

Assessment of Airborne Bacteria and Fungi in Different Home Environments

Seda Naz Sarıca^{1*}, Ayşe Bodur², Özlem Özden Üzmez³, Semra Malkoç⁴

^{1*} Eskişehir Technical University, Graduate School of Science, Department of Environmental Engineering, Eskişehir, Turkey, (ORCID: 0000-0002-5160-6809),

sedanazsarica@gmail.com

² Eskişehir Technical University, Faculty of Engineering, Department of Environmental Engineering, Eskişehir, Turkey, (ORCID: 0000-0002-6781-8363),

aysebodur2@gmail.com

³ Eskişehir Technical University, Faculty of Engineering, Department of Environmental Engineering, Eskişehir, Turkey, (ORCID: 0000-0003-4310-788X),

ozden@eskisehir.edu.tr

⁴ Eskişehir Technical University, Faculty of Engineering, Department of Environmental Engineering, Eskişehir, Turkey, (ORCID: 0000-0002-8090-411X),

semra@eskisehir.edu.tr

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Abstract

The aim of this study is to evaluate the concentrations of bacteria and fungi in different indoor environments (living area, bedroom, kitchen, bathroom, hallway) of three selected homes in Eskişehir, Turkey. In each home, one-hour measurements were performed in both midday and evening hours of a day. Measurement studies were carried out by passive method and were repeated in three seasons as winter, spring and summer in the year of 2021. Indoor/Outdoor ratios (I/O) for bacteria and fungi were calculated by using simultaneous indoor and outdoor measurement results to evaluate the effect of outdoor air on indoor air. The concentrations of bacteria and fungi aerosols in the various indoor environments of three homes ranged between 1.00 – 1889.37 CFU/m³. In general, the results were between “low” and “high” pollution degrees when compared with European Commission standards. The highest I/O ratio for bacteria was found in the bathroom of Home 3 in the summer-evening measurement period while the highest I/O fungi ratio was obtained in the hallway of Home 1 in the winter-evening period. When the relationship between bacteria and fungi concentrations measured in different seasons was investigated, weak relationship was observed in all seasons except winter season at Home 1 and spring season at Home 2. Both seasonal variations and characteristics of the home environments were observed to have an effect on the indoor bacterial and fungal concentrations.

Keywords: Bacteria, Fungi, Home Environment, Indoor Air Quality, Microbiological Assessment.

Farklı Ev Ortamlarında Havadaki Bakteri ve Mantarların Değerlendirilmesi

Öz

Bu çalışmanın amacı, Türkiye Eskişehir’de seçilen üç evin farklı iç ortamlarındaki (yaşam alanı, yatak odası, mutfak, banyo, koridor) bakteri ve mantar konsantrasyonlarını değerlendirmektir. Her evde, günün hem öğle hem de akşam saatlerinde birer saatlik ölçümler yapılmıştır. Ölçüm çalışmaları pasif yöntemle yapılmış ve 2021 yılında kış, ilkbahar ve yaz olmak üzere üç mevsimde tekrarlanmıştır. Dış ortam havasının iç ortam havası üzerindeki etkisini değerlendirmek üzere, eş zamanlı gerçekleştirilen iç ve dış ortam ölçüm sonuçları kullanılarak bakteri ve mantar için İç/Dış ortam oranları (I/D) hesaplanmıştır. Üç evin çeşitli iç ortamlarındaki bakteri ve mantar aerosollerinin konsantrasyonları 1,00 – 1889,37 CFU/m³ arasında değişmektedir. Genel olarak, elde edilen sonuçlar Avrupa Komisyonu standartlarıyla karşılaştırıldığında “düşük” ve “yüksek” kirlilik seviyeleri arasında yer almaktadır. Bakteriler için en yüksek I/D oranı yaz akşamı ölçüm periyodunda Ev 3’ün banyosunda, en yüksek I/D mantar oranı ise kış akşamı periyodunda Ev 1’in koridorunda elde edilmiştir. Farklı mevsimlerde ölçülen bakteri ve mantar konsantrasyonları arasındaki ilişki incelendiğinde, Ev 1’de kış mevsimi ve Ev 2’de ilkbahar mevsimi hariç tüm mevsimlerde zayıf bir ilişki gözlemlenmiştir. Hem mevsimsel değişimlerin, hem de ev ortamlarının özelliklerinin iç mekân bakteri ve mantar konsantrasyonları üzerinde etkisi olduğu gözlemlenmiştir.

Anahtar Kelimeler: Bakteri, Mantar, Ev Ortamı, İç Ortam Hava Kalitesi, Mikrobiyal Değerlendirme.

* Corresponding Author: sedanazsarica@gmail.com

Assessment Of Airborne Bacteria And Fungi In An Indoor And

Young-Chul Lee, Ju-Young Moon



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Sampling and Analysis of Indoor Microorganisms Chin S. Yang, Patricia A. Heinsohn, 2007-03-31 Investigation techniques and analytical methodologies for addressing microbial contamination indoors Microbial contamination indoors is a significant environmental and occupational health and safety problem This book provides fundamental background information on fungal and bacterial growth indoors as well as in depth practical approaches to analyzing and remedying problems The information helps investigators laboratory managers and environmental health professionals properly use state of the science methods and correctly interpret the results With chapters by expert microbiologists mycologists environmental professionals and industrial hygienists *Sampling and Analysis of Indoor Microorganisms* is a multidisciplinary comprehensive reference on advanced approaches covering Microbiological problems in a water damaged environment Indoor construction techniques and materials that impact environmental microbiology Microbial ecology indoors airborne bacteria genetic based analytical methods and statistical tools for microorganism analysis Microbiological sampling approaches Mold removal principles and methods including specialized microbial remediation techniques for HVAC systems legionellas and biofilms and sewage contamination A forensic approach toward the assessment of fungal growth in the indoor environment A must have guide for practicing professionals including environmental health and safety personnel public health officials and building and construction engineers and architects this is also a valuable reference for attorneys home inspectors water restoration personnel mold remediation contractors insurance adjusters and others

Pollution Assessment for Sustainable Practices in Applied Sciences and Engineering Abdel-Mohsen O. Mohamed, Evan K. Paleologos, Fares Howari, 2020-10-25 *Pollution Assessment for Sustainable Practices in Applied Sciences and Engineering* provides an integrated reference for academics and professionals working on land air and water pollution The protocols discussed and the extensive number of case studies help environmental engineers to quickly identify the correct process for projects under study The book is divided into four parts each of the first three covers a separate environment Geosphere Atmosphere and Hydrosphere The first part covers ground assessment contamination geo statistics remote sensing GIS risk assessment and management and environmental impact assessment The second part covers atmospheric assessment topics including the dynamics of contaminant transport impacts of global warming indoor and outdoor techniques and practice The third part is dedicated to the hydrosphere including both the marine and fresh water environments Finally part four examines emerging issues in pollution assessment from nanomaterials to artificial intelligence There are a wide variety of case studies in the book to help bridge the gap between concept and practice Environmental Engineers will benefit from the integrated approach to pollution assessment across multiple spheres Practicing engineers and students will also benefit from the case studies which bring the practice side by side with fundamental concepts Provides a comprehensive overview of pollution assessment Covers land underground water and air pollution Includes outdoor and indoor pollution assessment Presents case studies that help bridge

the gap between concepts and practice The Quality of Air ,2016-07-26 The Quality of Air discusses the topic from both the environmental and human health points of view As today s policymakers academic government industrial researchers and the general public are all concerned about air pollution in both indoor and outdoor scenarios this book presents the advances in the analytical tools available for air quality control within social political and legal frameworks With its multi author approach there is a wide range of expertise in tackling the topic Addresses real scenarios of polluted sites Presents updates of the available methodologies for the quality control of indoor and outdoor air Includes evaluations of working scenarios in different fields as mandated by regulations **Manual of Environmental Microbiology** Cindy H. Nakatsu,Robert V. Miller,Suresh D. Pillai,2020-08-11 The single most comprehensive resource for environmental microbiology Environmental microbiology the study of the roles that microbes play in all planetary environments is one of the most important areas of scientific research The Manual of Environmental Microbiology Fourth Edition provides comprehensive coverage of this critical and growing field Thoroughly updated and revised the Manual is the definitive reference for information on microbes in air water and soil and their impact on human health and welfare Written in accessible clear prose the manual covers four broad areas general methodologies environmental public health microbiology microbial ecology and biodegradation and biotransformation This wealth of information is divided into 18 sections each containing chapters written by acknowledged topical experts from the international community Specifically this new edition of the Manual Contains completely new sections covering microbial risk assessment quality control and microbial source tracking Incorporates a summary of the latest methodologies used to study microorganisms in various environments Synthesizes the latest information on the assessment of microbial presence and microbial activity in natural and artificial environments The Manual of Environmental Microbiology is an essential reference for environmental microbiologists microbial ecologists and environmental engineers as well as those interested in human diseases water and wastewater treatment and biotechnology The Lung Microbiome Michael J. Cox,Markus J. Ege,Erika von Mutius,2019-03-01 Studying the lung microbiome requires a specialist approach to sampling laboratory techniques and statistical analysis This Monograph introduces the techniques used and discusses how respiratory sampling 16S rRNA gene sequencing metagenomics and the application of ecological theory can be used to examine the respiratory microbiome It examines the different components of the respiratory microbiome viruses and fungi in addition to the more frequently studied bacteria It also considers a range of contexts from the paediatric microbiome and how this develops to disease of all ages including asthma and chronic obstructive pulmonary disease chronic suppurative lung diseases interstitial lung diseases acquired pneumonias transplantation cancer and HIV and the interaction of the respiratory microbiome and the environment Bionanotechnology Experimental Guide Young-Chul Lee,Ju-Young Moon,2025-07-19 This book examines the fascinating field of bionanotechnology which combines biology with the design development and uses of materials at the nanoscale A thorough introduction to nanotechnology and nanomaterials

emphasizing their creation characterization and biological uses is provided in the beginning of the book The basics and applications of nanotechnology in numerous scientific fields will be clearly understood by readers The integration of nanomaterials and nanotechnology in several fields including medicine development genomics microbiology proteomics animal cell culture in vitro biology testing and even cosmetics is covered in more detail in later chapters Examine how these sectors are changing as a result of nanotechnology which is opening up new possibilities for innovation and development Additionally this book strives to create a balance between complex ideas and understandable language The plain writing approach ensures accessibility without sacrificing the book s intellectual tone The explanation of complex ideas is useful and entertaining An additional chapter in this book describes the procedures for creating an academic report This book provides you the knowledge and abilities you need to effectively explain scientific discoveries whether you re a researcher scientist or student

Encyclopaedia of Occupational Health and Safety: Hazards Jeanne Mager Stellman,1998 Aerosol Measurement Pramod Kulkarni,Paul A. Baron,Klaus Willeke,2011-09-09 Aerosol Measurement Principles Techniques and Applications Third Edition is the most detailed treatment available of the latest aerosol measurement methods Drawing on the know how of numerous expert contributors it provides a solid grasp of measurement fundamentals and practices a wide variety of aerosol applications This new edition is updated to address new and developing applications of aerosol measurement including applications in environmental health atmospheric science climate change air pollution public health nanotechnology particle and powder technology pharmaceutical research and development clean room technology integrated circuit manufacture and nuclear waste management *A Protocol for the Assessment of Indoor Air Quality in Homes and Office Buildings* Derrick Crump,2002 BRE specialists reviewed the parameters that determine indoor air quality IAQ and drafted a protocol for undertaking an IAQ assessment This report provides the final protocol revised following comments from experts and a field trial and is intended as guidance for specialists undertaking an IAQ assessment and building owners managers concerned about IAQ The key parameters are temperature humidity non biological particles and fibres biological particles radon other inorganic gases organic compounds and gases associated with landfill sites eg methane Abstracts of the ... General Meeting of the American Society for Microbiology American Society for Microbiology. General Meeting,2006

Aerobiological Engineering Handbook : Airborne Disease and Control Technologies Wladyslaw Kowalski,2005-12-13 Solve any building air quality problem A complete reference for the design of air filtration systems and HVAC systems used in homes schools hospitals laboratories or animal facilities this book offers complete descriptions of each of the major technologies currently used for air disinfection Each subject chemical or microbial is treated in sufficient detail to allow the design of these components to solve specific building air quality problems Design solutions for control of gases and odors Recommended technologies and methods to combat biological terrorist weapons in HVAC systems Diagnosis of air quality problems Complete airborne pathogen database for the identification of infection risk Handbook of Occupational Safety

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