

# Effects of gamma irradiation in the antimicrobial activity of wild mushroom extracts

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## Introduction

The interest of mushrooms has been increasing over time due to their potential in prevention or treatment of different diseases. Mushrooms have been reported for their anticancer, anti-inflammatory, and immunosuppressive and antimicrobial properties. In particular, several authors reported the antibacterial activity of extracts prepared from different mushroom species [1]. In spite of these undeniable qualities, mushrooms are one of the most perishable products and tend to lose quality immediately after harvest. Irradiation is recognized as a safe and effective preservation method, being used worldwide to increase the shelf life of foods (e.g., fruits and vegetables, spices, grains, meat or seafood, aromatic and medicinal plants and spices) [2, 3].



## Methodology

In the present study, the antibacterial properties of methanolic extracts prepared from *Boletus edulis* Bull. and *Hydnum repandum* L. Fr., previously submitted to gamma irradiation, were assessed against clinical isolates with different resistance profiles: two Gram negative bacteria: *Escherichia coli* and *Proteus mirabilis*, isolated from urine, and two Gram positive bacteria: MSSA-methicillin-sensitive *Staphylococcus aureus*, isolated from wound exudate and MRSA- methicillin-resistant *Staphylococcus aureus*, isolated from expectoration) from hospitalized patients in Local Health Unit of Mirandela, Northeast of Portugal. The fruiting bodies were collected in Trás-os-Montes (Northeast of Portugal) in November 2012. Gamma irradiation was performed in experimental equipment with four <sup>60</sup>Co sources at 1 and 2 kGy doses

## Results

The 1 kGy dose does not seem to be the preferable choice to treat *B. edulis* and *H. repandum* (which have a better response to the 2 kGy dose). Among the tested extracts, those obtained from *B. edulis* presented the highest activity against all the tested bacterial. The antimicrobial activity of the mushroom extracts did not suffer significant changes that might compromise applying irradiation as a possible mushroom conservation technology.

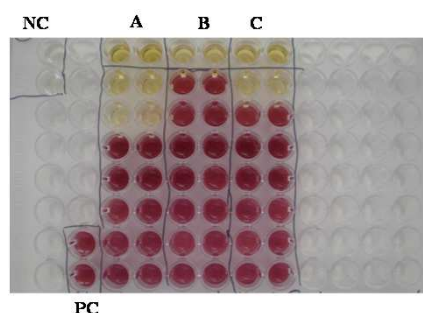
	<i>Escherichia coli</i>	<i>Proteus mirabilis</i>	MRSA	MSSA
gamma-irradiated <i>Boletus edulis</i>				
0 kGy	10	5	2.5	5
1 kGy	10	20	5	5
2 kGy	10	10	2.5	5
gamma-irradiated <i>Hydnum repandum</i>				
0 kGy	10	>20	10	5
1 kGy	20	>20	20	10
2 kGy	10	>20	10	5

Table 1. MIC values (mg/mL) of irradiated wild mushrooms against clinical isolates of Gram-negative and Gram-positive bacteria.

MIC- minimum inhibitory concentration; MRSA- methicillin-resistant *Staphylococcus aureus*; MSSA- Methicillin-sensitive *Staphylococcus aureus*.

Figure 1. *Boletus edulis* against *Proteus mirabilis*

NC - Negative control PC - Positive control  
A - 0 kGy B - 1 kGy C - 2 kGy



## Conclusion

As a general conclusion, the 2 kGy should be considered as the best choice in terms of antimicrobial activity maintenance.

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