

1. Background and goal of the present work

Cultural heritage institutions have long relied on chemical treatments to preserve organic materials such as wood, textiles, and plant fibers from biological threats like mold, insects, and pests. Since the late 19th century, the use of pesticides in museums and libraries has increased, often leading to multiple contaminations from various chemical substances (ODEGAARD & SADONGEI, 2005). While these methods were effective in preventing deterioration, they pose significant risks to both the artifacts and the health of conservators (Fig 1).



Fig. 1. Object with crystalline efflorescence and label indicating pesticide treatment from the Museu de Arqueologia e Etnologia (MAE-USP) collection.

In recent years, there has been a growing need for sustainable and non-toxic conservation methods. Gamma ionization, a technique that uses radiation to disinfect cultural artifacts, has emerged as a promising alternative. However, its adoption remains limited due to a lack of awareness and trust among professionals.

The goal of this survey was to assess the current use of traditional chemical treatments in cultural heritage conservation and to evaluate the level of acceptance and awareness of gamma ionization as a sustainable alternative. By understanding regional trends and barriers, this study aims to promote the adoption of safer and more environmentally friendly conservation practices.

2. Materials and methods

Survey Design:

- An online survey with 20 questions was distributed in English, Spanish, and Portuguese to reach a diverse audience.

- The survey was divided into four sections:

- 1) General information about participants (e.g., experience, institution type, country);
- 2) Preventive conservation practices;
- 3) Use of toxic treatments;
- 4) Use of non-toxic alternatives, including gamma ionization.

Data Collection:

- The survey was available from September to November 2022 and shared via professional forums, social media, and conservation networks.

Data Analysis:

- Responses were analyzed using Microsoft Power BI® software.
- Geographic regions were grouped to identify trends in the use of toxic and non-toxic treatments (Fig. 2).



Fig. 2. Flowchart or diagram showing the survey process.

3. Results and Discussion

Geographic distribution and professional background of participants:

- 192 professionals from 30 countries participated, with the majority from Latin America, Europe, and North America (Fig. 3).
- A total of 169 (88%) participants indicated that they had at least five years of experience in cultural heritage conservation or more.
- Participants reported working with archival and bibliographic materials (39.6%), historical collections (39.6%) and archaeological and ethnographic objects (37.5%).

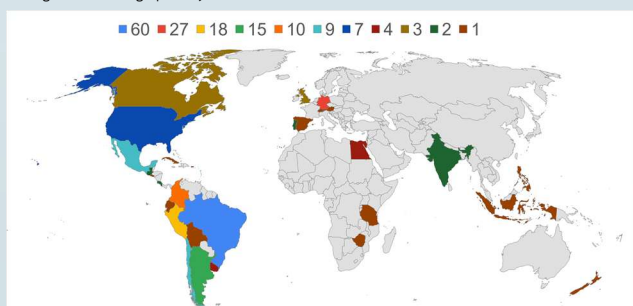


Fig. 3. The geographic distribution of questionnaire participants and the number of respondents.

Use of chemical treatments:

- 38.5% of participants reported using chemicals for pest control, chosen for low cost, simplicity, fast treatment, effectiveness, familiarity, and trust in the results (Fig. 4).

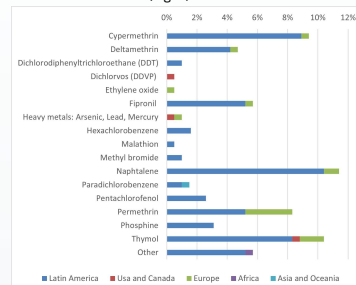


Fig. 4. A comparison of the chemicals personally used by participants based on their geographic location.

Sustainable Techniques for Treating Collections:

- 57.3% of participants reported not being familiar with gamma radiation as a method for disinfecting cultural items, though many expressed interest in learning more (Fig. 5).

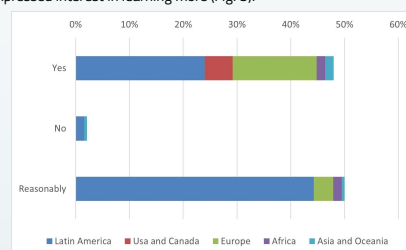


Fig. 5. Knowledge of gamma radiation among participants.

Acceptance of Gamma Radiation in Brazil:

- A survey of 105 Brazilian professionals (BRITO, 2024) revealed a generally positive attitude towards gamma radiation technology, with "interest" and "curiosity" indicating potential acceptance, and "insecurity" showing little resistance (Fig. 6).

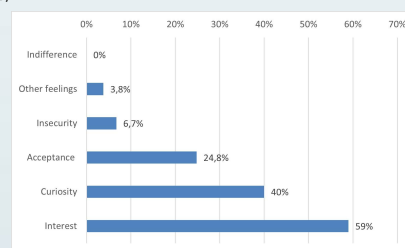


Fig. 6. Feelings evoked by the expression "gamma ionization".

4. Conclusion

- Survey Limitations:** The survey reflects a specific group of participants, not fully representing the professional reality of all institutions, but highlights geographic trends in practices. Toxic treatments are still widely used, especially in Latin America.
- Acceptance of Gamma Radiation:** Latin American professionals need to build greater trust in non-toxic treatments. There is growing interest in sustainable methods like gamma ionization in Brazil.
- Need for Knowledge Dissemination:** More education and resources are needed to promote non-toxic alternatives. Open communication with global organizations like ICOM-CC and ICCROM can enhance information exchange, particularly in Latin America, to increase confidence in non-toxic techniques.
- Future research** in this area could benefit from expanding surveys and conducting personal interviews, particularly in regions with low questionnaire participation.
- The complete survey results can be accessed by scanning the QR code (Fig. 7), allowing readers to explore diverse responses using specific filters on the interactive website.



Fig. 7. QR-Code for survey results.

5. Acknowledgements

The authors would like to express their gratitude to all participants for dedicating their time to complete this survey.

References:

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