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# Brazilian Publications on the Application of Ionizing Radiation on Food Packaging

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## 1. Introduction

Irradiation is a well-established technique with a wide range of applications in food preservation. Ionizing radiation (gamma rays, X-rays, or electron beams) is applied to prepackaged food to enhance safety and extend shelf life by killing bacteria, pests, and mold without heat [1]. Irradiation of prepackaged foods can cause chemical and physical changes in plastic packaging materials, so the main tendency has been to search for natural materials that can be used instead. In the last decades, ionizing radiation has started to be explored for the development of new materials based on natural polymers. One of these applications is the fabrication of new biodegradable primary packaging materials to be used in direct contact with food products based on natural biodegradable polymers like proteins or polysaccharides, mainly starch, known to be able to form films or coatings [2, 3]. In the present article, data obtained from the Capes Periodical Portal collection are presented showing the participation of Brazil in the number of publications along the years since the respective first records on subjects related to the application of ionizing radiation on food packaging. The study will focus on Brazilian participation in national and international paper production on themes related to food irradiation, food packaging, biodegradable packaging, starch, and packaging.

## 2. Methodology

For the literature search on the application of ionizing radiation to food packaging, the CAPES Periodicals Portal collection was used. The search included selected databases, journals, and books, encompassing both Brazilian and international publications. Content signed with scientific publishers is available to the identified IP addresses of participating institutions. The search was focused using different tag or keywords since the 1st record to the end of 2025. Publications in English were retrieved by limiting the search to the "title," "abstract," and "keyword" fields.

## 3. Results and Discussion

The number of publications on food irradiation, food packaging, biodegradable packaging and on food + packaging + ionizing radiation are presented in figures 1, 2, 3 and 4 respectively. These first 3 items increase almost exponentially as a function of time, being the Brazilian contribution present in recent years although small. Data from the combination of the food + packaging +ionizing radiation represent the novelty of such field of study as very few laboratories perform research on that.

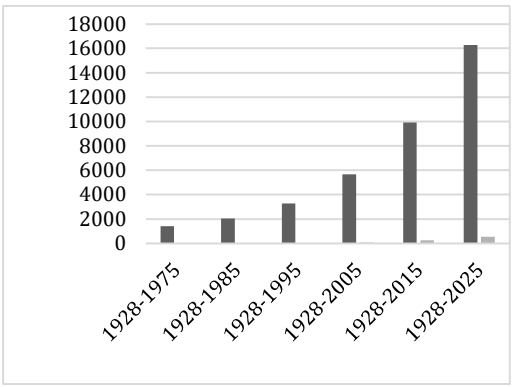



Figure 1: Number of articles published on food irradiation. Black: international production; grey: Brazilian production

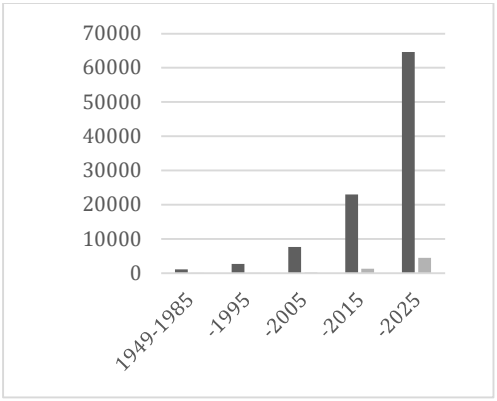



Figure 2: Number of articles published on food packaging. Black: international production; grey: Brazilian production

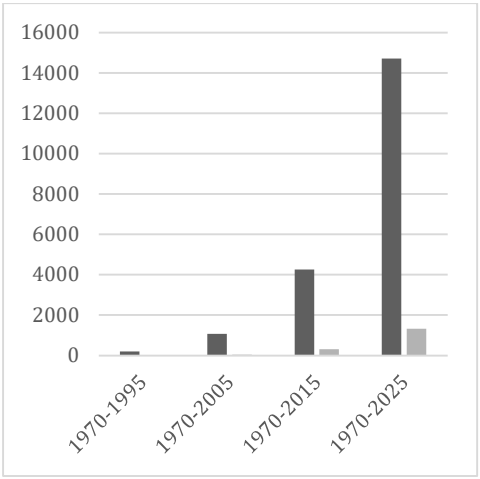



Figure 3: Number of articles published on biodegradable packaging. Black: international production; grey: Brazilian production

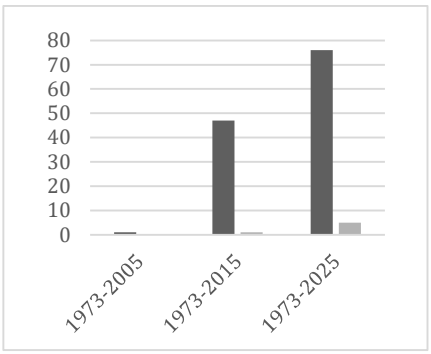



Figure 4: Number of articles published on food + packaging +ionizing radiation. Black: international production; grey: Brazilian production

In figures 5 and 6 are displayed data related to the number of publications found on starch, a specific material used in the development food packaging.

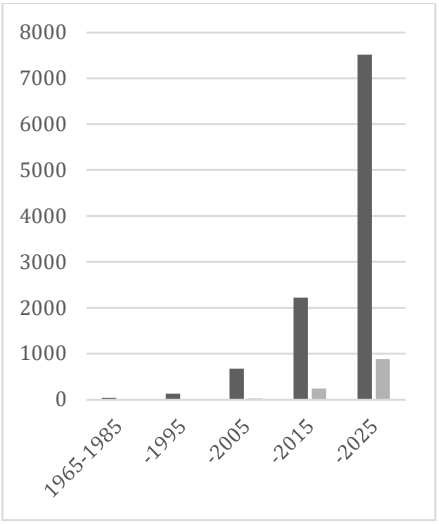



Figure 5: Number of articles published on starch + packaging. Black: international production; grey: Brazilian production

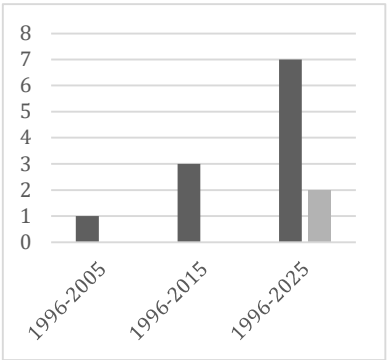



Figure 6: Number of articles published on starch + packaging + ionizing radiation. Black: international production; grey: Brazilian production

## 4. Conclusions

Present data are limited by the choice of words made by different authors. Nevertheless, they show the enormous quantity of publication about food packaging due to their importance. Also, it is evident the tendency of steady growth of the application of ionizing radiation in the development of biodegradable packaging materials together with the use of starch as a component on new biodegradable packaging materials for food. Brazilian share in that worldwide literature appears incipient but promising.

## References

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