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Study of Cultivation and Nutritional Value of Microgreens: A Bibliometric Analysis

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INTRODUCTION & AIM

Microgreens, also known as confetti, are young vegetables, harvested a few days after germination. They are notable for their bright colors, delicate textures, and high nutritional value, as they contain higher concentrations of vitamins, minerals, and antioxidants than mature vegetables. Apart from microgreens, baby leaves are harvested 20–40 days after germination, offering high nutritional value and antioxidant activity, with minimal processing and long shelf life. Mature plants represent the final stage of plant development, with fully developed structures and a critical role in reproduction and ecological balance. A comparison between sprouts, microgreens, baby leaves, and mature plants reveals differences in growth time, light and water requirements, cultivation method, and harvesting method (Bhaswant et al., 2023; Kyriacou et al., 2019). The growing demand for functional foods and sustainable farming methods has boosted scientific interest.

The purpose of this study is to conduct a bibliometric analysis of the international literature on microgreens, with the aim of highlighting research trends, thematic areas, and collaborative networks.

METHODS

This study uses bibliometric analysis to systematically investigate the scientific literature on microgreens, with the aim of highlighting research trends, thematic areas, and collaborative networks from 1982 to 2023. The data were collected from the Scopus, PubMed, and Web of Science databases, filtered to focus exclusively on microgreens, and merged into a single data set using Microsoft Excel. The analysis was performed in RStudio using the Bibliometrix package, which provided statistics, thematic maps, and collaboration networks (Aria & Cuccurullo, 2017). The process included data cleaning, duplicate removal, and thematic mapping, providing a comprehensive picture of the scientific landscape and emerging trends in the field of microgreens.

Timespan: 1982 – 2023 (41 years)
Documents: 462
Document type: Articles, Reviews
Software: R (Bibliometrix package)
Bibliographic Databases: SCOPUS, PubMed, Web of Science
Search Queries: (Last updated April 2024)
-SCOPUS: TITLE-ABS-KEY(micro*green*) (588 documents)
-Web of Science: micro*green* (Topic) (514 documents)
-PubMed “microgreen”[All Fields] OR “microgreens”[All Fields] OR “microgreen” [All Fields] (223 documents)
Number of duplicated articles: 863

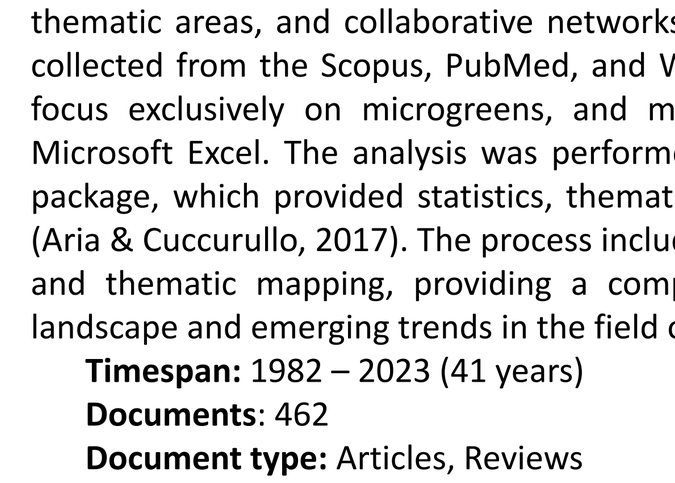

Figure 1. Annual Growth Production.

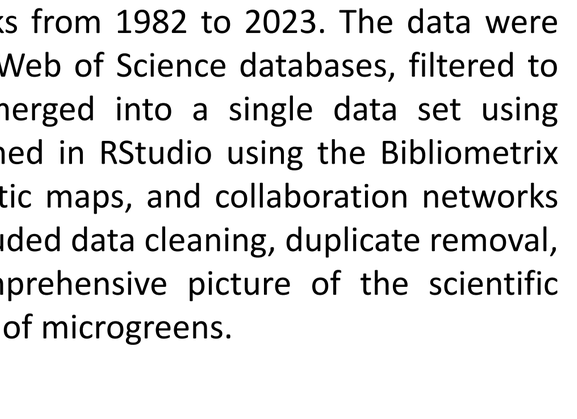

Figure 2. Most contributing countries.

RESULTS

Over the last decade, there has been an increase in research activity (annual scientific growth 12.48%) (Figure 1). The most contributing countries are USA, Italy and India while two Italian universities lead the way in research (University Naples Federicco II, University Bari Aldo Moro) (Figure 2). The most relevant sources are Horticulturae (n=28), Foods (n=23) and Agronomy (n=20) (Figure 3). Among the authors, Luo Y. stands out as the most important (20 papers, TC-index=1087, H-index=15), Xiao Z. (2012) is the most global cited author (288 citations, Journal of Agricultural Chemistry) and Pinto E. (2015) is the most local cited author (75 citations, Journal of Food Composition and Analysis). Research about microgreens peaked between 2021 and 2023 (Figure 4), maintaining steady interest due to their nutritional value, often studied alongside sprouts for their health benefits. Light-emitting diodes are frequently associated with microgreens in studies focused on cultivation technologies and optimizing environmental conditions to enhance antioxidant content and growth (Figure 5).

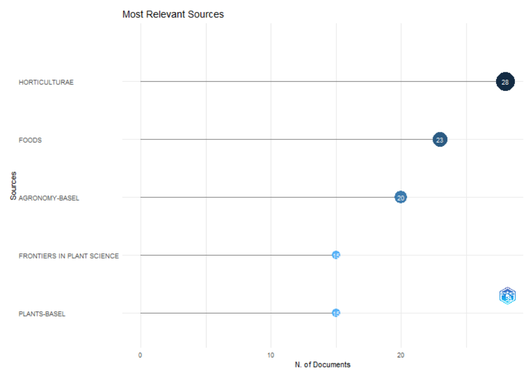

Figure 3. Most Relevant Sources.

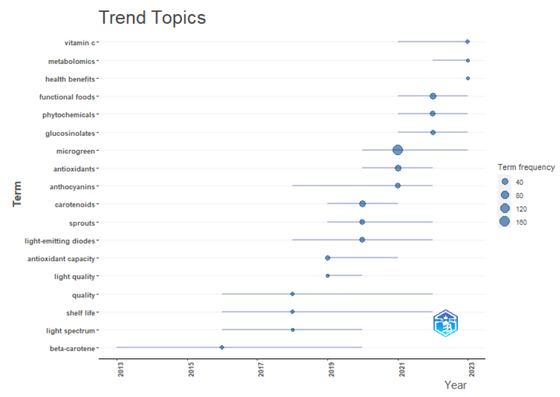

Figure 4. Trend Topics.

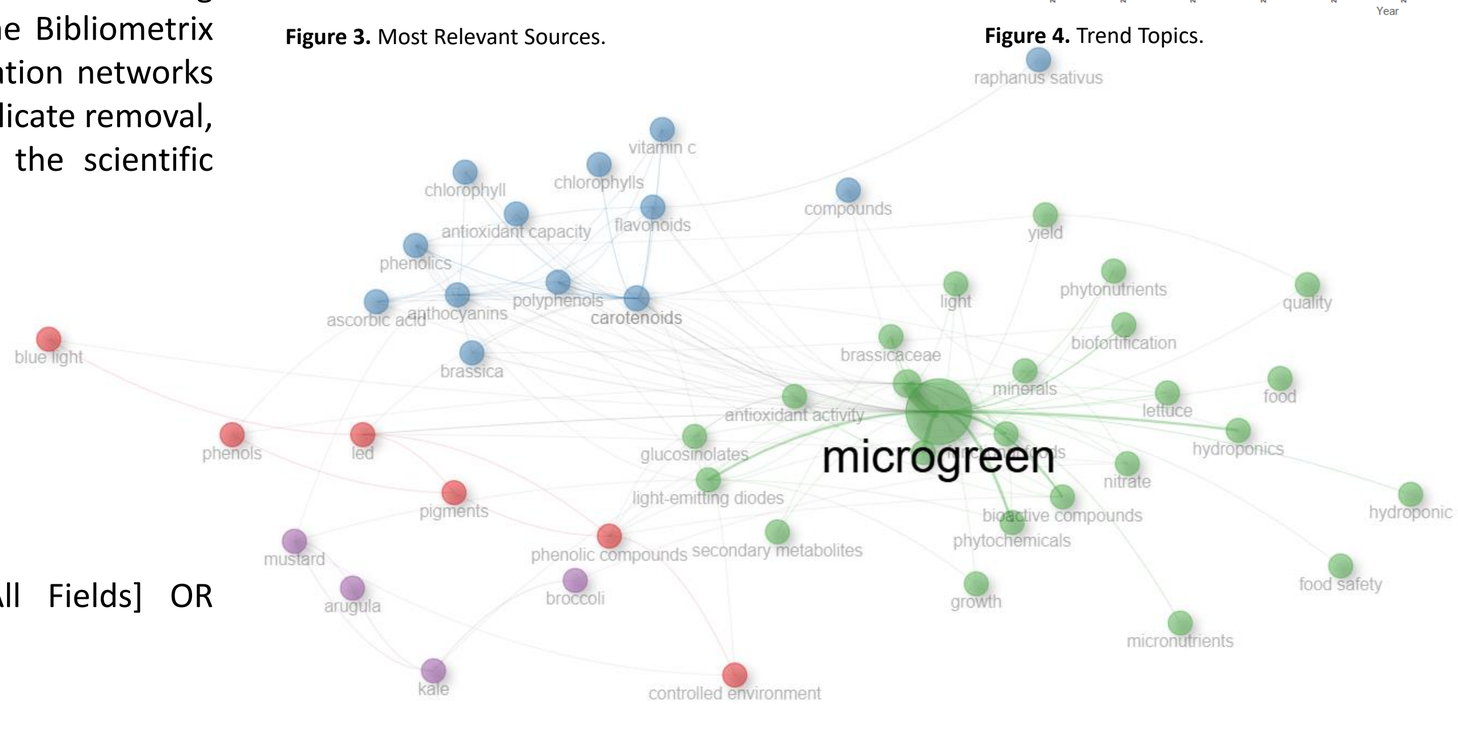

Figure 5. Co-occurrence network.

DISCUSSION & CONCLUSION

The analysis indicates that the research community is interconnected, with strong collaborative patterns. Key focus areas that emerged were the nutritional value of microgreens, innovative cultivation methods, and potential health benefits, revealing interdisciplinarity. Of particular interest is the application of advanced cultivation methods (hydroponics, aeroponics) which provide solutions for sustainable agriculture and food security. Challenges and future research directions are also highlighted, including the need to standardize cultivation methods and further explore the bioavailability and health effects of microgreens’ bioactive compounds.

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