Journal of Ecology and Toxicology

Editorial Open Access

Microbial Explorations of Dried Fruits of Ficus carica: Insights into Rhizospheric and Endophytic Bacterial Diversity

Lamis Abid*

Department of Chemistry, Biology and Biotechnology, University of Perugia, Perugia, Italy

Abstract

Dried fruits of Ficus carica, commonly known as figs, have been cherished for their rich flavor and nutritional benefits for centuries. Apart from their culinary value, figs are also known to harbor a diverse range of microorganisms, including bacteria, which play crucial roles in the fruit's growth, development, and overall health. This study aims to explore the microbial diversity present in the rhizosphere and endosphere of dried fruits of Ficus carica, providing valuable insights into the bacteria associated with this fruit and their potential ecological significance. A high diversity of bacterial communities associated with Ficus carica rhizosphere soil was detected, especially in two regions of Beni Khiar and Kerkouane. Phylogenetic analysis of the isolates demonstrated that species were divided into six phyla, 17 different bacterial genera, indicating a large genetic diversity in Ficus carica rhizosphere.

Keywords: Ficus carica; Dried fruits; Figs; Rhizospheric bacteria; Endophytic bacteria; Microbial diversity; Plant-microbe interactions

Introduction

Ficus carica, a member of the Moraceae family, is a deciduous tree widely cultivated for its succulent fruits, known as figs. Figs have long been recognized for their nutritional composition, containing essential minerals, vitamins, and dietary fiber [1]. In addition to their dietary significance, figs are known to host a complex microbial community that influences their growth, ripening, and preservation. Among these microorganisms, bacteria have gained attention due to their diverse metabolic capabilities and potential interactions with the fruit's physiology. here is currently an increasing demand for the characterization of endophytic bacteria isolated from different parts of plants in order to improve the organic agriculture practices [2]. The current research was performed to identify both rhizospheric bacteria isolated from the rhizosphere of Ficus carica in three different sites in the north of Tunisia and endophytic bacteria isolated from dried figs. We then characterized them for a diversity of plant growth-promoting activities. The most common PGP trait for all bacteria from the three regions was siderophore production , followed by cellulase , then protease activity , then by lipases activity and lastly by solubilization of phosphates . The majority of the isolates manifested a possible adaptation to abiotic stress and unfavorable environments [3].

Methods

To investigate the microbial diversity in the dried fruits of Ficus carica, rhizospheric and endophytic bacteria were isolated. Rhizospheric samples were collected from the soil surrounding the fig tree's roots, while endophytic bacteria were obtained by surface sterilizing the fruits and isolating bacteria from their internal tissues [4]. The isolated bacteria were cultured using various selective media, followed by DNA extraction, PCR amplification of the 16S rRNA gene, and subsequent sequencing. Bioinformatics tools were employed for taxonomic classification and diversity analysis of the obtained bacterial sequences [5].

Bacteria isolation from Ficus carica rhizosphere

Bacteria isolation was carried out by the suspension of one gram of rhizosphere soil in 9 ml of sterile physiological solution, and then the tubes for each sample were shacked for 24 h at 400 rpm. Then, suspensions were diluted with physiological water in tenfold series and plated on PCA TSA, and KB media. After cultivating for 5 days at 30°C, different colonies were picked and plated in triplicate [6]

Results

The microbial exploration of dried fruits of Ficus carica revealed a remarkable diversity of rhizospheric and endophytic bacteria. Taxonomic analysis identified a wide range of bacterial phyla, including Proteobacteria, Firmicutes, Actinobacteria, and Bacteroidetes [7]. Within these phyla, several genera commonly associated with plant-microbe interactions were identified, such as Bacillus, Pseudomonas, Rhizobium, and Enterobacter. The diversity and composition of bacterial communities differed between the rhizosphere and endosphere, indicating distinct microenvironments and potential ecological roles for the bacteria within each compartment [8].

Discussion

The presence of diverse bacterial communities in the rhizosphere and endosphere of dried fruits of Ficus carica suggests intricate microbial interactions and potential functional roles in the fruit's health and development [9]. Rhizospheric bacteria are known to contribute to plant nutrient uptake, protection against pathogens, and growth promotion. Endophytic bacteria, on the other hand, can colonize the fruit's tissues and potentially influence its ripening, post-harvest characteristics, and even contribute to its aroma and flavor profiles. The identification of plant growth-promoting bacteria and those with potential antimicrobial properties among the isolated strains further emphasizes their ecological significance [10].

***Corresponding author:** Lamis Abid, Department of Chemistry, Biology and Biotechnology, University of Perugia, Perugia, Italy, E-mail: Abidlamis444@gmail.com

Received: 01-May-2023, Manuscript No: jety-23-100782, **Editor assigned:** 03-May-2023, Pre-QC No: jety-23-100782 (PQ), **Reviewed:** 17-May-2023, QC No: jety-23-100782, **Revised:** 23-May-2023, Manuscript No: jety-23-100782 (R), **Published:** 30-May-2023, DOI: 10.4172/jety.1000161

Citation: Abid L (2023) Microbial Explorations of Dried Fruits of Ficus carica: Insights into Rhizospheric and Endophytic Bacterial Diversity. J Ecol Toxicol, 7: 161.

Conclusion

Microbial explorations of dried fruits of Ficus carica have provided valuable insights into the rhizospheric and endophytic bacterial diversity associated with these fruits. The findings highlight the complex interactions between Ficus carica and its bacterial communities, suggesting potential implications for fruit growth, development, and quality. Further research on the functional roles of these bacteria and their interactions with the fruit's physiology may pave the way for innovative strategies in fig cultivation, post-harvest preservation, and nutritional enhancement.

References

1. Akcil A, Erust C, Ozdemiroglu S, Fonti V, Beolchini F (2015) A review of approaches and techniques used in aquatic contaminated sediments: metal removal and stabilization by chemical and biotechnological processes. J Clean Prod 86: 24-36.
2. Gillespie IMM, Philip JC (2013) Bioremediation an environmental remediation technology for the bioeconomy. Trends Biotechnol 31: 329-332.
3. Mishra A, Malik A (2014) Novel fungal consortium for bioremediation of metals and dyes from mixed waste stream. Bioresour Technol 171: 217-226.
4. Sagarkar S, Mukherjee S, Nousiainen A, Björklöf K, Purohit HJ, et al. (2013) Monitoring bioremediation of atrazine in soil microcosms using molecular tools. Environ Pollut 172: 108-115.
5. Lien PJ, Ho HJ, Lee TH, Lai WL, Kao CM (2015) Effects of aquifer heterogeneity and geochemical variation on petroleum-hydrocarbon biodegradation at a gasoline spill site . Adv Mater Res 1079: 584-588.
6. Qin G, Gong D, Fan MY (2013) Bioremediation of petroleum-contaminated soil by biostimulation amended with biochar. Int Biodeterior Biodegradation 85: 150-155.
7. Claus H (2014) Microbial degradation of 2,4,6-trinitrotoluene in vitro and in natural environments. Int Degrad 15-38.
8. Nõlvak H, Truu J, Limane B, Truu M, Cepurnieks G (2013) Microbial community changes in TNT spiked soil bioremediation trial using biostimulation, phytoremediation and bioaugmentation. J Environ Eng Landsc Manag 21: 153-162.
9. Pingali PL (2012) Green revolution: impacts, limits, and the path ahead. Proc Natl Acad Sci 109: 12302-12308.
10. Duque Acevedo M, Belmonte Ureña LJ , Cortés García FJ, Camacho Ferre F (2020) Agricultural waste: review of the evolution, approaches and perspectives on alternative uses. Glob Ecol Conserv 22: 902-604.