

**EFFECTS OF GAMMA-IRRADIATION AND
MODIFIED ATMOSPHERE PACKAGING ON QUALITY
OF BLACK PEPPER AND CUMIN**

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Combined effects of gamma-irradiation and modified atmosphere packaging (MAP) on spice quality were evaluated. Black pepper and cumin in powdered form were packaged under either air (aerobic packaging, AP) or 0% O₂ (100% N₂) and then γ -irradiated at 7, 12 or 17 kGy. Differences in microbial quality, colour and essential oil (EO) composition were compared to the control samples (non-irradiated). Gamma-irradiation reduced total bacterial count to undetectable levels after 7 kGy and 12 kGy irradiation of cumin and black pepper, respectively. Yeast and mould count of all samples was undetectable after irradiation. Losses in a* and b* values of black pepper were observed after irradiation. The L* value of black pepper was increased by irradiation, and it was higher in AP compared to MAP. Irradiation decreased EO yield from black pepper, and the yield of both spices was lower in AP compared to MAP. Increases in monoterpenes and decreases in some sesquiterpene and oxygenated compounds in black pepper oil were noted after irradiation. However, cuminaldehyde, thymol, carvacrol, caryophyllene oxide were increased by irradiation of black pepper. Irradiation also caused decreases in the monoterpene content of cumin. Amounts of some monoterpenes were higher and some sesquiterpene and oxygenated compounds were lower in MAP. Cuminaldehyde, thymol and carvacrol were not detected in MAP samples of black pepper. Gamma-irradiation alone is sufficient to decrease microbial load of black pepper and cumin, but its combination with MAP is promising; for example MAP prior to irradiation was advantageous in preventing colour and EO losses.

Keywords: Irradiation, modified atmosphere packaging, spices

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