

TRENDS IN FOOD PROCESSING: INNOVATIONS FOR HEALTHY AND SUSTAINABLE EATING

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Abstract

Through this document, it was possible to analyze the main characteristics of the volume of scientific production regarding the study of the variables Food Processing, Innovation and Healthy Eating. A bibliometric analysis was proposed to analyze details such as Year of Publication, Country of Origin of the publication, Area of Knowledge in which the published research is carried out and the Type of Publication most frequently used by the authors of each document published in high-impact journals indexed in the Scopus database during the period between 2017 and 2022. Among the main findings, it was possible to determine that, for the execution of the different research methodologies, the report of 80 scientific documents related to the study of innovative trends in food processing within the tenure to a healthier and more sustainable diet was achieved. The maximum number of publications made in a year was 27 papers submitted in 2022. The country of origin of the institutions that reported the highest number of records in Scopus, was China with 15 documents. The area of knowledge with the greatest influence at the time of executing the research projects that resulted in scientific publications was Agriculture and Biological Sciences with 51 documents. Finally, the type of publication most frequently used to publicize findings from the analysis of the aforementioned variables was the Article, which represented 46% of the total scientific production.

Keywords: Food Processing, Innovation, Trends, Healthy Eating, Sustainable Eating.

1. Introduction

Food production processes play a crucial role in realizing a healthy and sustainable diet. Innovation in these processes has become a major focus in the development of food products to meet the changing needs of consumers who are concerned about their health and environmental impact. In recent years, we have seen a growing interest in foods that promote health and protect the environment. This leads to different approaches and innovative technologies in the production process. One of the main aspects of innovation in food production is the improvement of the nutritional value of products.

Consumers are looking for foods that are rich in essential nutrients and provide health benefits. In response to this demand, production technologies are being developed that conserve nutrients and reduce losses during processing. In addition, reducing food waste has become a major concern. It is estimated that huge amounts of food are wasted at all stages of production and supply chains. To combat this, more efficient production processes are introduced to reduce waste and optimize the use of available resources. Environmental sustainability is also at the heart of innovation in food production processes. Methods are being developed to reduce the consumption of energy, water and natural resources and the emission of greenhouse gases.

Adopting sustainable farming methods, implementing organic production methods and using renewable energy are some of the strategies used to achieve more sustainable food production. In addition, new technologies and production methods are being researched to improve food security. Early detection of contaminants, the use of non-thermal processing methods and real-time quality control are some of the advances that have improved food safety and quality. For this reason, this article seeks to describe the main characteristics of the compendium of publications indexed in the Scopus database related to the variable variables Food Processing, Innovation and Healthy Eating, as well. As the description of the position of certain authors affiliated with institutions, during the period between 2017 and 2022

2. General objective

Analyze from a bibliometric approach, the characteristics in the volume of scientific production related to Food Processing, Innovation and Healthy Eating, registered in Scopus during the period 2017-2022.

3. Methodology

This article is carried out through a mixed orientation research that combines the quantitative and qualitative method.

On the one hand, a quantitative analysis of the information selected in Scopus is carried out under a bibliometric approach of the scientific production corresponding to the study of Food Processing, Innovation and Healthy Eating. On the other hand, examples of some research works published in the area of study indicated above are analyzed from a qualitative perspective, starting from a bibliographic approach that allows describing the position of different authors against the proposed topic.

It is important to note that the entire search was performed through Scopus, managing to establish the parameters referenced in Figure 1.

3.1 Methodological design

Figure 1. Methodological design



Source: Authors.

3.1.1 Phase 1: Data collection

Data collection was executed from the Search tool on the Scopus website, where 80 publications were obtained from the choice of the following filters:

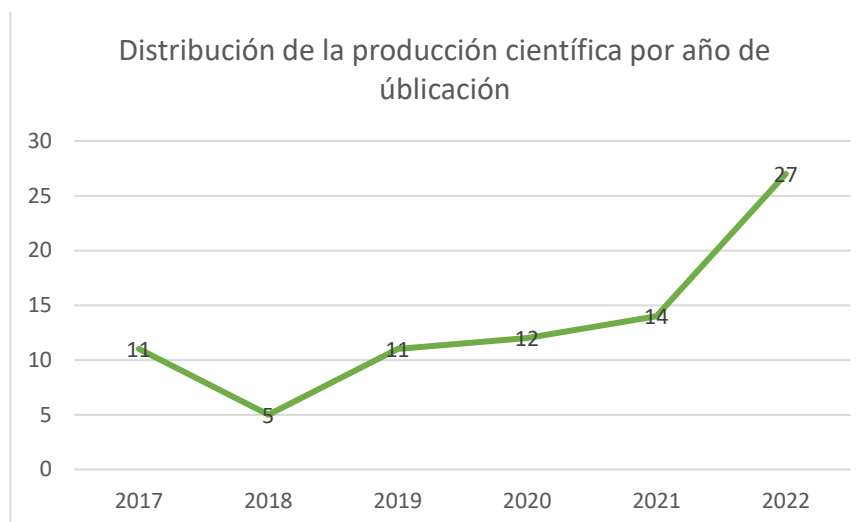
- TITLE-ABS-KEY (food AND processing, AND innovation, AND healthy AND food) AND (LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017))
- Published documents whose study variables are related to the study of Food Processing, Innovation and Healthy Eating.
- Works published in journals indexed in Scopus during the period 2017-2022.
- No distinction by country of origin
- Without distinction in areas of knowledge.
- Regardless of type of publication.

Development, Human, Food Systems. From the above, one of the main trends in food processes to promote healthy eating is the reduction of unhealthy ingredients and additives. Consumers are increasingly concerned about the quality of the food they eat and are looking for more natural and less processed options. Therefore, food processes are evolving to eliminate or reduce the use of artificial ingredients, added sugars, saturated fats and other additives harmful to health. Another important trend is the improvement of the nutritional quality of food. Food processes are designed to preserve essential nutrients and minimize losses during processing. In addition, fortification technologies are being developed to fortify foods with key nutrients, such as vitamins, minerals and antioxidants, with the aim of offering more nutritious options for consumers.

4.2 Distribution of scientific production by year of publication

Figure 3 shows how scientific production is distributed according to the year of publication.

Figure 3. Distribution of scientific production by year of publication.



Source: Own elaboration (2023); based on data exported from Scopus

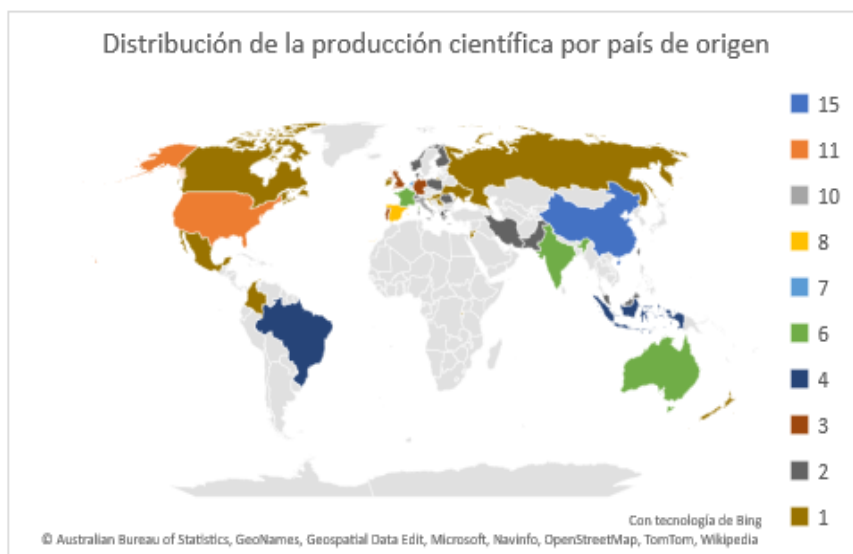
Among the main characteristics evidenced by the distribution of scientific production by year of publication, a level of number of publications registered in Scopus is notorious in the years 2022, reaching a total of 27 documents published in journals indexed in said platform. This can be explained by articles such as the one entitled "A systematic review of fermented fruit-based foods as an approach to improve dietary diversity" The aim of this systematic review is to provide an in-depth perspective of non-alcoholic fermented fruit drinks with an emphasis on the enhancement of bioactive and nutritional compounds such as phenolic compounds, vitamins and minerals, and their effort as

pro/prebiotic diets. For example, consumption of fermented fruits and fruit-based probiotic foods, such as kombucha, has increased, and evidence of effects on antioxidant and bioactive compounds is presented and analyzed. Researchers use cutting-edge technology and innovations to convert fermented fruits into functional beverages with bioactive metabolites and phytochemicals. Therefore, for the production of any functional beverage, it is essential to optimize microbial strains that can use different fruit matrices as a single or in combination. These perspectives articulate fruit-based probiotics as one of the possibilities of fruit processing for culinary and pro-health purposes. Novelty Impact Statement: This systematic review focuses notably on fruit fermentation along with several bioactive ingredients derived from fermented fruits. In addition, a comprehensive description of fruits and fruit juices as promising carriers of probiotics, fermented fruits as dietary supplements that are on the market, and related future prospects are discussed.(Doriya, 2022)

4.3 Distribution of scientific production by country of origin.

Figure 4 shows how scientific production is distributed according to the nationality of the authors.

Figure 4. Distribution of scientific production by country of origin.



Source: Own elaboration (2023); based on data provided by Scopus.

Within the distribution of scientific production by country of origin, records from institutions were taken into account, establishing China, as the country of that community, with the highest number of publications indexed in Scopus during the period 2017-2022, with a total of 15 publications in total. Secondly, the United States with 11 scientific papers, and Italy ranking third presenting to the scientific community,

with a total of 10 papers among which is the article entitled "Plant research matters for Africa" this article aims to analyze a food systems framework to discuss knowledge gaps and research priorities to improve plant production and consumption, which leads to healthier diets, but also to employment and income opportunities, particularly for women and young people. This will require a deep understanding of vegetable supply chains, food environments, dietary gaps and consumer behaviour, as well as external factors such as climate change, urbanisation and policies. Making vegetables more available and affordable will require technological and organizational innovations along the supply chain, from seed to retail, and strong public-private partnerships. Vegetable productivity is affected by poor seed quality, unadapted crops, suboptimal production practices, lack of protected cultivation technology, and pest and disease attacks exacerbated by climate change.(Wopereis M.C.S, 2022)

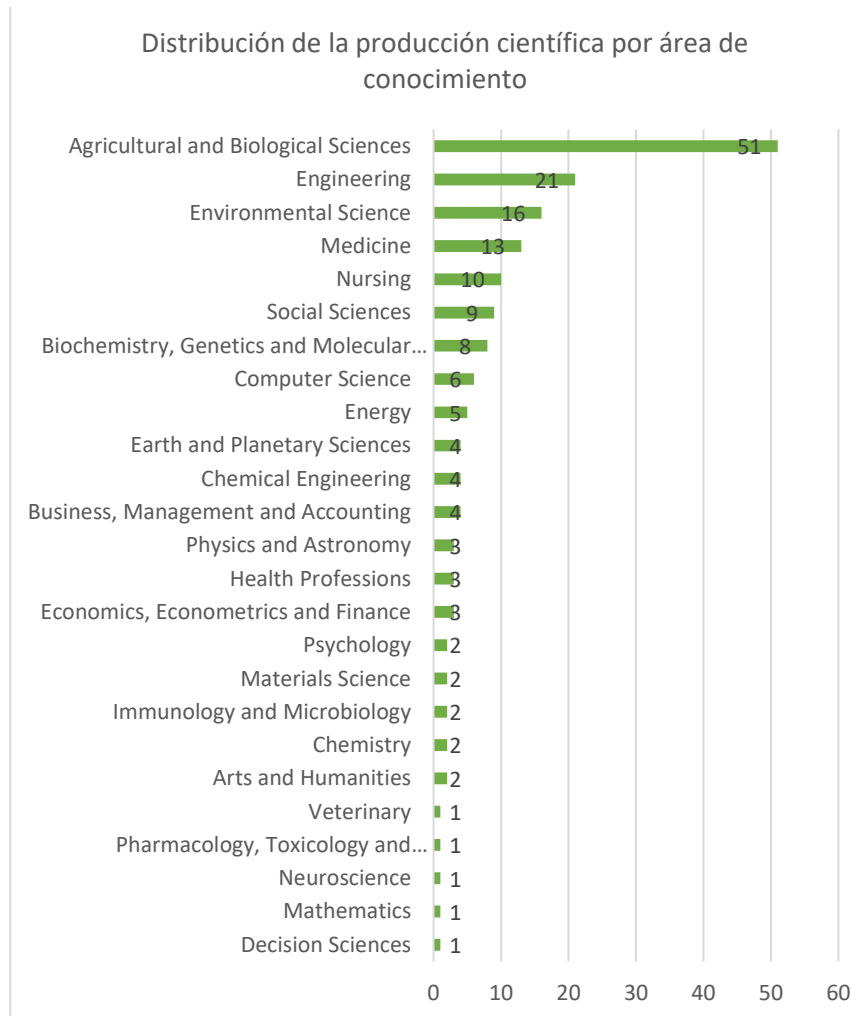
4.4 Distribution of scientific production by area of knowledge

Figure 5 shows the distribution of the elaboration of scientific publications from the area of knowledge through which the different research methodologies are implemented.

Agricultural and Biological Sciences was the area of knowledge with the highest number of publications registered in Scopus with a total of 51 documents that have based their methodologies variables Food Processing, Innovation and Healthy Eating. In second place, Engineering with 21 articles and Environmental Science in third place with 16. The above can be explained thanks to the contribution and study of different branches, the article with the greatest impact was registered by the area of Agricultural and Biological Sciences entitled "A sustainable approach to the development of innovative products from fruit and vegetable by-products" whose scope of study seeks to offer solutions by providing sustainable methods to minimize their waste losses and transform them into valuable products, with affordable equipment and techniques. The study focuses on the preliminary phase of quantitative analysis of fruit and vegetable by-products generated on a small scale, showing the results an average productivity of 55% in fresh juices. Due to the high remaining water content in the waste, a new mechanical pressing process of the resulting squeezed pulp was introduced, generating an additional juice yield, ranging from 3.98 to 51.4%. Due to the growing trend towards a healthier lifestyle, by-products were frozen or air-dried for preservation at each of the processing stages, and total phenolic compounds and antioxidant activity were analyzed to assess the traceability of these bioactive compounds to help maximize their transfer to future end products. The polyphenols transferred to by-products varied between 7 and 23% in pulps and between 6 and 20% in flours. The highest potential of DPPH was found in flours, up to three times compared to the raw material, but the high dry matter content

must be taken into account. The results highlight the potential of reusing processing waste as a reliable source of bioactive compounds.(Muntean, 2022)

Figure 5. Distribution of scientific production by area of knowledge.

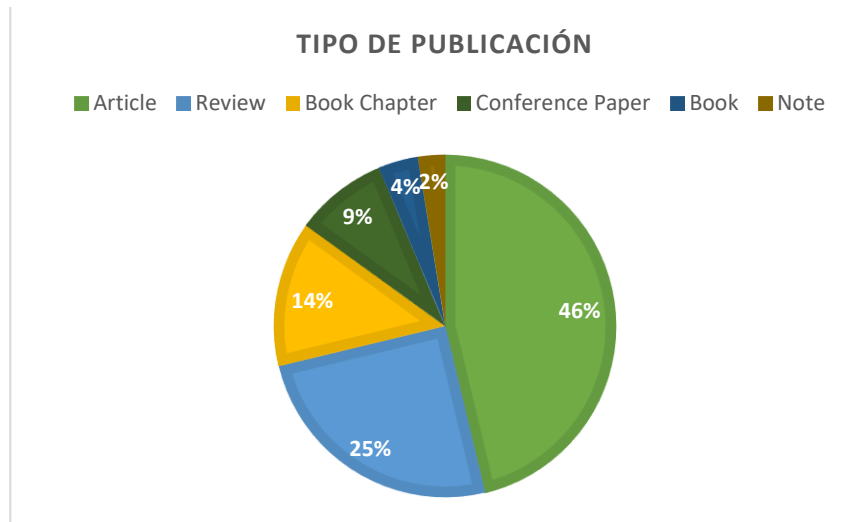


Source: Own elaboration (2023); based on data provided by Scopus.

4.5 Type of publication

In the following graph, you will observe the distribution of the bibliographic finding according to the type of publication made by each of the authors found in Scopus.

Figure 6. Type of publication.



Fountain: Own elaboration (2023); based on data provided by Scopus.

The type of publication most frequently used by the researchers referenced in the body of this document was the Journal Article with 46% of the total production identified for analysis, followed by Journal with 14%. Chapter of the Book are part of this classification, representing 9% of the research papers published during the period 2017-2022 in journals indexed in Scopus. In this last category, the title "The importance of food processing and eating behavior in promoting healthy and sustainable diets" stands out. Numerous association studies and findings from a controlled feeding trial have led to suggestions that "processed" foods are bad for health. Food processing and formulation technologies are essential to food preservation and provide access to safe, nutritious, affordable, attractive and sustainable food for millions of people around the world. However, food processing at any level can also have negative health consequences as a result of thermal destruction of vitamins; formation of toxins such as acrylamide; or excessive intakes of salt, sugar and fat. Research on ultra-processed foods focuses on the composition and formulation of foods. In addition, many modern food formulations may have poor nutritional quality and higher energy density. We describe the role of processing in providing a safe and secure food supply and explore the characteristics of processed foods that promote higher energy intake. Despite the potential for negative health effects, food processing and formulation represent an opportunity to apply the latest advances in technology and ingredient innovation to improve the food supply by creating foods that decrease the risk of overeating.(Forde, 2022)

5. Conclusions:

Through the bibliometric analysis carried out in the present research work, it was established that China was the country with the highest number of records published for the variables Food Processing, Innovation and Healthy Eating with a total of 15 publications in the Scopus database. Similarly, it was established that the application of theories framed in the area of Agricultural and Biological Sciences, were the most frequently used in the implementation of trends in food processes has a significant impact on the promotion of healthy and sustainable eating. Through innovation in the food industry, new forms of production are being developed that address current challenges related to health, environment and food safety. The adoption of these trends involves a reduction of unhealthy ingredients and additives in food, which improves its nutritional quality and contributes to a more balanced diet. Eliminating or reducing the use of artificial ingredients, added sugars and saturated fats encourages healthier eating and prevents diet-related diseases. In addition, the implementation of trends in food processes drives the production of plant-based foods as more sustainable and healthy alternatives to animal products. This helps reduce the environmental impact of agriculture and livestock, promoting the conservation of natural resources and the reduction of greenhouse gas emissions. Innovation in food processes also translates into greater efficiency in the use of resources, such as water and energy, as well as reduced food waste. This contributes to global sustainability by minimizing the environmental footprint of food production and optimizing the use of limited resources. Transparency and traceability in food processes allow consumers to make more informed and conscious choices about their diet. By providing clear information on the origin of food, the production methods used and the ingredients used, greater trust is fostered and the relationship between consumers and producers is strengthened.

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- [ОРГАНИЧЕСКОЕ СЕЛЬСКОЕ ХОЗЯЙСТВО В РОССИИ: ОСОБЕННОСТИ РАЗВИТИЯ И ВОЗМОЖНЫЕ СОЦИАЛЬНО-ЭКОЛОГИЧЕСКИЕ ЭФФЕКТЫ] *Izvestiya Rossiiskoi Akademii Nauk.Seriya Geograficheskaya*, 85(5), 675-686. doi:10.31857/S2587556621050137
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