation to the resistance phenotype by reintroduction, alone and in combination, into the susceptible parental strain, using a novel seamless CRISPR-Cas9-based system we will describe. Our study identified novel genes conferring triazole resistance and helped outline the complex stepwise evolutionary paths by which *A. fumigatus* develops resistance.

SHORT BIOGRAPHY

Nir Osherov is a full Professor at Tel Aviv University, where he is Director of the Ella Kodesz Institute of Host Defense against Infectious Diseases, and Head of the BSc Program in Medical and Life Sciences. He received his Ph.D. in Biochemistry from the Hebrew University in Jerusalem, followed by a Postdoctoral Fellowship at MD Anderson Cancer Center and Baylor College of Medicine in Houston, Texas. He has authored over 100 research publications and reviews and is named a co-inventor in 3 patents. His research laboratory focuses on the Identification of novel virulence genes in the human pathogenic mold Aspergillus fumigatus, the identification of novel antifungal resistance mechanisms, and the development of novel antifungals. His approach integrates molecular biology, evolution, high-throughput screening, transcriptomics, and proteomics.

Genome-wide CRISPRi Exploration of Plant-derived Compounds for Antifungal Potential

Levi O.[1,2], Zuchman R.[1,2], Sleman N.[1,2], Khamaisi H.[1,2]

[1] *Faculty of Sciences and Technology, Tel-Hai Academic College, Upper Galilee 1220800, Israel*

[2] *MIGAL - Galilee Research Institute, Kiryat Shmona, 11016, Israel*

ABSTRACT

Fungal pathogens pose a major threat to human health and agriculture, compounded by rising resistance to existing antifungal agents. To identify new sustainable antifungal leads, we performed a high-throughput screen of 794 diverse plant extracts against *Candida albicans*. Dozens of extracts significantly inhibited fungal growth. Notably, extracts of *Tea seens* and *Gentiana lutea* reduced *C. albicans* proliferation by over 40%, indicating potent antifungal activity.

In addition, investigated the mechanism of action of a plant-derived phenolic, ferulic acid (FA). Using a genome-wide CRISPR interference (CRISPRi) screen, we identified 194 gene knockdowns that heightened FA sensitivity and 12 that conferred resistance. Notably, repression of the squalene synthase gene ERG9 conferred marked resistance to FA, implicating the ergosterol biosynthesis pathway in FA's activity. ERG9 knockdown upregulated the HMG-CoA reductase paralogs HMG1 and HMG2, consistent with FA targeting HMG1/2 and depleting ergosterol. Deep proteomic profiling of FA-resistant *Cochliobolus heterostrophus* strains further revealed conserved upregulation of ergosterol biosynthetic enzymes.

Functionally, FA synergized with fluconazole, reducing its MIC by ~8-fold in *C. albicans* and restoring susceptibility in azole-resistant strains. In planta assays demonstrated dose-dependent inhibition of *C. heterostrophus*, significantly reducing lesion formation on maize leaves.

Together, these findings establish FA as a plant-derived antifungal that disrupts conserved sterol biosynthesis, enhances azole efficacy, and suppresses fungal disease in planta. This integrated approach, combining plant extract discovery with genome-wide CRISPRi functional genomics and deep proteomics, provides a framework for identifying eco-friendly antifungals that could expand both clinical and agricultural toolkits.

SHORT BIOGRAPHY

I am a molecular biologist and Senior Lecturer at Tel-Hai Academic College, and head of a research group at MIGAL-Galilee Research Institute. My research focuses on antifungal resistance, genome-wide CRISPRi functional genomics, and the discovery of plant-derived antifungal compounds. I integrate experimental microbiology with high-throughput assays, proteomics, and transcriptomics to uncover genetic mechanisms of fungal stress responses and drug resistance. My team has identified synergistic interactions between natural plant compounds and clinical antifungals, including strategies that overcome azole resistance in *Candida albicans*. We also investigate antifungal activities of plant extracts in agricultural pathogens, aiming to expand the antifungal toolkit with sustainable, eco-friendly solutions.

Molecular Mechanisms Governing Aneuploidy-Mediated Azole Resistance in *Aspergillus flavus*

Sionov E.[1*], Barda O.[1], and Doron-Faigenboim A.[2]

[1]*Department of Food Science, Institute of Postharvest and Food Sciences, Agricultural Research Organization, Volcani Institute, Rishon LeZion, Israel*

[2]*Department of Vegetable and Field Crops, Institute of Plant Sciences, Agricultural Research Organization, Volcani Institute, Rishon LeZion, Israel*

*edwardsio@volcani.agri.gov.il

ABSTRACT

Aspergillus flavus is one of the leading causes of invasive and noninvasive aspergillosis, diseases with high rates of mortality in immunocompromised individuals. Additionally, *A. flavus* is one of the most significant agricultural pathogens, contaminating crops with aflatoxin, the most carcinogenic natural compound, resulting in billions of dollars in losses annually. Azole drugs are considered the most effective compounds in controlling *Aspergillus* infections both in clinical and agricultural settings. Emergence of azole resistance in *Aspergillus* spp. is typically associated with point mutations in *cyp51* orthologs that encode lanosterol 14α-demethylase, a component of the ergosterol biosynthesis pathway that is the target of azoles. We hypothesized that alternative molecular mechanisms are also responsible for the acquisition of azole resistance in filamentous fungi. We performed whole-genome sequencing (WGS) of selected lab-evolved strains following exposure to different azole agents that represent a wide range of azole-resistance and resistance-stability phenotypes in order to identify and characterize genomic changes, which manifested in different patterns of chromosomal instability. WGS of azole-resistant isolates revealed that *A. flavus* adapts to high azole concentrations by duplication of specific chromosomes or chromosomal regions. Interestingly, we noticed a dramatic decrease in the dosage of chromosome 6 in highly resistant clones, as well as other chromosomal aberrations, emphasizing the potential diversity of aneuploidy-mediated resistance mechanisms. It is noteworthy that all resistant strains reverted back to the original level of susceptibility after serial passages on drug-free PDA media. WGS data revealed that all reverted strains had lost aneuploidy and had normal chromosomal dosages. These results confirm that genomic plasticity through aneuploidy enables filamentous fungi to cope with azole-related stress. This finding is of global importance since acquired aneuploidy-mediated antifungal resistance may play a significant role in the failure of azole treatments to control fungal infections both in the clinic and in the field.

Keywords: *Aspergillus flavus*, azole antifungals, drug resistance

SHORT BIOGRAPHY

Dr. Edward Sionov received his PhD degree in microbiology from Tel-Aviv University, Israel, in 2006. There, he specialized in experimental treatments of systemic fungal infections in animal models. In 2007, he joined Dr. June Kwon-Chung's lab in the Laboratory of Clinical Infectious Diseases, NIAID, NIH, as a postdoctoral fellow. There, he studied molecular mechanisms of drug resistance in *Cryptococcus neoformans* to azole antifungal agents. Dr. Sionov is currently a Principal Investigator in the Agricultural Research Organization, Volcani Institute, Israel. His research focuses on the mechanisms of antifungal drug resistance, mechanisms and environmental conditions associated with the development of mycotoxigenic fungi and the production of mycotoxins in food and agricultural commodities, and the development of technologies for the reduction/elimination of mycotoxins in agricultural products.

MP65/ENO1 ratio as an indicator of pathogenicity in *Candida albicans* infection

Cohen Y.[1], and Marks R.S.[1*]

[1]*Avram and Stella Goldstein-Goren Department of Biotechnology Engineering, Ben-Gurion University of the Negev, Be'er-Sheva 84105, Israel*

*rsmarks@bgu.ac.il

ABSTRACT

Vulvovaginal candidiasis (VVC) is a frequently occurring infection of the lower female genital tract, caused by *Candida albicans,* for which women seek gynecological consultation. VVC diagnosis remains challenging due to the poor specificity of conventional gold-standard diagnostic methods, such as clinical symptoms, vaginal pH, and microscopy. Moreover, current diagnostic kits detect the presence of *Candida albicans* but fail to distinguish between its commensal and pathogenic forms, often resulting in misdiagnosis and inappropriate treatment. This study aims to determine whether the MP65/ENO1 ratio can serve as a novel biomarker for identifying the pathogenic form of *Candida albicans*. In vitro experiments using ELISA confirmed that the MP65/ENO1 ratio distinguished yeast from hyphal forms, and ROC curve analysis demonstrated excellent discriminatory power (AUC = 0.9907) with an optimal cutoff of 0.109, yielding 72.4% sensitivity and 94.4% specificity. Vaginal clinical samples were collected and analyzed to validate in vitro findings by comparing them with conventional diagnostic methods. Preliminary patient data (n=3) further supported its clinical relevance, as the microscopy-positive sample exhibited a distinctly elevated ratio, while vaginal pH and symptom profiles failed to differentiate infection status. These findings indicate that integrating the MP65/ENO1 ratio with conventional methods such as clinical symptoms assessment, pH testing, and microscopy offers an objective, quantitative parameter for improved diagnostic accuracy and reduced risk of misdiagnosis.

Keywords: Vulvovaginal candidiasis, *Candida albicans*, yeast, hyphae, MP65, ENO1.

SHORT BIOGRAPHY

Yahav Cohen is an M.Sc. biotechnology engineer specializing in clinical and diagnostic research, with a focus on the development of innovative detection methods for fungal infections. Her M.Sc. research centered on *Candida albicans*, exploring the MP65/ENO1 biomarker ratio as a novel indicator of pathogenicity. Her broader interests lie in translational biotechnology — integrating molecular biology and clinical applications to improve patient diagnostics and outcomes.

Comparison of Large Language Models to Identify Biomarkers for the Pathogenic Phase of *Candida albicans*

Narcross F.[1*], Cohen Y.[1] and Marks R.S.[1]

[1]*Avram and Stella Goldstein-Goren Department of Biotechnology Engineering, Ben-Gurion University of the Negev, Be'er Sheva, Israel*

*narcross@post.bgu.ac.il

ABSTRACT

The use of Large Language Models (LLMs) to identify biomarkers for the pathogenic phase of mycological infections is currently nonexistent, yet holds promise for assisting in the development of point-of-care tests for multiple medical mycological conditions. Here, we introduce a novel LLM-based approach that, when assisted by human expertise, can rapidly identify biomarker candidates suitable for further study in the development of point-of-care triage (POCT) kits. First, the approach queried 16 LLMs on a series of 8 issues focusing on the pathogenic phase of the fungus *Candida albicans*, known as vulvovaginal candidiasis (VCC). This condition affects approximately 75% of women in their lifetime. The questions ranged from basic questions about the LLMs' knowledge of the pathogenic and non-pathogenic presence of the fungi to designing a POCT kit suitable for establishing the pathogenic phase of *Candida albicans*. Notably, such a test kit does not exist in the marketplace. Second, the 270 pages of responses were then analyzed by an additional, high-performance LLM (Claude Sonnet 4.1), with verification performed by "human-in-the-loop" expertise. This method leveraged an optimized combination of both LLMs and human knowledge to deliver a final collection of biomarkers suitable for further studies to substantiate the recommendations before the development of POCT kits.

Keywords: Medical mycology, *Candida albicans*, vulvovaginal candidiasis, Artificial Intelligence, Generative AI, Large Language Models

SHORT BIOGRAPHY

Fredric Narcross is a PhD student in the Biosensors Laboratory of the Department of Biotechnology Engineering at Ben Gurion University of the Negev. Fredric's expertise is in biotechnology data analytics, data modeling, Artificial Intelligence, and Large Language Models (LLMs). His research focus is on knowledge discovery from shared biotechnology and biomedical data. Mr. Narcross also has strong interests in creating tools for modeling nervous systems at both the microscopic and macroscopic scales. For these efforts, Fredric has earned three patents, one patent pending, and several pertinent publications.

Study the Antifungal Activity of Anandamide Against *Candida* Species

Wolfson G.[1,2*], Sionov R.[1], Steinberg D.[1], Polacheck I.[2], Korem M.[2]

[1] *Institute of Biomedical and Oral Research (IBOR), Faculty of Dental Medicine, The Hebrew University of Jerusalem, Jerusalem 9112102, Israel.*

[2] *Department of Clinical Microbiology and Infectious Diseases, Faculty of Medicine, Hadassah-Hebrew University Medical Center, Jerusalem 9112001, Israel.*

*goldie.wolfson@mail.huji.ac.il

ABSTRACT

Candidemia, a bloodstream infection caused by *Candida* species, is the most prevalent fungal bloodstream infection globally and presents significant clinical challenges. While *Candida albicans* remains the primary causative agent, infections by azole-resistant non-*albicans* species such as *Candida glabrata* and *Candida parapsilosis* are increasingly reported. Moreover, *Candida auris*, a multidrug-resistant pathogen, has emerged as a serious global public health concern. These species possess unique resistance profiles and virulence traits, contributing to elevated morbidity and mortality rates.

In this study, we investigated the antifungal activity of the endocannabinoid N-arachidonoyl ethanolamine (anandamide, AEA) against multiple *Candida* strains. *C. albicans, C. glabrata, C. parapsilosis,* and *C. auris* were grown in the presence of AEA. Inhibition of planktonic growth was assessed by determining the minimum inhibitory concentration (MIC), colony-forming units (CFU) counts, and growth curve analysis. Biofilm formation was evaluated using the MTT metabolic assay, while ATP production was measured via the BacTiter-Glo luminescence assay. Biofilm architecture and cell viability were further examined using spinning disk confocal microscopy (SDCM). The synergic effect of AEA combined with fluconazole was assessed through checkerboard assays.

AEA treatment reduced MIC values for *C. glabrata* (32 µg/mL), *C. parapsilosis* (8-32 µg/mL), and *C. auris* (31-125 µg/mL). Growth curve and CFU analyses indicated that AEA reduced fungal growth. ATP and MTT assays demonstrated a dose-dependent reduction in metabolic activity, with *C. auris* strains exhibiting the most pronounced effect. SDCM imaging confirmed a decrease in total cell numbers and an increase in percent dead cells, along with an increase in cell size following treatment. Combination studies demonstrated partial synergy between AEA and fluconazole across multiple strains.

These findings suggest that AEA exhibits promising antifungal activity against various pathogenic *Candida* species. The results support further exploration of AEA as a potential therapeutic agent for the prevention and treatment of *Candida* infections.

Keywords: Candidemia, *Candida auris*, Multidrug-resistant, Endocannabinoids, Anandamide, Antifungal

SHORT BIOGRAPHY

Goldie Wolfson is a doctoral candidate at the Hebrew University of Jerusalem in the Faculty of Dental Medicine, Biomedical and Oral Research Institute. Her research focuses on the antimicrobial and antifungal effects of the endocannabinoid anandamide (AEA) on oral pathogens and several *Candida* species. Goldie has presented her work at national and international conferences and has received multiple awards for research excellence and teaching. She is passionate about bridging fundamental microbiology with clinical relevance and contributing to the development of innovative antimicrobial approaches.

Session 5 – Medicinal Macrofungi

Chair: Liudmila Kalitukha, Haim Leibovitzh

Mushrooms' Effects on Cancer Hallmarks

Haklai E[1,*]

Israel

*eshed.ha@gmail.com

ABSTRACT

The effects of mushroom-derived compounds on cancer cells and patients have been increasingly documented. Some mushroom-derived substances are even approved as medical treatments for cancer patients. Although the health benefits of mushrooms for cancer patients are known, the underlying biochemical pathways and mechanisms of action are rarely addressed. This lecture will present the 14 updated hallmarks of cancer (2022) and explore how mushrooms interact with them. Understanding the mechanisms through which mushrooms exert their effects is important for those who treat cancer patients (e.g., oncologists, practitioners of complementary medicine, etc.). This understanding may help improve the treatments patients receive.

Keywords: cancer hallmarks, medicinal mushrooms, integrative oncology, bioactive compounds

SHORT BIOGRAPHY

Eshed Haklai, M.Sc., N.D., Eng., is an R&D and regulatory manager in the cosmetics industry and a certified practitioner of complementary medicine, specializing in medicinal herbs and mushrooms. He is also a registered and licensed engineer in the field of pharmaceutical engineering. Eshed holds a B.Sc. in pharmaceutical engineering and an M.Sc. in chemistry from the Hebrew University of Jerusalem. He also earned a second M.Sc. in pharmaceutical science from the University of East London. In recent years, he has specialized in supporting cancer patients through integrative approaches.

Fomes fomentarius: from Tindermaker to Medicinal Mushroom

Kalitukha L.[1*]

[1]*Good Feeling Products GmbH, Germany*

liudmila.kalitukha@gfpsl.de

ABSTRACT

Fomes fomentarius, commonly known as tinder conk, hoof fungus, tinder polypore, etc., is a common sight in mature hardwood forests. The fungus infects trees through damaged bark, forming tough, hoof-shaped perennial fruiting bodies. Historically, people valued *F. fomentarius* for its ability to smolder for long periods, making it ideal for starting and transporting fire, or for cauterisation. In traditional medicine across many cultures, it was used to treat a range of conditions, including digestive issues, liver ailments, inflammation, and cancer. Scientific interest in this fungus was sparked in 1974, following the discovery of red-brown pigments in its upper layer. Since then, curiosity has only grown. Researchers have explored its taxonomy, chemical composition, ecological roles, and, most notably, its potential medicinal uses. Today, *F. fomentarius* is being studied for a wide range of health-related benefits. These include modulating the immune system, regulating blood sugar and cholesterol, and binding and removing heavy metals, dyes, and radioactive substances. Promising antimicrobial, antiviral, anti-inflammatory, antioxidant, thrombolytic, anxiolytic, anticancer, and pain-relieving properties have been observed in laboratory experiments and small-scale clinical studies. The water-insoluble cell walls purified from the *F. fomentarius* fruiting bodies and marketed as a dietary supplement were particularly effective in cases of chronic, recurring, and multifactorial diseases. These positive results highlight the potential of tinder fungus supplementation as one of the promising natural ways to enhance quality of life.

Keywords: *Fomes fomentarius*, tinder fungus, medicinal mushroom, dietary supplement, quality of life

SHORT BIOGRAPHY

Dr. Liudmila Kalitukha is the Head of the Research and Development Center at Good Feeling Products GmbH in Germany. Her current activities focus on research, development, quality assurance, and the production of advanced mushroom products. Dr. Liudmila Kalitukha is a certified safety assessor for cosmetics and a member of the Scientific Advisory Board of the NEM Association (NEM e.V.). She is also a council member of the International Society for Medicinal Mushrooms (ISMM) and a member of the Editorial Board of the International Journal of Medicinal Mushrooms (IJMM).

Cost-Effectiveness of Mushrooms in Depression

Mark JC Nuijten[1,2]*

[1]*A2M, The Netherlands*

[2]*Ben-Gurion University, Israel*

*mark@a2m.nl

There is clinical evidence that psilocybin-containing "magic mushrooms" and extracts thereof can have therapeutic effects for which we applied standard health technology assessment (HTA) criteria (clinical benefit and cost-effectiveness) for the treatment of depression. A meta-analysis (2024) found a significant clinical benefit of psilocybin compared to placebo for reducing depression scores. Most clinical studies report that psilocybin is reasonably safe with only transient adverse events (e.g., headaches). The cost-effectiveness was assessed for the use of psilocybin-assisted psychotherapy (PAP) in patients with treatment-resistant depression and severe depression in the UK. PAP could be cost-effective versus conventional therapy under certain assumptions: when the cost of therapist support is reduced (50% lower) and when the price of psilocybin per person is moderate (e.g., £400-£800). Under these conditions, the incremental cost-effectiveness ratios (ICERs) fall into ranges that are acceptable under usual UK thresholds (£20,000 to £30,000 per QALY). The analyses are sensitive to perspective: whether only direct health care costs are counted, or also indirect costs (productivity gains/losses, social costs). The conclusion is that HTA criteria can be applied to medicinal mushrooms, such as psilocybin, which fulfill the requirements for clinical benefit and cost-effectiveness. Consequently, the reimbursement of psilocybin by the payer instead of the cost for the patient could be justified from a clinical and health economic perspective.

Keywords: mushroom, cost-effectiveness, health technology assessment, depression

SHORT BIOGRAPHY

Mark Nuijten is a medical doctor, health economist, valuation economist, and healthcare journalist. Mark is a leading health policy and economics expert since last two decades, reflected in more than 200 publications and leading positions in scientific societies and editorial boards. Mark was Board Director of ISPOR (2002-2004) and Chair of the Management Board of Value in Health (2002-2004). He was a member of the Editorial Advisory Board of Value in Health. He obtained his PhD in health economics (2003) on the thesis "In search for more confidence in health economic modelling" at Erasmus University, Rotterdam. Mark is the founder of A2M (Ars Accessus Medica), a founding partner of the Minerva International Health Economic Network, and a past partner with MEDTAP International. As a VP Business Development for Europe, he established global Pricing and Reimbursement Consultancy Services for MEDTAP. Before his MEDTAP period, Mark was the founding Managing Director of the IQVIA Quintiles office in the Netherlands, which included European responsibility for the policy and health economic division. He supervised PhD theses at the Universities of Maastricht and Groningen in the Netherlands, and since 2022, a Visiting Professor at Ben-Gurion University in Israel.

Fungal Names Matter: The Critical Role of Nomenclature in Medicinal Macrofungi Research and Applications

Biketova A. Yu.[1, 2, 3]*, Sarala G.P.[3]

[1]*Myco Expert, London, UK*

[2] *Association of Wild Fungi of Israel, Pardesiya, Israel*

[3] *Jodrell Laboratory, Royal Botanic Gardens, Kew, UK*

*alyona.biketova@gmail.com

ABSTRACT

Fungal taxonomy and nomenclature are often undervalued in applied mycology and the fungi-based industry, yet they are essential for the accuracy, safety, reproducibility, and standardisation of medicinal macrofungi (MM) studies. As the global demand for fungal-derived nutraceuticals and medicines grows, proper fungal identification, nomenclature, and consistent product labeling are indispensable. Adulteration of MM products can have severe health consequences for consumers, as reported in the literature. Sometimes mislabeling happens on purpose when rare and expensive species are exchanged with similar-looking, cheaper ones, like in the case with *Ophiocordyceps sinensis* vs. *Cordyceps militaris*, which have a 60–4,000 times price difference. A striking example of non-existent species name use is *Pleurotus "florida"*, which has a large commercial distribution and appears frequently in literature on cultivated and medicinal mushrooms. This name was introduced by Eger (1965), but was never published nor intended as a binomial. Different strains of *Pleurotus* "*florida*" were found to be *P. pulmonarius* and *P. ostreatus*. A particularly widespread misconception concerns Asian reishi mushrooms, which are commonly labeled as *Ganoderma lucidum*. However, molecular studies have shown that most cultivated medicinal reishi corresponds to *G. sichuanense* J.D. Zhao & X.Q. Zhang (=*G. lingzhi*), while *G. lucidum* is a European species that was originally described from the UK. Our tests of commercial strains and 25% ethanol tinctures (European) of reishi show that all of them belong to *G. sichuanense*. Likewise, *Agaricus subrufescens* Peck (=*A. blazei* auct. non Murrill), originally described from North America in 1894, is still widely marketed as *A. blazei* Murrill – a wrongly attributed name, causing persistent inconsistencies in both commercial and scientific contexts. Accurate fungal nomenclature ensures consistent identification of bioactive compounds and traceability in research, cultivation, and trade, as well as supports regulatory alignment and clear communication across sectors.

Keywords: fungal nomenclature, medicinal mushrooms, food supplements, cross-sector standardisation, applied mycology, *Ganoderma*

SHORT BIOGRAPHY

Dr. Alona Yu. Biketova is a mycologist, molecular biologist, and biotechnologist, as well as an R&D and business consultant (Myco Expert). She is a research leader and collaborator on multiple international projects: taxonomy and biodiversity of *Boletales* worldwide, methods of molecular and morphological ID of fungi, species concepts and evolution of *Agaricomycetes*, as well as medicinal macrofungi and authentication of nutraceuticals. She is a convenor of the Intentional Workgroup on the Taxonomy of Boletales (ICTF); a member of the International and European Mycological Associations, International Society for Medicinal Mushrooms, Association of Wild Fungi of Israel, British Mycological Society, etc. Dr. Biketova is a true woman of the world with international experience living and working in five countries: Ukraine, Israel, Hungary, Serbia, and the UK.

A Mushroom-Based Prebiotic Supplement Pilot Study among Patients with Crohn's Disease

Leibovitzh H.[1,2], Fliss Isakov N.[1,3], Werner L.[1,2], Thurm T.[1,2], Hirsch A.,[1,2] Cohen N.A.[1,2], and Maharshak N.[1,2*]

[1]*IBD Center, Department of Gastroenterology and Liver Diseases, Tel Aviv Sourasky Medical Center, Tel Aviv, Israel*

[2]*Faculty of Medical and Health Sciences, Tel Aviv University, Tel Aviv, Israel*

[3]*Department of Health, School of Public Health, Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel*

*nitsanm@tlvmc.gov.il

ABSTRACT

Data on a mushroom-based prebiotic supplementation in patients with Crohn's disease (CD) in the Western population is scarce. In this pilot trial, we aimed to assess the clinical efficacy and fecal microbial compositional and functional alterations associated with 'Mycodigest,' a commercial prebiotic supplement composed of three mushroom extracts. Patients with mild to moderate CD were recruited to a single-center, randomized, double-blind, placebo-controlled pilot induction trial. Clinical efficacy using the Harvey-Bradshaw index and biochemical response using C-reactive protein and fecal calprotectin were assessed at week 8 post-intervention. Fecal samples were assessed by DNA shotgun metagenomic sequencing. A multivariable linear mixed effects model was used to assess alteration in fecal microbiome composition and function pre- and post-'Mycodigest' intervention. Clinical response was higher in the 'Mycodigest' intervention (N=10) compared to the placebo (N=6) group (80 vs. 16.7%, respectively, p=0.035). There were no differences in terms of biochemical response within each group pre- and post-intervention. Post-'Mycodigest' intervention, 25 species were found to be differentially abundant compared to baseline, including an increase in short-chain fatty acid-producing bacteria, such as Parabacteroides distasonis (Beta coefficient 0.92, 95% Confidence interval [CI] 0.36–1.47) and Faecalimonas umbilicata (Beta coefficient 0.57, 95% CI 0.23–0.90). Two microbial pathways related to the metabolism of isoprenoid compounds were increased post-'Mycodigest' intervention. Mushroom-based prebiotic supplementation in subjects with CD resulted in clinical improvement, which may be related to post-intervention favorable compositional and functional microbial alterations.

Keywords: Medicinal Mushrooms, Crohn's Disease, Prebiotics, Gut Microflora

SHORT BIOGRAPHY

Dr. Haim Leibovitzh is a gastroenterologist at the Tel Aviv Medical Center's inflammatory bowel disease unit. He completed his post-doctoral research fellowship at Mount Sinai in Toronto. His research focuses on the role of the microbiome and multi-omics approaches in understanding both pre-disease and disease states of inflammatory bowel diseases. His work has been published in high-impact journals.

Clinical and Economic Valuation of Medical Innovation: Application to Mushrooms in Stroke

Mark JC Nuijten[1,2]*

[1]*A2M, The Netherlands*

[2]*Ben-Gurion University, Israel*

*mark@a2m.nl

Medical innovation pricing is constrained by the incremental cost-effectiveness ratio, a central factor in value-based pricing, with in the Netherlands a willingness-to-pay threshold of £20,000 to £30,000 per QALY. To counter perceptions of excessive pricing, we developed the Integrated Valuation Model—a tool that supports both early-phase valuation and late-stage pricing of medical innovations in reimbursement policy by integrating economic valuation principles, including expected free cash flows and the cost of capital, to support pricing decisions. It justifies prices of medical innovation that exceed conventional ICER thresholds by demonstrating financial viability, particularly for treatments with high development costs and small patient populations. The model enables scenario analysis and collaborative parameter adjustments with governments, maintaining conservative assumptions to ensure credibility. It has been applied successfully in EU countries, aiding companies in market access, price negotiations, and strategic development. The model supports stakeholders such as medical professionals and patient advocacy groups in ensuring timely access to innovative therapies. Transparent government involvement further enhances the model's legitimacy, promoting fair pricing and sustainable reimbursement for orphan drugs, herein demonstrated for psilocybin-containing mushrooms for treatment in post-stroke treatment (POC4Triage).

Keywords: mushroom, cost-effectiveness, health technology assessment, stroke

SHORT BIOGRAPHY

Mark Nuijten is a medical doctor, health economist, valuation economist, and healthcare journalist. Mark is a leading health policy and economics expert since last two decades, reflected in more than 200 publications and leading positions in scientific societies and editorial boards. Mark was Board Director of ISPOR (2002-2004) and Chair of the Management Board of Value in Health (2002-2004). He was a member of the Editorial Advisory Board of Value in Health. He obtained his PhD in health economics (2003) on the thesis "In search for more confidence in health economic modelling" at Erasmus University, Rotterdam. Mark is the founder of A2M (Ars Accessus Medica), a founding partner of the Minerva International Health Economic Network, and a past partner with MEDTAP International. As a VP Business Development for Europe, he established global Pricing and Reimbursement Consultancy Services for MEDTAP. Before his MEDTAP period, Mark was the founding Managing Director of the IQVIA Quintiles office in the Netherlands, which included European responsibility for the policy and health economic division. He supervised PhD theses at the Universities of Maastricht and Groningen in the Netherlands, and since 2022, a Visiting Professor at Ben-Gurion University in Israel.

Day 3 – Tuesday, 9 Dec 2025

Mushroom Foray & Mushroom Farms Tour

Day 4 – Wednesday, 10 Dec 2025

Session 6 - Fungal Taxonomy & Diversity

Chair: Alona Yu. Biketova, Segula Masaphy

The Plasticity Within the *Morchella* Genus: Species Identification, Habitats, and Trophic Mode

Masaphy S.[1,2*]

[1] *Tel-Hai College*

[2] *Applied Mycology Lab, MIGAL - Galilee Research Institute, Kiryat Shmona*

*segula@migal.org.il

ABSTRACT

Morels (*Morchella* species) are important edible mushrooms, known primarily for their distinctive aroma and taste. They have a global distribution and have been studied extensively around the world, but less in Israel. The genus is estimated to include more than 80 different species globally. In recent years, we have focused on investigating morel mushroom life, including studying the morel populations in Israel. This work showed high habitat diversity, high phenotypic diversity, and high nutritional mode diversity. These characteristics affect both taxonomy and chemical composition. Phenotypic-related identification has shown complexity and difficulties in getting a clear distinction between species, due to high phenotypic flexibility, where mushrooms of the same species are highly polymorphic, as to their color and head shape. Hence, the use of molecular means was exploited to overcome the phenotypic plasticity by using the internal transcribed spacer (ITS) region within the nuclear ribosomal DNA and partial LSU (28S) gene sequencing.

Keywords: Genotypic identification, *Morchella*, Morel, Phenotypic plasticity, Taxonomy, Trophic mode.

SHORT BIOGRAPHY

Prof. Segula Masaphy is a lecturer at Tel Hai College and an emeritus scientist from Migal-Galilee Research Institute in Kiryat Shmona. Prof. Masaphy specializes in the field of applied mycology. Along with research work, Prof. Masaphy served as scientific head of "The Water and Food Microbiology Service Lab" at Migal and as Head of "The Food Sciences Studies" department at Tel Hai College. Her research focused on different aspects of the fungal world, especially mushroom-producing fungi, including research into the environmental conditions affecting edible mushroom growth and fruiting (Agaricus, Pleurotus, Shiitake, Volvariella, Morchella), fungal-bacteria relationships, biotransformation and biodegradation of pollutants by higher fungi, fungal oxidative enzymes, bioactivity of fungal mycelium and fruitbodies, fungal ecological aspects and effect of forest management on soil fungi biodiversity. In recent years, her research has focused on the ecology and biotechnology of mushrooms: biodiversity, cultivation, bioactive compounds, and more.

How to Describe a New Species of Fungi in 2025

Biketova A. Yu.[1, 2, 3]*

[1]*Myco Expert, London, UK*
[2] *Association of Wild Fungi of Israel, Pardesiya, Israel*
[3] *Jodrell Laboratory, Royal Botanic Gardens, Kew, UK*
*alyona.biketova@gmail.com

ABSTRACT

Describing a new fungal species requires an integrative taxonomic approach and strict compliance with the International Code of Nomenclature for algae, fungi, and plants (ICN).
And what is a fungal species? There is no universal species concept for fungi. However, all of them consider one or several fundamental criteria: genealogical coherence (in particular, monophyly), phenotypic distinctiveness, and reproductive isolation. Therefore, the set of requirements for publishing a new species cannot be absolutely universal for all groups of fungi. Minimally accepted evidence for a new species could include (but is not limited to): macro- and micromorphology, single-, multi-locus DNA analyses or phylogenomics, metabolic or proteomic data, physiology, ecology, biogeography, mating studies, or taxon-specific approaches.
Formal requirements for the description of fungal species according to the ICN have not undergone significant changes over the past decades. The main requirements are: 1) a Latin legitimate binomial name; 2) a Latin or English diagnosis (description) of the species or a reference to a previously and effectively published diagnosis; 3) a designated holotype; 4) to meet requirements for effective publication. Since the Melbourne Code (2011), it is required to register a new name in any recognized repository (Index Fungorum, MycoBank, or Fungal Names). And the new Madrid Code (2025) requires that all new typification acts for fungi must also be registered.
More detailed information on how to describe fungal species from specimen collection to publication will be presented using examples of species described from Israel by the author and her co-authors: *Amanita exilis* Loizides, Biketova, Bellanger & P.-A. Moreau (Crous et al. 2021), *Cyanoboletus mediterraneensis* Biketova, A.C. Rinaldi & Simonini (Biketova et al. 2022), and *Hortiboletus hershenzoniae* Biketova & Wasser (Biketova et al. 2025).

Keywords: fungal taxonomy, nomenclature, species concepts, biodiversity of fungi, Madrid Code (ICN)

SHORT BIOGRAPHY

Dr. Alona Yu. Biketova is a mycologist, molecular biologist, and biotechnologist, as well as an R&D and business consultant (Myco Expert). She is a research leader and collaborator on multiple international projects: taxonomy and biodiversity of Boletales worldwide, methods of molecular and morphological ID of fungi, species concepts and evolution of Agaricomycetes, as well as medicinal macrofungi and authentication of nutraceuticals. She is a convenor of the Intentional Workgroup on the Taxonomy of Boletales (ICTF); a member of the International and European Mycological Associations, International Society for Medicinal Mushrooms, Association of Wild Fungi of Israel, British Mycological Society, etc. Dr. Biketova is a true woman of the world with international experience living and working in five countries: Ukraine, Israel, Hungary, Serbia, and the UK.

Diversity and Agricultural Potential of Truffles (Tuberaceae, Pezizales) in Israel

Masaphy S.[1,2], Biketova Yu. A.[3,4,5]*, Ezov N.[1], Azoulay L.[6], Kagan Zur V.[7], Zabari L.[1], Luzzati Y.[8], Levanon D.[1], Segal Y.[9], Danay O.[1], and Pereman I.[1]*

1Migal-Galilee Research Institute, Kiryat Shmona 11016, Israel 2Tel Hai College, Upper Galilee 12210, Israel 3Institute of Evolution and Department of Evolutionary & Environmental Biology, University of Haifa, Aba Khoushi Ave. 199, Mt. Carmel, Haifa 3498838, Israel 4Institute of Biochemistry, Biological Research Centre of the Eötvös Loránd Research Network, Temesvári Blvd. 62, Szeged H-6726, Hungary 5Mycological Society of Israel, P.O. Box 164, Pardesiya 42815, Israel6 Plant Protection Unit, Northern R&D, Migal-Galilee Research Institute, Kiryat Shmona 11016, Israel7 Department of Life Sciences, Ben-Gurion University of the Negev, Beer-Sheva 84105, Israel8 Kibbutz Bar'am, M.P. Merom Hagalil 13860, Israel 9Ways of Fungi, D.N. Mereom Hagalil, 1380600, Abirim, Israel.

*idanpe@migal.org.il, alyona.biketova@gmail.com

ABSTRACT

Israel, which forms a unique geographical bridge between three continents, harbors a relatively large number of fungal species due to its wide range of ecosystems. Among the hypogeous fungi, species of the family *Tuberaceae* have been observed in various habitats, and while some are native species, some are hypothesized to be newly introduced, including edible ones with agricultural commercial potential. Here, we provide a reassessment of the biodiversity of the family *Tuberaceae* in northern Israel. We report the genus *Reddellomyces* for the first time in Israel, as well as five new species of *Tuber* in Israel: *T. aff. excavatum, T. aff. lusitanicum, T. lyonii, T. aff. pulchrosporum,* and *T. aff. zambonelliae*. We also provide the assessment of the commercial potential of cultivating *Tuber aestivum* in Israel. The latter was introduced in an oak orchard in northern Israel and was coincidentally found in abundant numbers at a pecan tree (*Carya illinoinensis*) grove about 3.5 km away. Beginning in 2013, *T. aestivum* ascocarps were collected seasonally at the site, making it the first reported pecan grove in Israel yielding European summer truffles. This observation has led to the active inoculation of *T. aestivum* mushrooms in a pecan model plot, which has yielded ascocarps as early as 4 years following its establishment. Altogether, the study shows the richness of the family *Tuberaceae* in northern Israel and further emphasizes the commercial potential of *T. aestivum* and potentially other naturally occurring truffles for intercropping orchards.

Keywords: Tuber Biodiversity, Reddellomyces, Mushroom Cultivation, Ectomycorrhizal Fungi, Mycorrhizal Inoculation

SHORT BIOGRAPHY

Idan Pereman's group from MIGAL – Tel-Hai focuses on the biology and biotechnology of fungi, with emphasis on medicinal mushrooms, alternative proteins, and truffles. Their work on medicinal mushrooms, particularly Hericium species, investigates how cultivation conditions shape metabolic and transcriptomic pathways involved in the production of bioactive and neuroprotective compounds. In the field of alternative protein, the group studies edible and cultivated fungi as sustainable nutrient sources, analyzing how substrates and growth parameters influence protein content and nutritional quality. Research on truffles (Tuberaceae) focuses on their ecology and diversity in northern Israel and the implementation of intercropping systems for the cultivation of black truffles, aiming to advance sustainable truffle production in local agricultural settings.

Evaluating Expert and Community Survey Methodologies for Macrofungal Monitoring in Israel

Bar Shmuel N.[1,2]*, Livne-Luzon S.[3], Klein T.[3], Malkinson D.[1,2]

[1] *Shamir Research Institute, Katzrin, Israel*

[2] *University of Haifa, Haifa, Israel* [3] *Weizmann Institute of Science, Rehovot, Israel*

*nitsanber@gmail.com

ABSTRACT

Although hundreds of macrofungal species are known from Israel, long-term datasets and standardized protocols for monitoring their fruiting bodies are lacking, making it difficult to evaluate their ecological and management impacts. In this study, we examined the integration of expert surveys with community-based observations to establish a robust methodology for monitoring fruiting bodies. Our goal was to identify the expert survey method most suitable to serve as a reliable ground truth for richness and abundance, and as a benchmark for validating citizen-science data. During the winter of 2023–2024, expert surveys were conducted in the Carmel coastal forest using two approaches: spatial surveys and line transects. Both yielded hundreds of observations and nearly one hundred species. Spatial surveys consistently provided a broader representation of the fungal community than transects. When combined with iNaturalist and Facebook records, the dataset nearly doubled in size, increasing both the number of observations and the overall species pool. Comparative analyses revealed that spatial surveys produced seasonal patterns and diversity indices more consistent with community-based data, while transects generated a distinct and less comparable structure. Analyses of richness, diversity, and family-level multivariate patterns all supported the conclusion that spatial surveys are the stronger ground truth. Our findings highlight a substantial overlap between expert surveys and community-based records, while emphasizing differences in the level of ecological detail provided. Selecting an appropriate expert method involves a trade-off: prioritizing comparability and validation of the much larger volume of citizen-science data may come at the cost of reduced ecological resolution. Nevertheless, such integration offers a powerful approach to monitoring macrofungal fruiting body diversity at larger scales.

Keywords: Citizen Science, Macrofungal Monitoring, Community-Based Data, Biodiversity Assessment

SHORT BIOGRAPHY

Nitsan Bar-Shmuel is an ecologist and doctoral candidate at the University of Haifa's School of Environmental Sciences, under the supervision of Prof. Dan Malkinson and Prof. Tamir Kleime. Her research focuses on macrofungal fruiting bodies, examining how spatial and climatic variables shape seasonal and geographic patterns of fungal diversity in Mediterranean ecosystems. She combines intensive field surveys with citizen-science data sources to develop robust methodologies for monitoring fungal communities. Nitsan has extensive experience in ecological research across Israel and has worked in multiple research laboratories and field programs. In addition to her academic work, she is deeply engaged in public science outreach, coordinating citizen-science initiatives, environmental education programs, and community-based monitoring projects. Her approach bridges rigorous ecological research with public engagement, supporting both scientific understanding and practical conservation of Israel's fungal biodiversity.

The Effect of Forest Thinning Regimes on Underground Fungal Taxonomic and Functional Diversity

Masaphy S.[1,2*], Levi N.[1,2], Zabari L.[1], Orlofsky E.[1]

[1] *Tel-Hai College*

[2] *Applied Mycology Lab, MIGAL - Galilee Research Institute, Kiryat Shmona*

*segula@migal.org.il

ABSTRACT

The Fungal kingdom is critically important for forest and environmental health. The effect of mature pine forest thinning on soil characteristics and fungi was studied at a long-term ecological research (LTER) station located in the Jerusalem Mountains. Tree thinning in 2009 created plots with varied tree densities: dense, medium, low, fully cleared, and an unplanted control plot. In Spring 2020, the soil was characterized for moisture, pH, organic matter, and fungal biodiversity (ITS sequencing) from three plots of each treatment. Moisture and OM increased with increasing forest density, while pH decreased in the tree-bearing soil. Fungal diversity was highest in the clear-cut plots, while the low-tree-density plots lost 12% of the genera present at <1% abundance compared to other forested plots. Higher fungi (Ascomycota and Basidiomycota) dominated in pine-forested plots (60-70%), while lower fungi (Chytridiomycota, Mucoromycota) and unidentified fungi were more abundant in non-forested plots (55-65%). The variance in symbiotic fungi abundance was significantly higher in forested plots, while saprotrophic fungi were more common in plots without mature pine trees. Ectomycorrhizal fungi were dominant in all forested plots, mainly *Sebacina epigaea* or *Inocybe sp.*, while endophyte-plant saprotrophs and pathotrophs, e.g., *Mortierella alpina* were more dominant in plots without mature trees. These results suggest that intense thinning has long-term negative effects on total diversity while complete tree removal slowly transitions fungal communities to never-planted areas. Further studies on the high internal diversity of forested plots are needed to understand the partitioning of symbiotic Fungi in the wooded and trimmed areas.

Keywords: Forest health, *Pinus halepensis*, Soil fungal biodiversity, Thinning, Trophic mode.

SHORT BIOGRAPHY

Ezra Orlofsky, a native New Yorker, earned his PhD in the Zuckerberg Institute of Water Research of the Albert Katz International School of Desert Studies in Ben Gurion University (Sde Boqer). The unique blend of science at the edge of scarcity and sustainability strongly influenced Dr. Orlofsky's career. Beginning with wastewater treatment using constructed wetlands, he went on to study various nature-based processes and is now an independent science consultant working with water treatment and ecological research. For more information, please visit **www.coensci.org**.

Session 7 – Ecology of Fungi

Chair: Idan Pereman

The Metabolic Interactions Between the Black Soldier Fly and Fungi from Its Gut and Environment

Opatovsky I.[1,2*] and Ben-Mordehchai L.[1,2]

[1]*Department of Animal Science, Faculty of Science, Tel-Hai Academic College, Tel-Hai, Israel*

[2]*Department of Nutrition, MIGAL, Kiryat Shmona, Israel*

*itaio@migal.org.il

ABSTRACT

Information on the nutritional contribution of fungi located in insects' guts on their hosts is still scarce and fragmentary. Our research model is the black soldier fly (Hermetia illucens, BSF), a cosmopolitan species that thrives in rotten organic matter. Therefore, it is hypothesized to interact with the microorganism community in its surroundings. The most common fungi in the BSF environment (household compost bins) were found to be Candida tropicalis, which, when supplemented to the larvae feeding substrate, increased the larval weight. This research further investigated whether the metabolic effect of the Candida on the BSF is directly, through consumption, or indirectly, through metabolic changes in the substrate. The larvae that were supplemented with C. tropicalis displayed an increase in the fatty acid biosynthesis pathway, due to an increase in the palmitic and myristic acids that are abundant in the fungi. In addition, the presence of C. tropicalis in the substrate caused an increase in threonine, leucine, and isoleucine in the larvae and may affect larval weight through the Target of Rapamycin (TOR) pathway. This study suggests two mechanisms underlying the nutritional effect of fungi on BSF larvae. The first involves direct digestion of fungi or nutrients that are extracted by fungi in the insect gut, while the other implies an indirect fungal effect due to the digestion of the feeding substrate and extraction of nutrients in the substrate.

Keywords: *Candida tropicalis*, *Saccharomyces cerevisiae*, Symbiotic interactions, Diptera

SHORT BIOGRAPHY

Dr. Itai Opatovsky studies insect nutrition and metabolism at Tel-Hai Academic College and MIGAL Research Institute. Part of his research deals with fungal occurrence in the gut and surrounding areas of insects and how it affects the insect's metabolism and immune system. In addition, part of his work studies the effect of fungi on the colonization of the insect in novel patches.

Context Dependency in Diverse Effects of Common Mycorrhizal Networks

Livne-Luzon S.[1*], Klein T.[1]

[1]*Department of Plant and Environmental Sciences, Weizmann Institute of Science, Israel*

*stavl@weizmann.ac.il

ABSTRACT

Although gaining much attention in recent years, it is unclear whether mycorrhizal fungi distribute meaningful amounts of resources among trees in ways that increase the fitness of the receiving trees. To this end, we performed several experiments, including shaded and non-shaded pairs of inter- and intra-species *Pinus halepensis* and *Quercus calliprinos* saplings growing outdoors in forest soil. The effects of belowground connections were examined by tree performance and non-structural carbohydrates (NSC) pools. Additionally, we monitored the carbon (C) flow from a $^{13}CO_2$-labeled donor tree to the final recipient tree. We were able to demonstrate belowground C transfer, most prominently from pines to shaded oaks, and identify the main fungal symbionts involved in C transfer by DNA stable isotope probing (DNA-SIP). Collectively, our findings indicate that the effects of belowground C transfer are evidently context-dependent, and they manifest in nuanced alterations in plant NSC that are not readily apparent through conventional growth metrics.

Keywords: belowground, carbon, ectomycorrhiza, DNA-SIP, labeling

SHORT BIOGRAPHY

Dr. Stav Livne-Luzon is an ecologist at the Weizmann Institute of Science, Israel, with expertise in fungal ecology and plant–fungi interactions. Her research focuses on the ecological roles of mycorrhizal fungi in seedling establishment, symbiosis, and carbon transfer through mycorrhizal networks, particularly in Mediterranean and semi-arid environments. She has led multiple interdisciplinary projects combining fieldwork, molecular tools, and ecological modeling to better understand the ecological role of mycorrhizal networks under lab and natural conditions.

Richness, Community Structure, and Spatial Autocorrelation of Soil Fungi Along a Sharp Aridity Gradient in Monodominant Pine Forests

Shemesh H.[1*], Klein T.[2], Hibner A.[1], Herol L.[3], Truong C.[4], Livne-Luzon S.[2]

[1] *Tel-Hai College, Department of Environmental Sciences, Israel*

[2] *Department of Plant and Environmental Sciences, Weizmann Institute of Science, Israel*

[3] *Mitrani Department of Desert Ecology, Swiss Institute of Dryland, Environmental and Energy Research, Jacob Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev, Midreshet Ben-Gurion, Israel*

[4] *Royal Botanic Gardens Victoria, Melbourne, VIC, Australia*

*hagaish@telhai.ac.il

ABSTRACT

Understanding how aridity shapes fungal communities is essential for predicting ecosystem responses to climate change. Monodominant forests of Aleppo pine (*Pinus halepensis*) occurring along a steep precipitation gradient offer the opportunity to test the effect of aridity on distance decay patterns of soil fungi, without the confounding effects of vegetation. We conducted nested soil sampling in four Mediterranean, two semi-arid, and three arid forests along an aridity gradient (250-800 mm annual precipitation) and examined the distance decay patterns of saprotrophic (SAP) and ectomycorrhizal (ECM) fungi at different spatial scales. ITS2 soil metabarcoding revealed that both fungal richness and diversity increased with precipitation. Fungal communities showed significant spatial autocorrelation at multiple scales, with stronger distance decay patterns in Mediterranean than arid forests. ECM and SAP communities in arid sites were largely subsets of the Mediterranean climate communities. Stochastic assembly processes dominated under mesic conditions, while deterministic processes prevailed in arid regions, particularly for ECM fungi. Our results demonstrate that aridity can reduce fungal richness and stochasticity, and that climate can structure fungal communities independently of vegetation. This study highlights the need to consider scale-dependent ecological processes and emphasizes the role of climate, beyond vegetation, in shaping the assembly of fungal communities in forest soils.

Keywords: climate change, distance-decay, ectomycorrhiza, *Pinus halepensis*, precipitation, saprotrophs.

SHORT BIOGRAPHY

Hagai Shemesh, Tel-Hai University. I am a plant ecologist with an interest in ectomycorrhizal interactions. My interests focus on the manner in which ectomycorrhizal fungi facilitate tree seedling establishment under stressful conditions, such as drought and competition.

Hidden Fungal Communities in Desert Rocks and Their Role in Bioweathering

Rabbachin L.[1], Nir I.[2,*], Waldherr M.[3], Vassallo Y.[4], Guadalupe P.[1], Graf A.[3], Kushmaro A.[2], and Sterflinger K.[1]

[1]*Institute of Natural Sciences and Technology in the Arts (INTK), Academy of Fine Arts Vienna, Vienna, Austria.*

[2]*Environmental Biotechnology Laboratory, Avram and Stella Goldstein-Goren Department of Biotechnology Engineering, Ben-Gurion University of the Negev, Be'er Sheva, Israel*

[3]*Department of Bioinformatics, University of Applied Sciences, Vienna, Austria*

[4]*Laboratory of Plant Pathology, Department of Environmental Biology, Sapienza University of Rome, Rome, Italy*

[5]*School of Sustainability and Climate Change, Ben-Gurion University of the Negev, Be'er Sheva, Israel*

*iritnir1@gmail.com

ABSTRACT

The petroglyphs of the Negev Desert, Israel, are famous and valuable archaeological remains. Previous studies have investigated the microbial communities associated with petroglyphs and their potential role in stone deterioration; nevertheless, the role of fungi remains unclear. In this study, the fungal communities present on the stone and, as a comparison, in the surrounding environment (soil and air) at Negev petroglyph sites were analyzed by means of culture-dependent and -independent (metagenomic) techniques. The metagenomic results showed a high fungal biodiversity in the soil, and both approaches highlighted the prevalence of species producing melanized, large, thick-walled spores (mainly *Alternaria* spp.). From the air sampling, mostly *Cladosporium* spp. were retrieved. On the other hand, on the rock, the results seem to indicate a low presence of fungi, but with a rock-specialized mycobiota consisting of extremotolerant microcolonial fungi (MCF) (e.g., *Vermiconidia* and *Coniosporium*) and *lichens* (*Flavoplaca*). In addition, low proportions of cosmopolitan fungi were detected on the stone, but the comparison of the data clearly indicates that they are transients from the surrounding environment. The ability of the isolated strains to dissolve $CaCO_3$ and therefore be a potential threat to the petroglyphs (limestone substrate) was tested, but only one strain resulted in positive acid production under laboratory conditions. Nevertheless, both lichens and MCF detected in this study are well-known stone deteriogens, which may have a significant impact on the petroglyph's deterioration.

Keywords: biowetahering, fungi, desert, microcolonial fungi (MCF)

SHORT BIOGRAPHY

Dr. Irit Nir is a scientist from the microbial biotechnology lab at the Department of Biotechnology, BGU, with expertise in environmental microbiology. Her research focuses on the diversity and function of microbial communities colonizing building materials (concrete, mortar, stone) and extreme terrestrial environments. Dr. Nir is also a member of ICOMOS Israel, where she is involved in the Intentional climate action working group.

iNaturalist Platform for Fungal Phenology: Opportunities and Biases

Shapiro A.[1,2*], Levy O.[2], Sela A.[1]

[1]*Institute of Agricultural and Biosystems Engineering, Agriculture Research Organization Volcani Institute, Israel*

[2]*Faculty of Engineering, Bar-Ilan University, Israel*

*iehllmore@gmail.com

ABSTRACT

Citizen science platforms, such as iNaturalist, provide extensive, time-stamped, and georeferenced ecological data. While plant observation data are widely used in phenological studies, large-scale analyses of fungi remain limited. This study evaluates the potential of iNaturalist data for monitoring global long-term trends in fungal productivity and diversity, while developing methods to address its inherent limitations. Following data cleaning, we identified strong biases toward large, conspicuous, and photogenic species, namely, the iconic fly agaric (Amanita muscaria) and various bracket fungi, whose durability increases their chances of being observed. To reveal phenological patterns, we employed a clustering approach on temporal data that was transformed from linear to angular coordinates. This approach identified nine primary fruiting-season clusters worldwide and distinct subgroups with differing seasonal peaks, indicating complex ecological triggers detectable within a citizen science dataset. Overall, our initial work demonstrates that iNaturalist data can effectively capture large-scale fungal phenology and reveal complex fruiting patterns, provided that sampling biases are rigorously addressed. The validation of these patterns against curated scientific datasets remains a critical next step.

Keywords: observation, *Amanita muscaria*, citizen science, fruiting, climate.

SHORT BIOGRAPHY

My name is Angelika Shapiro, and I am a first-year PhD candidate in a joint program between the Volcani Institute and Bar-Ilan University. I hold an M.Sc. in Life Sciences and worked as a molecular biologist to improve crop varieties. I have shifted my focus to mycology, which, as I believe, is an under-researched field that offers immense potential for discovery and interdisciplinary collaboration. By applying tools from network science and machine learning, our lab aims to better understand the principles that govern fungal networks, and in particular, fungal fruiting. My long-term goal is to contribute to a more holistic understanding of biological systems and help develop innovative solutions for food security and environmental resilience.

Invisible Decay: Biodeterioration Processes and Alternative Mitigation Strategies in Romanian Cultural Heritage

Moza M. I.[1,2,3*], Cucu I.C. [3], Ifrim A.M. [3], Mironescu M. [3,4], Chifiriuc M.C. [1,2]

[1] Department of Botany and Microbiology, Faculty of Biology, University of Bucharest, Romania [2] Research Institute of the University of Bucharest (ICUB), Bucharest, Romania [3] Applied Mycology and Biology Investigations Research Center, Moza Foundation, Bucharest, Romania [4] Faculty of Agricultural Sciences, Food Industry and Environmental Protection, Lucian Blaga University of Sibiu, Romania

[*]iasmina_moza@yahoo.com

ABSTRACT

Biodeterioration is a major factor contributing to the degradation of cultural heritage materials, resulting in aesthetic, structural, and chemical alterations that compromise their historical and artistic value. In Romania, the diversity of climate conditions and the wide range of heritage substrates, including stone, wood, paper, and painted surfaces, create a favorable environment for complex biological colonization, mainly driven by fungi, bacteria, algae, and lichens. The purpose of this study is to contribute to a better understanding of the main types of biodeterioration affecting Romanian cultural heritage and to evaluate alternative, sustainable, and less invasive methods for their control, as conventional biocides may present environmental risks and material incompatibilities. Several representative case studies from Romanian heritage sites were investigated using an interdisciplinary methodological approach that combined classical microbiological techniques, optical and electron microscopy, molecular identification, and physico-chemical analyses of the substrates, including the presence of $CaCO_3$ and organic compounds. In situ and in vitro monitoring was also conducted to assess colonization dynamics and treatment efficiency. The results highlight a high diversity of biodeteriogenic communities with specific substrate preferences and demonstrate that selected alternative treatments, including natural biocides and physical methods, can significantly reduce biological growth while maintaining material integrity. These findings support the development of environmentally friendly, context-adapted conservation strategies and contribute to improved long-term management practices for cultural heritage. This study provides valuable data for conservators, microbiologists, and decision-makers involved in the protection of heritage objects and sites under increasing environmental stress.

Keywords: biodeterioration, cultural heritage, conservation science, microfungi, alternative control methods, Romania

SHORT BIOGRAPHY

Maria Iasmina MOZA, PhD, teaching assistant at the University of Bucharest's Faculty of Biology, specializing in aquatic ecology, ecotoxicology, mycology and microbial ecology**.** Her research focuses on cyanobacterial dynamics in the Danube Delta**,** biodegradation of cultural heritage materials, eDNA monitoring and mycology**.** She has delivered over 50 presentations to national and international conferences and supervised and co-supervised more than 40 bachelor and master thesis on topics like: mycology, aquatic ecology, medical and microbial microbiology. She is familiar with both field sampling and experiments as well laboratory work and analysis like, EcoPlates, PCR, qPCR, isolation and purification of microorganism, in vitro, in situ and ex situ assays, data analyzing using dedicated software so multiparametric analysis as well as project management. Whit an experience more than 10 year in the research field he has H= 6 and over 130 citations and was member in 8 international or national projects and more than 150 biological reports on cultural heritage.

Session 8 - Wild Macrofungi in Israel (in Hebrew)

Chair: Yula Vilozni, Dalia Lewinsohn

New Fungi Species in Israel

Gillon E.[1,3], Biketova A. Yu.[2,3,4,5], Vilozni Y.[3], Covo S.[1]

[1]*Department of Plant Pathology and Microbiology, Robert H. Smith Faculty of Agriculture, Food and Environment, Hebrew University of Jerusalem, Rehovot, Israel.*

[2]*Jodrell Laboratory, Royal Botanic Gardens, Kew, Richmond TW9 3DS, UK*

[3]*Wild Mushroom Association of Israel, P.O. Box 164, Pardesiya 42815, Israel*

[4]*Institute of Biochemistry, Biological Research Center of the Eötvös Loránd Research Network, Temesvári Blvd. 62, Szeged H-6726, Hungary*

[5]*Institute of Evolution and Department of Evolutionary & Environmental Biology, University of Haifa, Aba Khoushi Ave. 199, Mt. Carmel, Haifa 3498838, Israel*

*egillon@gmail.com

ABSTRACT

Israel's diverse ecosystems, ranging from temperate forests to arid deserts, provide a rich habitat for a wide variety of fungi species, many of which may have potential for culinary or medicinal applications. Previous research on Israel's macrofungi was mostly based on morphological data, resulting in inconclusive identification on the species level. Only a fraction of the discovered fungi were identified using modern genetic sequencing, leaving most of them unclear. The ambition of this study was to collect all of the undiscovered macrofungi species in Israel and to identify them using DNA sequencing. A citizen science project was created in order to collect fungi specimens from the entire area of Israel, documenting each one with detailed information. DNA was extracted from these specimens, and key barcoding segments were sequenced. The sequences were used to identify the fungal samples to the species level. This citizen science project collected more than 1,200 fungi specimens across diverse habitats in Israel. Among these, DNA analysis revealed nearly 50 new species for the country and genetically confirmed the presence of more than 30 others previously identified based on morphology alone. By further collecting fungal specimens and sequencing them, we are confident that more species new to Israel, and perhaps even novel species, will be discovered. These new species may hold the key to new beneficial active compounds.

Keywords: fungal taxonomy, biodiversity, biogeography, mushrooms, Israel, DNA barcoding, molecular phylogeny

SHORT BIOGRAPHY

Elad Gillon is a PhD student in Prof. Shay Covo's lab at the Hebrew University. He established a citizen science project in 2011, with the aim of collecting and genetically identifying the full diversity of macrofungi in Israel. Elad is also the CEO of Bargal Analytical Instruments, one of the largest companies in Israel for advanced scientific instruments.

Trips for Mushroom Foraging Around the World - Learning Mycology in Motion

Ginsburg M.[1*]

[1]*LOVINMUSHROOMS, Israel*

*maya_ga@hotmail.com

ABSTRACT

How can we learn about mushrooms from scratch, by ourselves? Is it even possible? In a short talk, Maya will tell us about her special journey throughout the world. A journey aimed to explore the true basics of mushrooms, mushroom foray, and ethnomusicology - the different approaches of different cultures.

Keywords: mushroom kingdom, foraging, ethnomycology

SHORT BIOGRAPHY

Maya Ginsburg, www.lovinmushrooms.com, is a content entrepreneur, lecturer, facilitator, and guide in the world of mushrooms. She began her journey in the world of mushrooms as a mushroom forager around the world and as a guide for foraging tours in Israel. Over the years, as the field developed, her work grew into a real training and content center called "Lovinmushrooms." Currently, she is working on the production and guidance of annual and seasonal courses to introduce and deepen knowledge of the kingdom of mushrooms, mushroom foraging trips in Israel and abroad (with an emphasis on trips in Israel and in the Val Sesia region of Italy), and producing and hosting the "Tosefet pitriot" podcast under the sponsorship of "Marina Mushrooms." She received her certification through various frameworks, from academic knowledge to trips around the world. Among other things, she attended a workshop-course with Paul Stamets in 2017 and with Alan Rockefeller in 2022. A passionate mushroom enthusiast, she attends the conference to share her deep love for the field.

בעקבות הפטריות בתאילנד

זערור ש.

תקציר

פטריות הבר בתאילנד ממלאות תפקיד מרכזי בתרבות, ביחסי האדם והיער, בכלכלה ובמטבח. בהרצאה נדבר על המסע שלי בעקבות הפטריות ברחבי צפון תאילנד, תוך בחינת המגוון העשיר של מיני הפטריות המקומיות, הפטריות המשמשות למאכל והקשרים הייחודיים שבין תושבי הכפרים לבין סביבת היער.

ביוגרפיה קצרה

ששון זערור, מיקולוג אזרחי, מדריך סיורים וקורסים על פטריות הבר בישראל, סוקר בפרויקט ניטור הפטריות.

Citizen Mycology in Israel: Retraining Fungal Priors Through a Distributed Epistemic Network

Skoulsky O.[1*]

[1]*Israel Mushroom Society, Israel*

*photolyx@gmail.com

ABSTRACT

This presentation analyzes a citizen-science mycology network in Israel, composed of Russian-speaking field observers who document local fungal diversity in real-time. The project addresses a key problem: immigrants bring pre-existing fungal knowledge formed in European and Russian ecosystems, where species complexes, toxicity profiles, and visual cues differ significantly. These imported priors lead to systematic and sometimes dangerous misidentifications. The objective of the study is to understand how these priors recalibrate when participants engage with a structured learning system. The methodology includes a standardized photographic protocol for fungal identification, a Q&A format designed to teach the entire observer community, seasonal repetition that reinforces diagnostic skills, and a peer-review dynamic that provides continuous error correction. Results show that participants typically retrain their fungal priors within one or two seasons, producing reliable observational data across diverse habitats. The network now generates multi-season phenological patterns and contributes to the documentation of underreported taxa. These findings indicate that citizen observers function as an unstructured environmental sensor array with high potential for integration into formal research frameworks. This work highlights the scientific value of community-based monitoring and invites collaboration on phenology, biodiversity assessment, and participatory ecological data collection

Keywords: citizen mycology, fungal education, phenology, biodiversity, Mediterranean, knowledge transfer

SHORT BIOGRAPHY

Olga Skoulsky is a citizen-science organizer and coordinator of a large Russian-language mycology community in Israel. She specializes in public-facing fungal education, risk-aware identification practices, and the development of methodological frameworks for community-driven ecological monitoring. Her work focuses on improving fungal literacy among newcomers to Mediterranean ecosystems and building distributed observer networks capable of producing research-grade field data. She collaborates with professional mycologists, educators, and environmental groups to bridge public participation with scientific needs, especially in the areas of phenology and biodiversity documentation.

Session 9 – Ethno-Mycology

Chair: Sandra Valabregue

Dermatophytosis in Fine Art: An Update

Marks R.S.[1,*]

[1] *Avram and Stella Goldstein-Goren Department of Biotechnology Engineering, Ben-Gurion University of the Negev, Be'er-Sheva 84105, Israel*

*rsmarks@post.bgu.ac.il

ABSTRACT

Early iconography of dermatophytosis as medical pathology is often found in fine art, depicted faithfully, providing a limited clinical description whose etiological agent may be inferred. These are found in Esteban Murillo's (1618-1682) Santa Isabel Reina de Hungría curando a los enfermos (1672, Iglesia de San Jorge del Hospital de la Hermandad de la Caridad, Sevilla, Spain) and Santo Tomás de Villanueva dando limosna (1668, Museo de Bellas Artes, Sevilla, Spain); Ferdinand Bol's (1616-1680) De Regenten des Leprozenhuis (1649, Amsterdam Museum, the Netherlands); Jan Salomonsz de Bray's (1627-1697) The Regents of the Leper Hospital in Haarle (1667, Frans Hals Museum, Haarlem, the Netherlands); Francisco Goya y Lucientes's (1746-1828) Muchachos trepando a un árbol (1791-92, Museo del Prado, Spain) and La Boda (1792, Museo del Prado, Spain); Isidore Pils' (1813-1875) La prière des enfants teigneux, (1853, Musée de l'Assistance Publique, Paris, France) and the anonymous sculpture Sainte Élisabeth de Hongrie et le petit teigneux invalide (?, Sainte-Chapelle de Châteaudun). Modern artists will completely change their style of representation of said diseases, being less descriptive and more sensational. Some examples are those of Elisa Vegilante's surrealistic Victim of Ringworm (2003); Shooshie Sulaiman's Maka Panau (Tinea versicolor) (2005); Yulia Starkova's Designed diseases: ringworm as tattoo; Claire Mack's Tinea Pedis (2010), or Naomi Judko's Ringworm is cured in the chimney.

Keywords: Dermatophytoses, medical art, medical history

SHORT BIOGRAPHY

Prof. Robert S. Marks is a full professor in the Department of Biotechnology Engineering at Ben-Gurion University of the Negev, where he founded the university's Biosensors Laboratory. He has authored over 235 scientific publications, edited eight books, and holds multiple patents. His work has contributed to the creation of several startups in Israel, the US, and Singapore. Prof. Marks has chaired more than 20 international scientific conferences and serves on various editorial boards and advisory panels. He also created and teaches Ben-Gurion University's Ethnomycology course, which explores the cultural and biomedical relevance of fungi — a passion that helped inspire the launch of Funga Fest.

Mycelium-Based Technology & Spiritual Practices: Dialogues Between Jewish Mysticism and Shamanic Medicine

Valabregue S.[1*] and Lerer A.[2]
[1]*Rotberg School, Hebrew University, Israel*
[2]*Shaman Medical Mycellium Biotechnology, Israel*
*sandra.valabregue@gmail.com

ABSTRACT

This session explores the meeting point between two ancient yet living traditions of consciousness exploration — shamanic medicine and Jewish mysticism. Both share a deep understanding of the psyche and the capacity to induce transformation, healing, and expanded awareness.

Ayelet Lerer Shaki
Mycelium-Based Technologies: A Dialogue Between Jewish and Shamanic Traditions
Ayelet Lerer Shaki will present insights from her work at Shaman Medical Mycelium Biotechnology, a startup developing Amanita muscaria-based therapeutic technologies. Drawing on both scientific research and her extensive fieldwork in Jewish-inspired therapeutic practice, she will share how Amanita muscaria microdosing and guided healing rituals can bridge neurobiology, spirituality, and personal transformation.

Dr. Sandra Valabregue
Spiritual Practices: A Dialogue Between Jewish and Shamanic Traditions
Dr. Sandra Valabregue will introduce key tools from Kabbalistic mysticism — symbolic and meditative techniques designed for consciousness navigation and divine connection.
The session will open and close with a guided meditation, merging Kabbalistic mapping and Amanita muscaria guidance. Participants will experience a living dialogue between body, mind, and spirit — between the mycelial network of nature and the mystical pathways of consciousness.

Keywords: *Amanita muscaria*, microdosing, spiritual practice, kabbalah, awareness, expanded consciousness.

SHORT BIOGRAPHY

Ayelet Lerer Shaki is an award-winning film director and entrepreneur in psychedelic medicine. In 2020, she founded Shaman Medical Mycelium Biotechnology, a startup researching *Amanita muscaria* and developing therapeutic platforms. She co-founded the Shaman Group, which builds infrastructure and models for the integration and implementation of Psychedelic-Assisted Therapy (PAT). Her work bridges creative practice, clinical innovation, and responsible frameworks for translation to care.

Dr. Sandra Valabregue is a painter and scholar of Kabbalah whose work has been exhibited internationally. She has taught at leading universities in the United States and Israel and is currently an independent researcher and lecturer at the School for Overseas Students at the Hebrew University. Her scholarship and practice focus on mystical techniques and theological frameworks, with special attention to imagination, mapping, and navigation tools for consciousness, and the art of transformation.

Yeast Microbiome as a Biological Indicator for Identifying the Original Contents of Ancient Clay Vessels

Rosenberg E.[1]*, Aouizerat T.[1], Schoemann M.[1], Katvan E.[1,2,3], Coppenhagen-Glazer S.[1], Cohen R.[4], Hassid G.[4], Drori E.[5], Yaari R.[5], Hoch L.[5], Seligman J.[6], Haddad E.[6], Nadav-Ziv L.[6], Paz Y.[6], Maeir A.M.[2,7], Gadot Y.[8], Klutstein M.[1], Hazan R.[1]

[1]Institute of Biomedical and Oral Research (IBOR), Faculty of Dental Medicine, Hebrew University of Jerusalem, Israel, [2]The Martin (Szusz) Department of Land of Israel and Archaeology, Bar-Ilan University, Israel, [3]Land of Israel Studies, Peres Academic Center, [4]Department of Chemistry, Bar-Ilan University, Israel, [5]Wine & Grapevine Research Institute, Department of Chemical Engineering, Ariel University, Israel, [6]Israel Antiquities Authority, Jerusalem, Israel, [7]Tell es-Safi/Gath Archaeological Project, [8]The Laster and Sally Entin Faculty of Humanities, Tel Aviv University, Israel

*eden.rosenberg@mail.huji.ac.il

ABSTRACT

Yeasts are remarkably resilient microorganisms capable of long-term survival under nutrient-limited conditions, enabling their use as biological indicators of ancient fermentation. Because yeasts are central to the production of fermented foods and beverages, their detection provides molecular and microbial evidence of the original contents of archaeological clay vessels, thereby contributing to our understanding of ancient dietary and cultural practices. Previously, yeasts linked to alcoholic fermentation were isolated from ancient beer vessels. This research focuses on wine vessels recovered from the Byzantine-period wine factory at Tel Yavne. We aimed to determine whether molecular and microbial analyses could confirm the use of these vessels for wine production through the identification of Saccharomyces cerevisiae, a key yeast in alcoholic fermentation. 98 Clay fragments (including 50 from Tel Yavne) underwent DNA extraction followed by targeted qPCR to detect S. cerevisiae. Yeast isolation was achieved by incubating vessel shards in liquid media and plating on selective agar plates. Four vessels (4.08%) yielded positive results for S. cerevisiae in both targeted qPCR and isolation, confirming positive wine identification. 116 Non-alcoholic clay vessels, soil, and plant samples serve as negative controls and showed 0% positivity, validating the specificity of yeast detection. Organic Residue Analysis (ORA), routinely applied in archaeology to identify ancient traces, confirmed the presence of tartaric acid, a wine-related organic compound, in the same vessels. Scanning electron microscopy (SEM) examined the pore structures of the three positive vessels and four negative wine vessels to investigate differential yeast recovery. Quantitative assessment indicates higher pore density in positive vessels, suggesting that pore size may influence yeast localization and isolation success. These findings demonstrate that microbial evidence, particularly the detection and isolation of fermentation-linked yeasts, provides a reliable means to identify the original use of archaeological vessels and contributes to reconstructing ancient food and beverage production.

Keywords: Yeast microbiome, *Saccharomyces cerevisiae,* Organic Residue Analysis, Microbial biomarker.

SHORT BIOGRAPHY

Eden Rosenberg is a PhD student at the Institute of Biomedical and Oral Research (IBOR), Faculty of Dental Medicine, Hebrew University of Jerusalem. Her doctoral research examines the intersection of microbiology and archaeological science, particularly the role of yeast microbiomes in identifying and reconstructing ancient fermentation processes. She has developed a novel method that combines molecular and microbiological techniques to characterize fermentation-associated microorganisms preserved in archaeological contexts. Eden is committed to interdisciplinary collaboration and to advancing innovative biomolecular tools for the study of ancient dietary and cultural practices.

"Dermatophytosis in Art" *Revisited* – Have LLMs Improved Research?

Narcross F.W.[1*] and Marks R.S.[1]

[1] *Avram and Stella Goldstein-Goren Department of Biotechnology Engineering, Ben-Gurion University of the Negev, Be'er Sheva 84105, Israel*

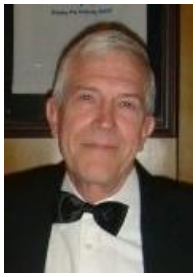
*narcross@post.bgu.ac.il

ABSTRACT

A research article on dermatophytosis in fine art was published in 1991 by Robert S. Marks. At that time, Marks was a graduate student, and he performed the research in university libraries from hardbound books, journals, as well as visits to museums. A search for a book of interest was performed using index cards stored alphabetically in wooden boxes that stretched out over a large portion of the library floor. This research process changed considerably with the advent of the Internet and the availability of books and journals online. The tedious manual search through index cards was replaced by a commercial search engine, and from the comfort of one's desk at home or school, research resources were available directly from a computer screen. In the last few years, search engines have become increasingly replaced by, or at least augmented with, Large Language Models (LLMs), such as ChatGPT. Today, one doesn't even need to be precise in what one is looking for. A user can simply ask an LLM for guidance in researching a topic, and the LLM will provide advice or details on a subject of interest. So, how effective is this new tool compared to the processes that predate it? Can LLMs do research? This article compares the original research by Marks to research conducted using the latest LLMs.

Keywords: mycology, dermatophytosis, art, artificial intelligence, Large Language Models

SHORT BIOGRAPHY



Fredric Narcross is a PhD candidate at Ben Gurion University of the Negev, Israel. His PhD research focuses on automating knowledge discovery in the biotechnical and biomedical sciences. Fredric is also a lifelong neuroscience researcher dedicated to modeling nervous systems and creating a new paradigm for artificial intelligence - artificial nervous systems. He has crafted tools that create artificial nervous systems with neurophysiological accuracy, including tools to place the artificial nervous systems onto Field Programmable Gate Array (FPGA) microchips. Fredric has 3 patents and 3 pending for his neuroscience research.

Session 10 – Closing Remarks and Awards

Edible Mushroom Industry in the Galilee - The Vision and Implementation

Levanon D.[1, 2]*

[1]*Tel Hai College, Israel*

[2]*MIGAL - Galilee Research Institute, Kiryat Shmona, Israel*

*danl@migal.org.il

ABSTRACT

The agricultural settlements (Moshavim and Kibbutzim) along the Lebanese border have always suffered from a lack of land and water. Growing edible mushrooms does not require agricultural land and large amounts of water. Therefore, the settlement institutions decided about forty years ago to establish mushroom cultivation units in Lebanese border Moshavim. The cultivation methods and facilities were designed in accordance with Dutch cultivation guidelines. Approximately 25 small farm units (two-three rooms each) were set up in several Moshavim and one central facility for preparing compost for all of them. The cultivation of champignon (*Agaricus bisporus*) mushrooms began, and most of the crops failed. After a short period of losses, most farms stopped growing mushrooms. It was decided that research was needed to learn how to grow successfully. The Ministry of Agriculture approached the Volcani Institute to establish a research team and facilities for this research. The Volcani Institute head decided to establish the Mushroom Research Unit at the Northern R&D, in the MIGAL Research Institute at Kiryat Shmona. The established research unit started applied research on top priority issues, including Chemical, physical, and biological parameters for the quality control of compost production; Recycling agricultural wastes for use as casing soils and recycling of spent mushroom substrates, and many more. These studies provided mushroom growers with tools to address cultivation challenges, and cultivation gradually became successful. Since then, the mushroom industry in the Galilee has grown and developed, and it supplies most of Israel's mushroom consumption (which has grown amazingly). The mushroom research group at MIGAL Research Institute, which gave continuous research and guidance to the Galilee mushroom growers, is still operating.

Keywords: Mushroom industry; Lebanese border; Moshavim; Applied research; MIGAL

SHORT BIOGRAPHY

Professor (Emeritus) Dan Levanon is currently the applied research department head at MIGAL – Galilee Research Institute, Kiryat Shmona, Israel. His research focuses on applied and agricultural biotechnology, environmental biotechnology, including: recycling organic wastes, bioremediation of polluted soil and water, cultivation of edible fungi, exotic and medicinal mushrooms, and their health-promoting active ingredients. Administrative experience: Chief Scientist of the Ministry of Agriculture of the state of Israel, Mayor of the Upper Galilee Municipality, Chairman of MIGAL- Galilee Research Institute, Scientific Director of Volcani Institute, Chairman of the Board of Directors -Tel-Hai Academic College, Chairman of the Board of Directors of US–Israel Agricultural Research and Development Fund (BARD).

Poster Presentations

Myco Structures Formulation Process Using Liquid Mycelium Culture

Silva C.[1*], Livne A.[2], Kushmaro A.[3], Malka O.[4], Pearlmutter D.[1,] and Gal E.[2]

[1]*Department of Environmental, Geoinformatics and Urban Planning Sciences, Ben-Gurion University of the Negev, Israel*

[2]*Department of Environmental and Civil Engineering, Ben-Gurion University of the Negev, Israel*

[3]*Department of Biotechnology Engineering, Ben-Gurion University of the Negev, Israel*

[4]*Department of Chemistry, Ben-Gurion University of the Negev, Israel*

*cesars@post.bgu.ac.il

ABSTRACT

This study presents a production methodology for Mycelium-Based Composites (MBC) using *Ganoderma Resinaceum* (*G. resinaceum*) Liquid Mycelium Culture (LMC) as inoculum, instead of grain spawn. Here, MBC were produced in cubic molds using hemp shives as substrate and inoculated with three *G. resinaceum* LMC concentrations (10%, 30% and 50% w/w). The methodology was structured into five stages: (1) LMC formulation, inoculation, and incubation, (2) substrate preparation, inoculation, and incubation, (3) MBC casting and incubation, (4) demolding and incubation, and (5) drying and inactivation. The production cycle entails 19 days for the 30% and 50% and 21 days for the 10% LMC. Thermal conductivity analysis showed that MBC using *G. resinaceum* LMC presented low thermal conductivity values (0.02 - 0.03 $W\ m^{-1}\ K^{-1}$) comparable to grain spawn (0.04 - 0.08 $W\ m^{-1}\ K^{-1}$) and expanded polystyrene (0.032 - 0.038 $W\ m^{-1}\ K^{-1}$). A two-way ANOVA demonstrated that thermal conductivity was independent of LMC concentration ($p = 0.723$) and production batch ($p = 0.201$), highlighting the robustness and reproducibility of the production process. This research demonstrates the potential of LMC for MBC production, and further research should focus on process optimization and characterization of the biocomposites.

Keywords: mycelium building composites, liquid mycelium culture.

SHORT BIOGRAPHY

César Silva is a PhD candidate at the Department of Environmental, Geoinformatics, and Urban Planning, Faculty of Humanities and Social Sciences, Ben-Gurion University of the Negev. His research focuses on advancing methodologies to scale up the production of mycelium-based composites for the building industry. Silva has been involved in projects related to small-scale MBC production in South America and has experience in the mushroom cultivation industry. He is currently part of the multidisciplinary ATRIUM Consortium, a European project dedicated to developing sustainable construction materials and bio-composites for design applications.

Enhancing The Bioactive Components in *Psilocybe Cubensis* Mycelium: The Influence of Submerged Fermentation Conditions

Sharchaton A.[1], Azerrad S.[1], Dekel Y., Kurzbaum E.[1*]

[1]*Shamir Research Institute, University of Haifa, Israel*

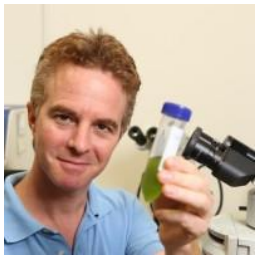
*ekurzbaum@univ.haifa.ac.il

ABSTRACT

Psychedelic mushrooms have been used in traditional medicine to treat mental and cognitive disorders, and some specific psychedelic molecules are studied today for psychiatric disorders. Our team is the first in Israel and one of the few in the world to receive a formal permit to grow and extract Psilocybin mushrooms for research. Our primary focus is on investigating the submerged fermentation conditions that influence the accumulation of bioactive compounds, including psilocybin and psilocin, in the mycelium of *Psilocybe cubensis*. The research investigates the effects of various factors, including fungal strain, nutrient media composition, pH, agitation, aeration, and mycelium disruption, on the accumulation of mycelial biomass and bioactive compound content. Strains were grown in liquid culture and on solid coconut vermiculite media, followed by psilocybin extraction using methanol with 0.5% acetic acid and subsequent HPLC-DAD analysis. Results indicated that while psilocybin was the predominant active compound, other metabolites, such as aeruginascin and baeocystin, were present at negligible levels. Notably, no correlation was observed between psilocybin content in the mycelium and fruiting bodies of individual strains. The Ema strain, showing the highest psilocybin yield in mycelial biomass, was selected for optimization. The most effective growth conditions for maximizing both biomass production and psilocybin content were identified as a glucose-based mineral medium, 7-day incubation, and an initial pH of 5.5. The findings have significant implications for enhancing the bioactivity of *P. cubensis* mycelium and may lead to the development of novel mushroom-based nutraceuticals and pharmaceuticals.

Keywords: Psilocybin, psychedelic molecules, Psilocybin mushrooms, Bioreactor

SHORT BIOGRAPHY



Prof. Eyal Kurzbaum is an Israeli environmental microbiologist and biotechnologist specializing in fungal bioreactor systems. He leads the Environmental Biotechnology Laboratory at the Shamir Research Institute and holds academic positions at the University of Haifa and Tel-Hai Academic College. Prof. Kurzbaum's research focuses on optimizing submerged fermentation techniques for cultivating fungi, particularly *Psilocybe cubensis*, to produce psychoactive compounds such as psilocybin. His work aims to establish scalable, reproducible methods for the industrial production of these bioactive metabolites, which have potential applications in pharmaceuticals and alternative proteins. Additionally, Prof. Kurzbaum investigates the use of mycelium as a sustainable source of protein, exploring its cultivation in bioreactors and its functional properties for food applications. His interdisciplinary approach integrates environmental biotechnology, mycology, and industrial fermentation, contributing to advancements in both environmental remediation and biotechnological innovation. Prof. Kurzbaum's work is pivotal in bridging the gap between fungal cultivation and practical applications in various industries.

Deciphering the Role of Pairwise Communication in Disease Resistance, Immunity, and Growth of Solanaceous Crops

Tejada L.[1,2], Gupta R.[2], Bar M.[1,2*]

[1] *Department of Life Sciences, Faculty of Natural Sciences, Ben-Gurion University of the Negev, Israel*

[2] *Department of Plant Pathology and Weed Research, Agricultural Research Organization, Volcani Institute, Israel*

barm@bgu.ac.il

ABSTRACT

Fungal–plant interactions range from beneficial associations to destructive pathogenesis. Among pathogenic fungi, *Botrytis cinerea,* a necrotroph responsible for gray mold disease, affects more than 200 plant species, including economically important solanaceous crops such as tomato (*Solanum lycopersicum*), pepper (*Capsicum annuum*), and eggplant (*Solanum melongena*). Despite extensive research on host–pathogen interactions, little is known about how communication between neighboring plants influences fungal infection outcomes. This study aims to decipher how volatile organic compounds (VOCs) emitted by one plant affect the disease resistance of another plant during *B. cinerea* infection. The research integrates physiological, biochemical, and molecular approaches using solanaceous plants grown under natural conditions. Disease response is assessed through lesion measurement, reactive oxygen species (ROS) and ethylene assays, and ion leakage tests. Additionally, gas chromatography (GC) analysis is used to profile airborne VOCs emitted during plant–plant interaction. Preliminary findings suggest that monoterpene can enhance resistance of their neighboring plants against *Botrytis cinerea*, highlighting the dynamic nature of airborne signaling in modulating plant–pathogen interactions. These insights contribute to a deeper understanding of the interaction among plants and fungi, offering potential applications in developing eco-friendly strategies for crop protection and sustainable agricultural systems, and understanding the role of plant volatiles in disease resistance and immunity of their neighbor.

Keywords**:** plant volatiles, *Botrytis cinerea*, Solanaceae, defense priming, plant–plant communication, monoterpenes

SHORT BIOGRAPHY

Loida L. Tejada is a Filipino international student who earned her master's degree at the Robert H. Smith Faculty of Agriculture, Food and Environment, Hebrew University of Jerusalem, and conducted her research at the Agricultural Research Organization – Volcani Institute. Her master's work examined how plant-to-plant steady-state communication affects the disease resistance of neighboring plants following inoculation with the pathogenic fungus *Botrytis cinerea*, under the supervision of Prof. Maya Bar. She is currently pursuing her Ph.D. in the Department of Life Sciences at Ben-Gurion University of the Negev, continuing her research under Prof. Bar's guidance. Through her research, she aims to contribute to the development of sustainable and eco-friendly approaches for enhancing crop protection and resilience in agricultural systems.

Plant Structure and CK Balance Modulate Host-Specificity and Pathogenicity of *Botrytis cinerea*

Anand G.[1,2], Benoni C.[2,3], Leibman-Markus M.[2], Gupta R.[2,4], Marash I.[1], Tejada L.[1], Dolgov T.[5], Rav-David D.[2], Kleiman M.[5], Elad Y.[2], Bar M.[1,2*]

[1] *Department of Life Sciences, Faculty of Natural Sciences, Ben-Gurion University of the Negev, Israel*

[2] *Department of Plant Pathology and Weed Research, Volcani Institute, Israel*

[3] *Faculty of Life Sciences, Bar Ilan University, Israel*

[4] *Department of Plant Pathology and Microbiology, Hebrew University of Jerusalem, Israel*

[5] *Department of Field and Vegetable Crops, Volcani Institute, Israel*

*barm@bgu.ac.il

ABSTRACT

Botrytis cinerea, a highly successful necrotrophic fungal plant pathogen, demonstrates a remarkably broad host range, yet the precise factors governing its host specificity remain unclear. This study systematically assessed *B. cinerea* agricultural isolates, revealing a degree of host preference where isolates were better able to infect the original "host" (i.e., the crop species each isolate was originally isolated from). In "non-host" infections, *B. cinerea* generated smaller necrotic lesions, often surrounded by a yellow halo that was usually absent from host infections, suggesting distinct infection processes. We were interested in examining what factors might be influencing how *B. cinerea* recognizes its host plant. We had previously found that both leaf structure and cytokinin (CK) content affect *B. cinerea* pathogenicity. Therefore, we examined whether these two factors could be involved in host recognition. *B. cinerea* isolates were found to germinate and grow better on biomimetic structures derived from their original hosts, in the absence of leaf chemistry. Furthermore, different *B. cinerea* isolates showed varying sensitivity to CK, which inversely correlated with CK levels in their original "hosts". Our findings provide empirical insights into *B. cinerea*'s host adaptation mechanisms.

Keywords: *B. cinerea*, host-specificity, cytokinin, plant structure

SHORT BIOGRAPHY

Dr. Meirav Leibman-Markus is a research associate at the Department of Plant Pathology and Weed Research, Institute of Plant Protection, Agricultural Research Organization (ARO), Israel. She earned her Ph.D. in Molecular Biology and Ecology of Plants from Tel Aviv University, where she investigated receptor-mediated immune signaling in plants. Her postdoctoral research at ARO and Tel Aviv University focused on molecular mechanisms underlying plant defense and the use of genome editing to enhance disease resistance in tomato crops. In recent years, her research in the laboratory of Prof. Maya Bar has explored host-microbe interactions, cytokinin signaling, and plant communication with the aim of developing molecular and biotechnological strategies to improve crop resilience and productivity.

The Role of the Target of Rapamycin (TOR) Kinase in Tomato Plant Immunity Against the Pathogen *Botrytis cinerea*

Marash I.[1,2], Leibman-Markus M.[1], Gupta R.[1,3], Anand G.[1,3], Bar M.[1,3*]

[1]*Department of Plant Pathology and Weed Research, Agricultural Research Organization, Volcani Institute, Bet Dagan 50250, Israel*

[2]*School of Plant Science and Food Security, Tel-Aviv University, Tel-Aviv, 69978, Israel.*

[3]*Department of Life Sciences, Faculty of Natural Sciences, Ben-Gurion University of the Negev, Beer-Sheva, 84105, Israel*

*barm@bgu.ac.il

ABSTRACT

Plants continually integrate nutrient status, energy availability, and environmental cues to determine whether to prioritize growth or defense. The Target of Rapamycin (TOR) kinase is a central regulator of this balance, coordinating development, metabolism, and translation. However, its role in plant pathogen interactions, particularly during *Botrytis cinerea* infection in tomato, is not fully understood. We examined how TOR shapes tomato immunity by modulating hormonal signaling, developmental context, and translation initiation. Silencing *SlTOR* or generating *RAPTOR1B* (a component of the TOR complex) knockout mutants enhanced resistance to *Botrytis cinerea* and other pathogens, without compromising yield. TOR inhibition activated a salicylic acid-dependent defense pathway and increased immune responses, demonstrating that TOR normally suppresses basal and induced immunity. The immune outcome of TOR inhibition depended strongly on developmental and hormonal state. Enhanced resistance upon TOR inhibition was most pronounced in mature, differentiated leaves and in genotypes with low cytokinin/gibberellin (CK/GA) ratios. CK repressed TOR activity and promoted immunity, whereas GA activated TOR and required TOR for full signaling output, positioning TOR as a key integrator of CK-GA crosstalk during defense. At the translational level, TOR interacted with eIF4E isoforms to influence the initiation of protein synthesis. eIF4E activity was required for TOR-mediated immune modulation, suggesting that TOR directs selective translation of defense-related transcripts during pathogen attack. Together, our findings establish TOR and RAPTOR1B as negative regulators of tomato immunity and central modulators of the growth-defense trade-off. By integrating metabolic, hormonal, and translational signals, TOR critically shapes tomato susceptibility to *Botrytis cinerea* and offers a promising target for engineering disease resistance without yield penalties.

SHORT BIOGRAPHY

Iftah Marash is a postdoc student in the lab of Prof. Maya Bar at Ben-Gurion University, with expertise in plant molecular biology and biotechnology. His research focuses on the role of the Target of Rapamycin (TOR) complex and its components, such as RAPTOR1B, in regulating plant immunity and development. It investigates how modulation of TOR influences protein translation, particularly through the translation initiation factor eIF4E, and how these processes impact the plant's ability to resist pathogens. The study aims to discover mechanisms by which altering translation initiation pathways can enhance disease resistance in crops without compromising yield.

Lion's Mane Extracts Recover Electrophysiological Deficits in Neurons

Stern S.[1*], Perelsman O.[1]

[1]*Sagol Department of Neurobiology, Faculty of Natural Sciences, University of Haifa, Haifa, Israel*

*sstern@univ.haifa.ac.il

ABSTRACT

Lion's mane (*Hericium erinaceus*) is an edible fungus, and various studies have demonstrated that its extracts possess neuroprotective properties. In our lab, we use neurons derived from patient-induced pluripotent stem cells (IPSCs) as models to study several neurodevelopmental conditions, among them autistic spectrum disorders. In this study, we explored the electrophysiological properties of neurons derived from patients carrying different mutations in the GRIN2B gene, using tests like calcium imaging and patch-clamp. The GRIN2B gene encodes a subunit of the N-methyl-D-aspartate (NMDA) receptors, and patient-derived neurons lack sufficient amounts of healthy GRIN2B protein, leading to a phenotype of hyper-excitability and early maturation in our tests. Ongoing treatment with lion's mane extracts reduced these symptoms to a level that resembles more that of control cells than that of untreated patient cells for a few of the GRIN2B mutations. In the future, we plan to test for effects in the expression levels of RNA and protein in treated cells, as well as using extracts from other mushrooms, such as the magic mushroom (*Psilocybe cubensis*) and mitake (*Grifola frondosa*).

SHORT BIOGRAPHY

Prof. Shani Stern is an associate professor at the Sagol Department of Neurobiology at the University of Haifa. She has a B.Sc. from Tel-Aviv University in electrical engineering, her M.Sc. is in computer science from the Weizmann Institute, and her Ph.D. is in Physics also from the Weizmann Institute. She was selected for the prestigious Zuckerman STEM leadership program. Her lab focuses on studying brain disorders such as autism spectrum disorder (ASD), bipolar disorder, schizophrenia, and Parkinson's disease using patient-derived neurons and brain organoids. The Stern lab uses whole-cell patch clamp, calcium imaging, and analysis of network dynamics, molecular biology, and computational simulations to understand mechanisms of disease and to develop novel therapeutics and machine learning algorithms for diagnostics of diseases and to predict response to treatment.

AI-Driven Screening of Natural Compound Combinations Against Citrus Fruit *Penicillium* Pathogens

Tzur Y.[1], Sholomovich T.[1,2], Yotal I.[2], Abramovici A.[2], Israeli A.[2,3], Shir M. O.[1,2], and Gamrasni D.[1,2*]

[1]*MIGAL, Galilee Research Institute, Kiryat Shmona, Israel*

[2]*Tel-Hai College, Department of Biotechnology, Faculty of Life Sciences, Upper Galilee, Israel*

[3]*The Robert H. Smith Faculty of Agriculture, Food & Environment, The Hebrew University of Jerusalem, Rehovot, Israel*

*dang@migal.org.il

ABSTRACT

Fungal decay caused by Penicillium italicum and Penicillium digitatum is among the major factors responsible for postharvest losses in citrus fruit worldwide. The increasing concern over fungicide resistance and chemical fungicide residues has led to a growing interest in natural, environmentally friendly alternatives. In this study, we evaluated the antifungal potential of various combinations of basic substances, EU-approved, against these two Penicillium species. To obtain high-quality candidate solutions, two different AI-based computational approaches generated a population of treatments considering combinations of three natural substances at a time, which were then tested in vitro for their inhibitory effects on fungal growth. The employed algorithms also accounted for the substances' costs with an additional objective to minimize the cost of each combination. Several treatments demonstrated notable antifungal activity, completely inhibiting colony growth of both species. Interestingly, the most effective combinations contained hydrogen peroxide as one of the three components, suggesting its lethal role. However, some combinations lacking hydrogen peroxide showed partial inhibition, while others had no significant effect. Our initial results indicate that certain combinations of natural compounds, particularly those including hydrogen peroxide, hold promise as alternative treatments to conventional fungicides for controlling Penicillium infections. These findings highlight the potential of AI-driven screening as a tool for identifying synergistic effects among natural antimicrobial agents. Further studies are required to optimize concentrations, assess safety, and evaluate efficacy under real postharvest conditions.

SHORT BIOGRAPHY

Dr. Danny Gamarsani, head of the Center for Postharvest Innovation Research, studies and develops methods for extending the shelf life of agricultural produce, improving their storage conditions, optimizing value chains, and reducing depreciation and losses. It does so while ensuring the optimal quality and nutritional value of the crops is maintained. The knowledge generated is transferred for the benefit of farmers and growers in the region and around the world.

The Fungi Collection

The Steinhardt Museum of Natural History, Tel Aviv University, Israel

smnh@tauex.tau.ac.il

ABSTRACT

The fungi herbarium is a comprehensive collection, consisting mainly of mushrooms from Israel and the East Mediterranean region. It is a unique collection founded by mycologist Nissan Binyamini in the 1960s and continued until 1992. His collection comprises approximately 6000 specimens, among which are 260 genera. It serves as the paramount referential work on fungi of Israel.
From 2016 to 2025, Bruria Gal added 1500 new specimens, among which were 150 genera of gilled and non-gilled mushrooms.
These were collected mainly in the Judean hills around Jerusalem, the Carmel mountain near Haifa, as well as the Galil and Golan regions. In rainy seasons, unique species were collected in the Negev Desert.
The collection comprises approximately 7500 specimens of fungi, conserved in paper envelopes under required conservation conditions.
The collection encompasses species of ascomycetes, basidiomycetes, mushrooms, and slime molds, making it the largest mushroom collection of the Middle East.
The herbarium is listed in Index Herbariorum under the acronym TELA.
To support the morphological identification of the specimens, DNA was extracted, amplified using the ITS1 and ITS4 primers, and the sequences were identified by searching against the nucleotide collection in GenBank. Sequences were submitted to GenBank.

SHORT BIOGRAPHY

The Steinhardt Museum of Natural History is Israel's national Center for biodiversity studies. It collects and catalogues millions of specimens. Hundreds of scientists, graduate students, and professionals from Israel and abroad use the collections for basic and applied research in the fields of natural history and conservation.

THE STEINHARDT museum of natural history

TEL AVIV UNIVERSITY אוניברסיטת תל אביב

Functional Role of *Cochliobolus heterostrophus* Epoxide Hydrolase AB1 in Fungal Pathogenicity

Khamaisi H.[1, 2*], Zuchman R.[1, 2, 3], Soliman N.[1, 2], Horwits B.[3], and Levi O.[1, 2]

[1]*Biotechnology, MIGAL- Galilee Research Institute, Israel*

[2]*Faculty of Sciences and Technology, Tel-Hai Academic College, Israel*

[3]*Faculty of Biology, Technion - Israel Institute of Technology, Israel*

*Hazemkh@migal.org.il

ABSTRACT

The α/β hydrolase-1 (ABH) domain represents a conserved structural fold ubiquitous across all domains of life. Their structural plasticity, particularly within the substrate-binding region, allows for functional adaptability, making ABH proteins indispensable to organismal survival and ecological adaptation. Fungal ABH proteins are hypothesized to contribute similarly to pathogenesis. Potential roles include nutrient acquisition via lipase-mediated degradation of host tissues, detoxification of antifungal agents, and secretion of immunomodulatory effectors. Despite their significance, gaps persist in understanding fungal ABH protein mechanisms, particularly their structural and functional interplay during infection, whose roles in pathogenicity remain a critical frontier in infectious disease research. Ferulic acid (FA), an abundant phenolic found in plant host cell walls, promotes rapid cell death of the maize pathogen *Cochliobolus heterostrophus*, which causes Southern Corn Leaf Blight in maize. FA treatment downregulates AB1 epoxide hydrolase expression. We aim to identify avenues for therapeutic intervention and highlight the need for focused studies on fungal ABH homologues. AB1 knockout increases fungal tolerance to FA in vitro and also enhances fungal virulence in maize. This study reveals that AB1 epoxide hydrolase modulates both ferulic acid sensitivity and virulence in *Cochliobolus heterostrophus*, with AB1 knockout strains showing increased FA tolerance in vitro and enhanced pathogenicity in maize.

Keywords: α/β hydrolase-1 (ABH), Ferulic acid (FA), *Cochliobolus heterostrophus*

SHORT BIOGRAPHY

I am a molecular biologist and a manager of the Fungal Resistance Mechanisms Lab at MIGAL-Galilee Research Institute. My research focuses on antifungal resistance, genome-wide CRISPRi functional genomics, and the discovery of plant-derived antifungal compounds. We also investigate the antifungal activities of plant extracts against agricultural pathogens, aiming to expand the antifungal toolkit with sustainable, eco-friendly solutions.

Medicinal Macrofungi on Calliprine Oak

Zmitrovich I.V.[1*], Shishlyannikova A.B.[2], and Belova N.V.[3]

[1]*Laboratory of Systematics and Geography of Fungi, Komarov Botanical Institute of the Russian Academy of Sciences, Russia*

[2]*Department of Forest Protection, Wood Science and Gamekeeping, Saint Petersburg State Forest Engineering University named after S.M. Kirov, Russia*

[3]*Laboratory of Fungal Biochemistry, Komarov Botanical Institute, Russia*

*iv_zmitrovich@mail.ru

ABSTRACT

The Calliprine oak (*Quercus calliprinos* or *Q. coccifera* subsp. *calliprinos,* according to various authors: see Paffetti et al., 2001, Denk & Grimm, 2010; Vitellii et al., 2017, Hipp et al., 2020) serves as a stand-forming species in the maquis forests found across Israel's mountainous regions, including the Golan Heights, Upper Galilee, Carmel, and Samaria. This oak is accompanied by a diverse array of specialized fungal species closely tied to its genus. The mycobiota of Calliprine oak within Israel has been extensively studied (Ţura et al., 2006; Zmitrovich et al., 2006; Ţura et al., 2008, 2009, 2010, 2011). Among the Agaricomycetes associated with Calliprine oak, certain species exhibit remarkable secretory activity during submerged cultivation. Notably, such species are particularly prominent as *Daedalea quercina* (L.) Pers. demonstrating anti-inflammatory and antioxidant effects by inhibiting enzymes such as cyclooxygenase 2, xanthine oxidase, and horseradish peroxidase, *Hymenochaete rubiginosa* (Dicks.) Lév. demonstrating antioxidant, anticholinesterase, antibacterial, and antifungal properties, *Inocutis dryophila* (Berk.) Fiasson et Niemelä showing remarkable radical-scavenging capacity, *Grifola frondosa* (Dicks.) Gray exhibiting antitumor, immunostimulatory, antiangiogenic, antidiabetic, antioxidant, antibacterial, and antiviral effects, *Laetiporus sulphureus* (Bull.) Murrill demonstrating antioxidant, antibacterial, and antitumor properties, *Pseudoinonotus dryadeus* (Pers.) T. Wagner et M. Fisch., demonstrating antioxidant, radical-scavenging and skin-protective effects, and *S. gausapatum* (Fr.) Fr., demonstrating significant activity against the nematodes.

Keywords: *Quercus calliprinos*, *Quercus coccifera*, fungal biotechnology, Israeli fungi

SHORT BIOGRAPHY

Ivan V. Zmitrovich – Doctor of Science in Biology and a leading researcher at the Komarov Botanical Institute in Saint Petersburg, Russia. A distinguished monographer specializing in the Atheliaceae and Amylocorticiaceae families, with additional expertise in aphyllophoroid and heterobasidiomycetous fungi of Israel, having conducted eight expeditions there between 2003 and 2011. Currently, he focuses on various aspects of fungal taxonomy and biogeography.

Plastic Degradation by Fungi: Insights from *Aspergillus*, *Trichoderma*, and *Rhizopus*

Moza M. I.[1,2,3*], Nicula A.[3], Mironescu M.[3,4], Chifiriuc M.C. [1,2]

[1]*Department of Botany and Microbiology, Faculty of Biology, University of Bucharest, Romania* [2]*Research Institute of the University of Bucharest (ICUB), Bucharest, Romania* [3]*Applied Mycology and Biology Investigations Research Center, Moza Foundation, Bucharest, Romania* [4]*Faculty of Agricultural Sciences, Food Industry and Environmental Protection, Lucian Blaga University of Sibiu, Romania*

[*]iasmina_moza@yahoo.com

ABSTRACT

Plastic pollution represents one of the greatest environmental challenges of the 21st century, as synthetic polymers are produced on a large scale and can persist in ecosystems for hundreds of years. Current waste management strategies are often inefficient and polluting, highlighting the urgent need for sustainable alternatives to protect the environment and biodiversity. Microfungi have gained significant attention for their potential to biodegrade synthetic polymers, as enzymatic activity enables them to break down long polymer chains into simpler, less harmful compounds. This study investigated the biodegradation capacity of *Aspergillus niger*, *Trichoderma viride*, and *Rhizopus* sp. on multiple types of plastics, including polyethylene, polyvinyl chloride (PVC), and biodegradable plastics, using both quantitative and qualitative methods under liquid and solid conditions. After 40 days of incubation, plastic mass losses of up to 34% were recorded. Analysis of the data revealed similar substrate preferences among the three fungal species, with PVC, biodegradable plastics, and low-density polyethylene showing the highest degradation rates. Notably, biodegradable plastics exhibited mass losses of up to 20%, confirming their potential as an environmentally friendly alternative for reducing plastic pollution. These findings demonstrate that microfungi can be harnessed to develop sustainable and ecologically viable strategies for plastic waste management. Investments in optimizing and enhancing fungal biodegradation processes are essential to translate these scientific discoveries into large-scale applications, providing a promising route for mitigating plastic pollution while preserving ecosystems.

Keywords: plastic biodegradation, *Aspergillus niger*, *Trichoderma viride*, *Rhizopus*, sustainable waste management, microfungi assay

SHORT BIOGRAPHY

Maria Iasmina MOZA, PhD, teaching assistant at the University of Bucharest's Faculty of Biology, specializing in aquatic ecology, ecotoxicology, mycology and microbial ecology**.** Her research focuses on cyanobacterial dynamics in the Danube Delta**,** biodegradation of cultural heritage materials, eDNA monitoring and mycology**.** She has delivered over 50 presentations to national and international conferences and supervised and co-supervised more than 40 bachelor and master thesis on topics like: mycology, aquatic ecology, medical and microbial microbiology. She is familiar with both field sampling and experiments as well laboratory work and analysis like, EcoPlates, PCR, qPCR, isolation and purification of microorganism, in vitro, in situ and ex situ assays, data analyzing using dedicated software so multiparametric analysis as well as project management. Whit an experience more than 10 year in the research field he has H= 6 and over 130 citations and was member in 8 international or national projects and more than 150 biological reports on cultural heritage.

Similar Yet Different: Visual Comparison of Edible and Toxic Look-Alikes in Mediterranean Forests of Israel

Naftali O.[1*]

[1]*Nigun Hayaar, Israel*

*oded.naftali@gmail.com

ABSTRACT

In Mediterranean forests, several edible and toxic mushroom species share strikingly similar appearances, posing potential risks to inexperienced foragers. This educational poster presents visual comparisons of two pairs of look-alike fungi commonly encountered in Israel: *Cantharellus cibarius* (chanterelle) versus *Paxillus panuoides*, and *Chroogomphus mediterraneus* versus *Omphalotus olearius*. Through precise illustration and ecological context, the poster highlights key macroscopic differences such as gill type, cap texture, and substrate preference. By employing design-based clarity - using icons for toxicity, habitat, and host association - the work communicates complex distinctions in an intuitive, visually engaging format. This synthesis of scientific accuracy and artistic pedagogy aims to raise public awareness of fungal safety, deepen understanding of forest ecology, and promote respect for the diversity of Mediterranean mycobiota.

Keywords: mushrooms, identification, education, ecology, illustration

SHORT BIOGRAPHY

Oded Naftali is an educator, creator, and software engineer and community builder focused on the intersection of mycology, ecology, community, and art. Founder of "Nigun Hayaar" educational initiatives in Israel, he develops creative tools that make nature study accessible, inspiring, and fun to the public. His work spans from children's mushroom educational shows and field guides to digital learning platforms and AI-generated storytelling. Oded's approach bridges visual design, environmental education, and citizen science, with the goal of strengthening local ecological literacy and reconnecting people with the living forest.

Fungi of the Forest: Visual Classification of Suillaceae and Boletaceae in Israel

Naftali O.[1*]

[1]*Nigun Hayaar, Israel*

*oded.naftali@gmail.com

ABSTRACT

The families *Suillaceae* and *Boletaceae* form a central component of Israel's forest ecosystems, establishing vital mycorrhizal relationships with native oak and pine trees. This educational poster offers a visual classification framework for these spongy-pored mushrooms, highlighting key morphological and ecological features through design-driven communication. Rather than serving as a field identification key, the work focuses on grouping related species by shared traits such as pore structure, cap color, and host association, enabling viewers to recognize natural patterns of diversity. Each species is presented with Hebrew and Latin names, accompanied by intuitive visual symbols that express ecological and morphological characteristics. The poster bridges scientific taxonomy and aesthetic storytelling, making complex fungal relationships accessible to learners of all ages. By combining art, ecology, and education, it fosters appreciation for local biodiversity and promotes visual literacy as a tool for ecological understanding.

Keywords: mushrooms, Suillaceae, Boletaceae, education, ecology, classification, illustration

SHORT BIOGRAPHY

Oded Naftali is an educator, creator, and software engineer and community builder focused on the intersection of mycology, ecology, community, and art. Founder of "Nigun Hayaar" educational initiatives in Israel, he develops creative tools that make nature study accessible, inspiring, and fun to the public. His work spans from children's mushroom educational shows and field guides to digital learning platforms and AI-generated storytelling. Oded's approach bridges visual design, environmental education, and citizen science, with the goal of strengthening local ecological literacy and reconnecting people with the living forest.

Similar Yet Different: Visual Comparison of *Lactarius deliciosus* and *Lactarius zonarius* in Israel

Naftali O.[1*]

[1]*Nigun Hayaar, Israel*

*oded.naftali@gmail.com

ABSTRACT

Even among experienced foragers, confusion between closely related *Lactarius* species can lead to uncertainty in the field. This educational poster presents a clear visual comparison of two common species in Israel - *Lactarius deliciosus*, typically associated with pine forests, and *Lactarius zonarius*, often found under oaks. Both species share a similar cap shape and concentric zoning, yet differ in latex color, gill pigmentation, and habitat preference. Through precise illustrations and photographic references, the poster highlights these macroscopic contrasts, focusing on diagnostic traits such as orange latex, carrot-colored stipes, and green staining in *L. deliciosus* versus the white latex and pale tones of *L. zonarius*. The work transforms complex field characters into accessible visual cues, promoting responsible foraging, ecological awareness, and appreciation for Mediterranean fungal diversity.

Keywords: mushrooms, *Lactarius*, ecology, education, identification, Israel, mycorrhiza

SHORT BIOGRAPHY

Oded Naftali is an educator, creator, and software engineer and community builder focused on the intersection of mycology, ecology, community, and art. Founder of "Nigun Hayaar" educational initiatives in Israel, he develops creative tools that make nature study accessible, inspiring, and fun to the public. His work spans from children's mushroom educational shows and field guides to digital learning platforms and AI-generated storytelling. Oded's approach bridges visual design, environmental education, and citizen science, with the goal of strengthening local ecological literacy and reconnecting people with the living forest.

Similar Yet Different: Visual Comparison of *Amanita echinocephala* and *Amanita vittadinii*

Naftali O.[1*]

[1]*Nigun Hayaar, Israel*

*oded.naftali@gmail.com

ABSTRACT

Confusing similar-looking mushrooms can have serious implications for safety and ecological understanding alike. This educational poster presents a detailed visual comparison between two spiky white *Amanita* species found in Israel — *Amanita echinocephala* and *Amanita vittadinii*. Both species exhibit distinctive surface ornamentation and pale coloration, yet differ in scale morphology and habitat preferences. Through side-by-side illustrations, the poster highlights these differences with clarity and simplicity: pyramidal scales and oak-associated habitats in *A. echinocephala* versus flattened scales and open-grassland growth in *A. vittadinii*. The work demonstrates how visual design can effectively communicate critical macroscopic distinctions that aid both public education and field awareness. By merging artistic representation with taxonomic accuracy, this poster supports safe, informed engagement with wild fungi while celebrating their morphological diversity.

Keywords: mushrooms, *Amanita*, morphology, education, identification, illustration

SHORT BIOGRAPHY

Oded Naftali is an educator, creator, and software engineer and community builder focused on the intersection of mycology, ecology, community, and art. Founder of "Nigun Hayaar" educational initiatives in Israel, he develops creative tools that make nature study accessible, inspiring, and fun to the public. His work spans from children's mushroom educational shows and field guides to digital learning platforms and AI-generated storytelling. Oded's approach bridges visual design, environmental education, and citizen science, with the goal of strengthening local ecological literacy and reconnecting people with the living forest.

Similar Yet Different: Visual Differentiation Between *Amanita ovoidea* and *Amanita proxima*

Naftali O.[1*]

[1]*Nigun Hayaar, Israel*

*oded.naftali@gmail.com

ABSTRACT

Accurate mushroom identification is essential not only for scientific understanding but also for public safety. This educational poster presents a visual comparison between two closely resembling species, *Amanita ovoidea* and *Amanita proxima*, both common in Mediterranean forests of Israel. While *A. ovoidea* is considered edible in some regions, *A. proxima* contains dangerous toxins that can cause severe poisoning. The poster highlights the subtle yet critical visual distinctions between them—particularly in the coloration of the volva through precise illustrations and simplified graphic symbols. By translating complex morphological cues into accessible visual language, this work aims to prevent misidentification accidents and promote responsible foraging. The design reflects the philosophy of "learning through seeing," where clear artistic representation serves as a bridge between field safety, scientific accuracy, and public education.

Keywords: mushrooms, Amanita, toxicity, identification, education, Israel

SHORT BIOGRAPHY

Oded Naftali is an educator, creator, and software engineer and community builder focused on the intersection of mycology, ecology, community, and art. Founder of "Nigun Hayaar" educational initiatives in Israel, he develops creative tools that make nature study accessible, inspiring, and fun to the public. His work spans from children's mushroom educational shows and field guides to digital learning platforms and AI-generated storytelling. Oded's approach bridges visual design, environmental education, and citizen science, with the goal of strengthening local ecological literacy and reconnecting people with the living forest.

Fungi of the Wood: Visual Overview of Common Tree-Dwelling Species in Israel

Naftali O.[1*]

[1]*Nigun Hayaar, Israel*

*oded.naftali@gmail.com

ABSTRACT

Wood-inhabiting fungi are the silent architects of forest regeneration, breaking down organic matter and sustaining the ecological cycle of decay and renewal. This educational poster presents a visual overview of common fungi found on tree trunks and branches across Israel. Featuring detailed illustrations, this work highlights their diversity of form, texture, and color while depicting their natural substrates. By combining ecological context with artistic representation, the poster communicates the essential role of these organisms in forest ecosystems and their beauty as living sculptors of wood. This integration of art and ecology invites viewers to perceive fungal decomposition as a creative and vital process within Mediterranean landscapes.

Keywords: mushrooms, *Lactarius*, Israel, oak, pine

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Milk of the Forest: Visual Representation of *Lactarius* Species and Their Habitats in Israel

Naftali O.[1*]

[1]*Nigun Hayaar, Israel*

*oded.naftali@gmail.com

ABSTRACT

The genus *Lactarius* forms a distinctive and ecologically crucial component of Israel's fungal flora that engages in symbiotic mycorrhizal partnerships with local oaks and pines. This educational poster presents detailed illustrations of the major *Lactarius* species found in Israel, organized visually according to their habitat associations. Each species is depicted with scientific and Hebrew names, emphasizing morphological variation alongside ecological context. By combining artistic precision with ecological storytelling, the poster reveals how forest composition—oak versus pine—shapes fungal diversity and distribution. Designed for both educational and aesthetic engagement, the work invites viewers to appreciate *Lactarius* not only as a taxonomic group but as a living expression of forest relationships. This integration of art, ecology, and pedagogy supports a deeper public understanding of Mediterranean mycorrhizal systems and the visual cues that connect fungi to their habitats.

Keywords: mushrooms, *Lactarius*, Israel, oak, pine

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Amanitas of Israel: A Visual Celebration of Form and Diversity

Naftali O.[1*]

[1]*Nigun Hayaar, Israel*

*oded.naftali@gmail.com

ABSTRACT

The genus *Amanita* is one of the most recognizable and artistically captivating fungal groups, uniting ecological importance with striking visual diversity. This educational art poster presents detailed illustrations of *Amanita* species occurring in Israel, highlighting their characteristic forms, colors, and structures. Without relying on textual or diagnostic information, the work focuses on visual immersion—inviting viewers to observe similarities and contrasts in volvas, rings, cap textures, and pigmentation. Through minimalism and precision, the poster transforms taxonomy into an accessible visual language that transcends scientific barriers, encouraging curiosity and appreciation for fungal diversity. By merging art and natural science, this work aims to cultivate aesthetic and ecological awareness while celebrating *Amanita* as a symbol of both beauty and caution in the natural world.

Keywords: mushrooms, Amanita, illustration, art, biodiversity, Israel

SHORT BIOGRAPHY

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