Revista Ciência Agronômica, v. 54, e20218091, 2023
Centro de Ciências Agrárias - Universidade Federal do Ceará, Fortaleza, CE
www.ccarevista.ufc.br

Scientific Article
ISSN 1806-6690

Xtend® packaging and *Aloe vera* coating benefit shelf life and safety maintenance of fresh shiitake mushrooms[1]

Xtend® e cobertura de *Aloe vera* preservam vida útil e segurança de cogumelos shiitake frescos

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ABSTRACT - The consumer market has expanded its search for foods combining sensory, nutritional, and bioactive attributes, which puts edible mushrooms in evidence. However, their production chain still has deficiencies to prevent mechanical damage, microbiological contamination, perishability, and weight loss during storage, factors closely associated with unsuitable packaging of the product. This study aimed to evaluate whether different packaging configurations, associated with the application of edible *Aloe vera* gel coating, preserve shelf life and safety of fresh shiitake mushrooms throughout their storage, especially as a replacement for standard packaging. The experiment was conducted with fresh shiitake mushrooms, with a completely randomized design in a 3 x 2 x 4 factorial scheme, with three packaging configurations (EPS PVC, EPS PVC perforated, Xtend®), 2 coating conditions (with and without *Aloe vera* gel coating), four storage times (0, 3, 7 and 10 days), with four repetitions. For each storage time, weight loss, visual aspect, CO_2 concentration in the package, and microbiological evaluations were assessed. In conclusion, use of *Aloe vera* coating on shiitake mushrooms preserves their quality attributes and promotes food safety through antimicrobial action, extending their shelf life. Xtend® packaging is potentially suitable to replace EPS PVC packaging in the sale of fresh mushrooms, reducing weight loss and preserving food quality and safety.

Key words: Postharvest quality. Microbiological contamination. Weight loss. Refrigerated storage.

RESUMO - O mercado consumidor tem ampliado sua busca por alimentos que agreguem atributos sensoriais, nutricionais e bioativos, o que traz os cogumelos comestíveis a uma posição de destaque. No entanto, sua cadeia produtiva ainda apresenta deficiências na prevenção de danos mecânicos, contaminação microbiológica, perecibilidade e perda de massa ao longo do armazenamento, fatores muito associados ao uso de embalagens pouco adequadas ao produto. O objetivo deste trabalho foi avaliar se diferentes configurações de embalagens, associadas à aplicação de cobertura comestível de gel de *Aloe vera*, preservam a vida útil e segurança de cogumelos shiitake frescos ao longo de seu armazenamento, sobretudo em substituição à embalagem padrão. O experimento foi conduzido com cogumelos shiitake frescos, com delineamento inteiramente casualizado em esquema fatorial 3 x 2 x 4, sendo 3 configurações de embalagem (EPS PVC, EPS PVC perfurado, Xtend), 2 condições de cobertura (com e sem cobertura de gel de Aloe vera), 4 período de armazenamento (0, 3, 7 e 10 dias), com 4 repetições. Em cada período de armazenamento avaliou-se perda de massa, aparência visual, concentração de CO_2 na embalagem e avaliações microbiológicas. Constatou-se que o uso de cobertura de *Aloe vera* em cogumelos shiitake preserva seus atributos de qualidade e promove a segurança do alimento através da ação antimicrobiana, prolongando sua vida útil. Embalagens Xtend® mostram-se potencialmente adequadas para substituir embalagens EPS PVC na comercialização de cogumelos frescos, reduzindo a perda de massa e preservando qualidade e segurança do alimento.

Palavras-chave: Qualidade pós-colheita. Contaminação microbiológica. Perda de massa. Armazenamento refrigerado.

DOI: 10.5935/1806-6690.20230009
Editor-in-Chief: Prof. Alek Sandro Dutra - alekdutra@ufc.br
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Received for publication in 05/07/2021; approved in 21/09/2022
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INTRODUCTION

Edible mushrooms have gained popularity in human diets due to their sensory, nutritional and bioactive attributes (ÇAĞLARIRMAK, 2007; HAN *et al*., 2015). One of the main kinds is the shiitake mushroom (*Lentinus edodes*), the second most popular and third most grown mushroom worldwide (LI *et al*., 2019; LUO *et al*., 2021). Besides its unmistakable sensory characteristics, production and consumption have also grown due to its nutritional value, with high levels of polysaccharides, antioxidants, dietary fiber, ergosterol, minerals and vitamins B1, B2 and C (ANTMANN *et al*., 2008). However, as it is a perishable product with high water content (approximately 90%), it is susceptible to mechanical damage, microbiological contamination, intensified deterioration and weight loss during storage (DONGLU *et al*., 2016; LUO *et al*., 2021).

Several studies have focused on proposing preservation and packaging methods and technological alternatives to extend the shelf life and ensure the quality and safety of fresh mushrooms, ranging from different packaging materials (AJAYI *et al*., 2015; DONGLU *et al*., 2015; DONGLU *et al*., 2015; DONGLU *et al*., 2016; HAN *et al*., 2015) to modified atmosphere techniques (BAN *et al*., 2014; DHALSAMANT *et al*., 2015; ZHANG *et al*., 2015) and edible coatings (BAN *et al*., 2014; MIRSHEKARI; MADANI; GOLDING, 2019). Such studies have achieved promising results for application in the production and distribution chain of shiitake mushrooms.

Although scientific contributions have been key to ensuring higher quality and safety in marketing fresh shiitake mushrooms, their use still faces economic and operational barriers. That is because most producers in the main producing countries in Asia, in the United States and in Brazil have small-scale operations (CHANG; WASSER, 2017; PAULA; TARSITANO; GRACIOLLI, 2001; SÃO PAULO, 2019), which makes it difficult to transfer technology to their production units. Most of them continue using expanded polystyrene (EPS) trays wrapped in PVC film as packaging, which does not ensure longer product shelf life (TAGHIZADEH *et al*., 2010). Such packaging, associated with poor processing conditions, results in significant qualitative and quantitative losses, making it impossible to fully meet the quality standards required by the consumer market, besides posing health risks due to food poisoning.

In this context, several technological alternatives have proven to be viable, such as Xtend® packaging, whose films have membranes with selective permeability to water vapor and gases, providing more favorable inner packaging conditions for fresh products (BOVI *et al*., 2018; PESIS *et al*., 2000), but at a high cost. At the same time, *Aloe vera* edible coating techniques have shown high antimicrobial potential, reduced browning and quality maintenance in mushrooms (MIRSHEKARI; MADANI; GOLDING, 2019; SOGVAR; KOUSHESH SABA; EMAMIFAR, 2016). However, they require significant changes in the processing of those products.

Therefore, the objective of this study was to evaluate whether different packaging configurations, associated with the application of edible *Aloe vera* gel coating, preserve shelf life and safety of fresh shiitake mushrooms throughout their storage, especially as a replacement for standard packaging.

MATERIAL AND METHODS

Plant-Based Material

Commercial shiitake mushrooms (*Lentinus edodes*) were used, provided by Yuri Cogumelos, Sorocaba, São Paulo (Brazil), produced in climatized chambers and compressed substrate blocks. The mushrooms were picked and transported to the laboratory 12 hours after harvesting, stored in low-density polyethylene (LDPE) bags. Medium diameter mushrooms (4 to 8 cm) with no mechanical damage, injuries or apparent deformations were selected for this study.

Aloe vera gel preparation

Aloe vera gel was prepared according to the methodology described by Sogvar, Koushesh Saba and Emamifar (2016) and adapted by Mirshekari, Madani and Golding (2019). Mature adult *Aloe vera* leaves (*Aloe barbadensis* Miller) were used, sanitized in a chlorinated solution at a concentration of 0.03% (v/v). The gelatinous matrix was manually separated from the outer cortex and homogenized, with subsequent filtering to remove fibers and plant residue.

Coating

For the samples with edible coating, the mushrooms were completely immersed in a solution of *Aloe vera* gel and distilled water (1:3 v/v) at 20 °C for 5 minutes (SOGVAR; KOUSHESH SABA; EMAMIFAR, 2016). Then, the mushrooms were placed on a sanitized flat surface for air drying at 20 ºC for 1 h.

Packaging and Storage

Three packaging configurations were used in this study: expanded polystyrene tray wrapped with PVC film (EPS PVC); EPS tray wrapped with PVC with the addition of microperforations (< 0.5 mm) to the film in three longitudinal lines on the packaging, equidistant from each other (EPS PVC perf.);

transparent flexible Xtend® polyamide-based packaging (Xtend® 885-MU22, Stepac, Tefen, Israel) (Figure 1). Portions of approximately 150 g of mushrooms, with and without *Aloe vera* coating, were placed in each of the packages, manually arranged with the surface of the cap facing up, and sealed with a heat sealer. The samples were stored in a cold chamber at 4 ± 1 °C and 85–90% relative humidity for 10 days.

Experimental Design

The experiment was carried out with fresh shiitake mushrooms, with a completely randomized design in a 3 x 2 x 4 factorial scheme, with 3 packaging configurations (EPS PVC, EPS PVC perf., Xtend®), 2 coating conditions (with and without *Aloe vera* gel coating), 4 storage times (0, 3, 7 and 10 days), with 4 repetitions. Twenty repetitions of each treatment were produced (packaging x coating) and stored in a cold chamber at 4 ± 1 °C and 85–90% relative humidity for 10 days. For each storage time, weight loss, visual aspect, CO_2 concentration in the package and microbiological evaluations (total coliform count, *Escherichia coli*, *Salmonella* spp., molds and yeasts) were assessed.

Weight Loss

Weight loss was determined in triplicate by weighing samples from each treatment on day 0 and at each of the storage times. The results were expressed as a cumulative percentage of loss in relation to the initial weight of fresh mushrooms.

Visual Aspect

Visual aspect was evaluated based on smartphone camera photographs (13 MP, LG Q6 Plus, LG, Seoul, South Korea) of the samples of each treatment at each of the storage times, of both the upper and lower sides of the mushrooms. Physical characteristics perceptible to the naked eye were observed from the images.

CO_2 concentration

For the samples used to determine the weight loss of each treatment at each storage time, CO_2 concentration inside the packages was determined with a portable gas analyzer (Dansensor® CheckPoint 3, Ametek Mocon, Minnesota, USA).

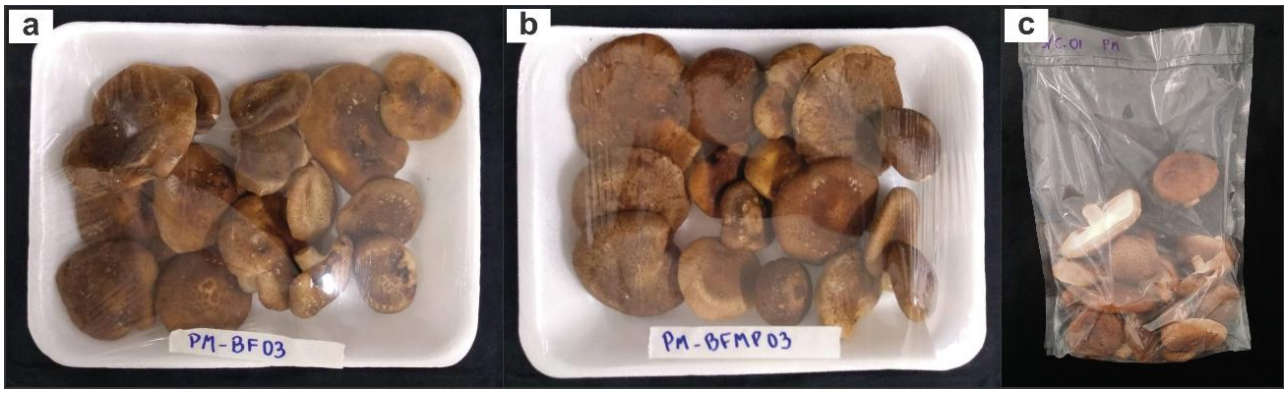
Microbiological Analyses

Microbiological analyses were performed according to the methodology of the American Public Health Association (DOWNES; ITO, 2001). Portions of each sample were homogenized and diluted in 0.1% buffered peptone water, at a ratio of 1:9 p/p, to obtain the initial microbial count solution, followed by serial decimal dilutions. Total coliforms and *E. coli* were determined using the multiple tube fermentation method, with a presumptive test in lauryl sulfate tryptose broth (LST), incubated at 35 ºC for 48 hours. For positive LST tubes, a confirmatory test was performed in brilliant green bile broth (BG) at 35 ºC for total coliforms, and in *Escherichia coli* broth (EC) at 45 ºC for *E. coli*. The direct surface plating method was used to determine *Salmonella spp*. (on brilliant green agar after incubation at 25 ºC for 48 h) and molds and yeasts (on potato dextrose agar (PDA) after incubation at 25 ºC for 5 days). The analyses were performed in triplicate. Total coliform and *E. coli* results were expressed as most probable number per gram (MPN g^{-1}) and mold and yeast results were expressed as colony forming units per gram (CFU g^{-1}).

Statistical Analysis

The assays were performed in triplicate and the data obtained were submitted to analysis of variance (ANOVA) to observe the effects between groups and between treatments, thus making it possible to verify whether the use of packaging configurations, associated or not with *Aloe vera* gel coating, benefits the shelf life and safety of fresh shiitake mushrooms. Means were compared between treatments using the Least Significant Difference (LSD) test with $p < 0.05$.

Figure 1 - Packaging configurations: EPS PVC (a), EPS PVC perf. (b) and Xtend® (c)



RESULTS AND DISCUSSION

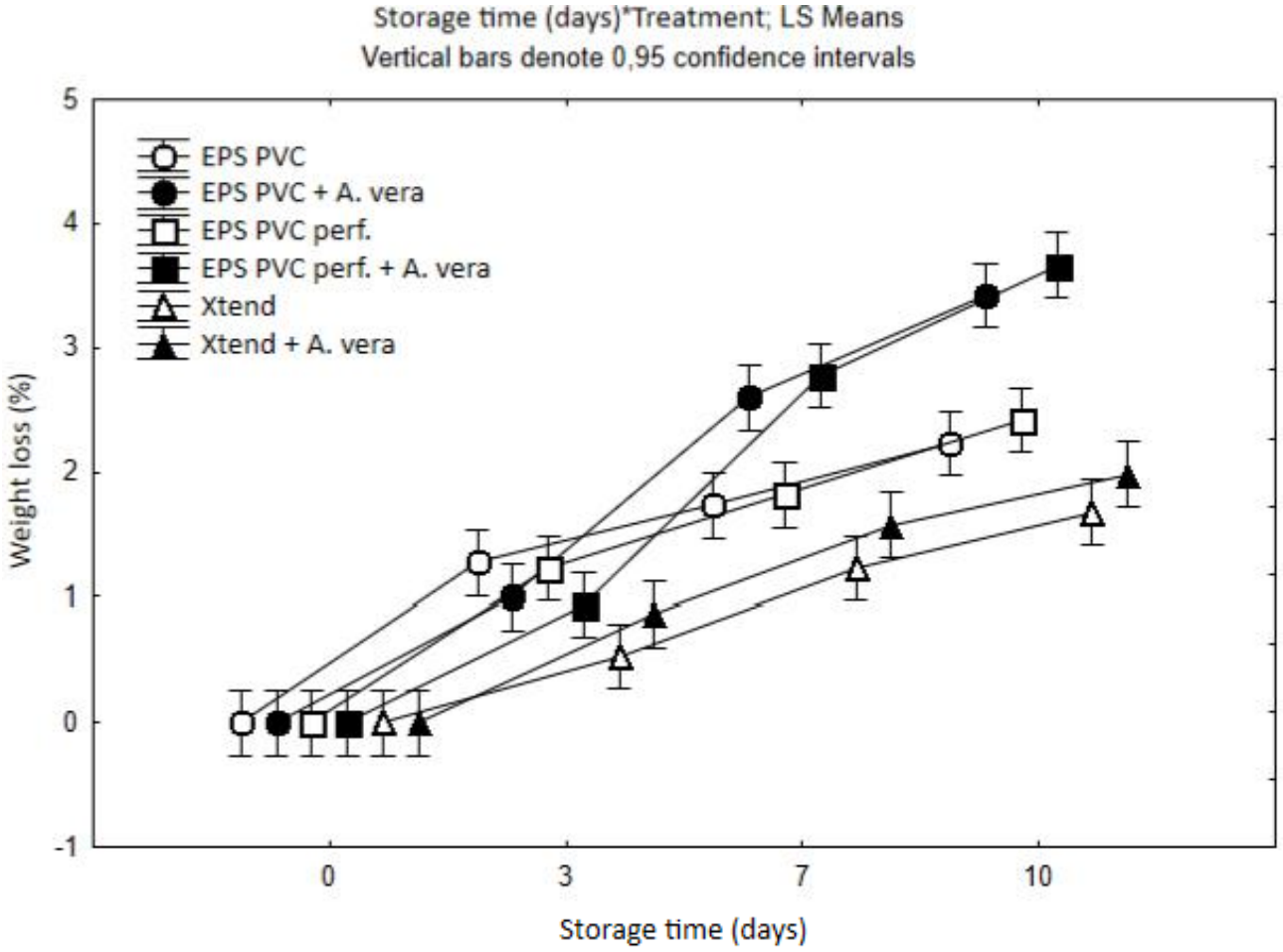
Weight Loss

Weight loss is an essential attribute for edible mushrooms, since water loss causes significant changes in the product's sensory characteristics and, consequently, in its quality. Shiitake mushrooms have high water content, characteristic of perishable products, and are susceptible to high weight loss due to their high respiratory rate and porous surface that provides interaction with the environment (MIRSHEKARI; MADANI; GOLDING, 2019). Suitable packaging plays a key role in guaranteeing favorable storage conditions while delaying weight loss during this period, ensuring quality fresh mushrooms that are safe for consumption.

As observed in Figure 2, the treatments with Xtend® showed less weight loss over time, with linear behavior and independent of *Aloe vera* coating, less than 2% at the end of 10 days. As for the EPS PVC and EPS PVC perf. packages, weight loss was slightly higher for the treatments without coating and significantly higher for both treatments with coating. For all treatments, however, weight loss did not exceed 4% at the end of 10 days, which is interesting considering that weight loss above 10% was observed for shiitake mushrooms in 12 days (ANTMANN *et al*., 2008) and above 7% for Paris mushrooms (*Agaricus bisporus*) in 5 days (BAN *et al*., 2014).

Xtend® packaging for mushrooms provides inner control of atmosphere and relative humidity, which regulates the migration of water vapor to the outside environment (BOVI *et al*., 2016), allowing reduced weight loss of the mushrooms. For EPS PVC and EPS PVC perf. packaging, the films have high permeability to water vapor and respiratory gases, enabling exchange with the outside environment (CENCI, 2011; TAGHIZADEH *et al*., 2010). Weight loss was significantly higher for treatments with coating when equal packaging was compared, with the exception of Xtend®. For treatments with coating, the higher weight loss at the end of the period can be explained by the increase in weight when

Figure 2 - Weight loss (%) in shiitake mushrooms packaged in three different configurations, with and without *Aloe vera* coating. Samples were stored at 4 °C for 10 days. Vertical bars represent 95% confidence intervals



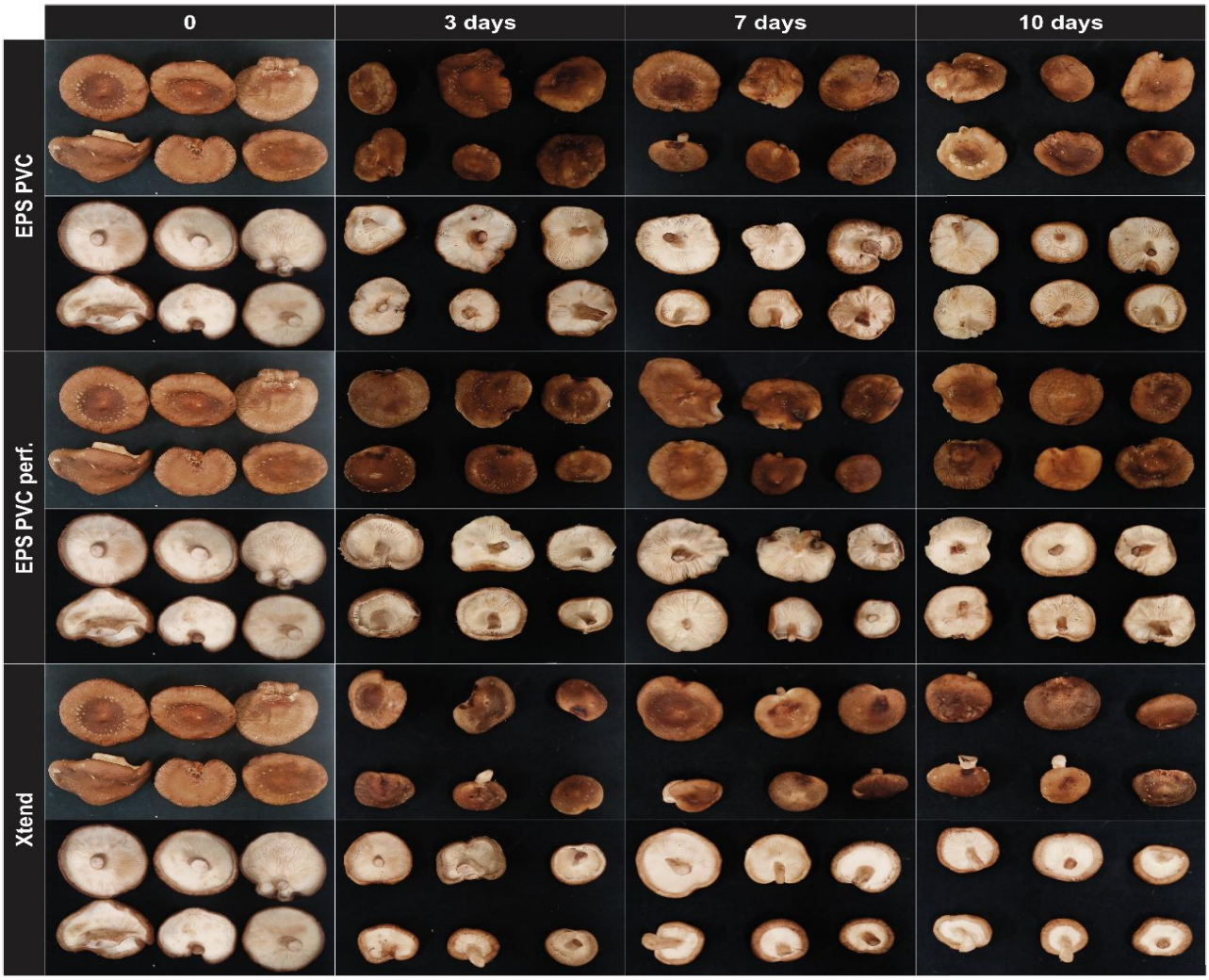
applying the coating. As it is a totally liquid product, the coated product is more susceptible to water loss. However, the absolute values are still generally low, which is related to the storage conditions in a refrigerated environment with high relative humidity. Low temperature causes a decrease in the metabolic activity of the product, while high relative humidity decreases the vapor pressure difference between packaging and the outside environment, mitigating mass transfer. In this regard, the choice of packaging has a significant effect on weight loss, but the use of *Aloe vera* coating does not imply important changes, since its application is mainly related to microbiological safety conditions.

Visual Aspect

Physical characteristics visible to the naked eye are essential attributes for the commercial value of fresh mushrooms, since they are important indicators of quality for consumers. Furthermore, the visual aspect is related not only to the appearance, but also to weight loss levels and the texture of mushrooms. Coloring is one such indicator, but it is less important for shiitake mushrooms than other edible mushrooms. While light-colored mushrooms, such as *Agaricus bisporus*, are affected by browning during storage (MIRSHEKARI; MADANI; GOLDING, 2019), shiitake mushrooms have a dark and heterogeneous color on the cap surface. Thus, color changes barely perceptible to the naked eye are not considered critical for this species. Despite this particular trait, shiitake mushrooms are also subject to enzymatic browning action (LI *et al*., 2014), which is mainly manifested in their underside.

Figure 3 shows that shiitake mushrooms without coating, stored in Xtend® packages, did not undergo significant changes in their visual aspect during the 10 days of storage, especially in the underside coloring. However, for mushrooms in EPS PVC and EPS PVC perf. packaging, there is a significant change in visual characteristics, especially in the underside coloring of mushrooms in EPS PVC packaging.

Figure 3 - Visual aspect of shiitake mushrooms packaged in three different configurations, without *Aloe vera* coating, stored at 4 ºC for 10 days



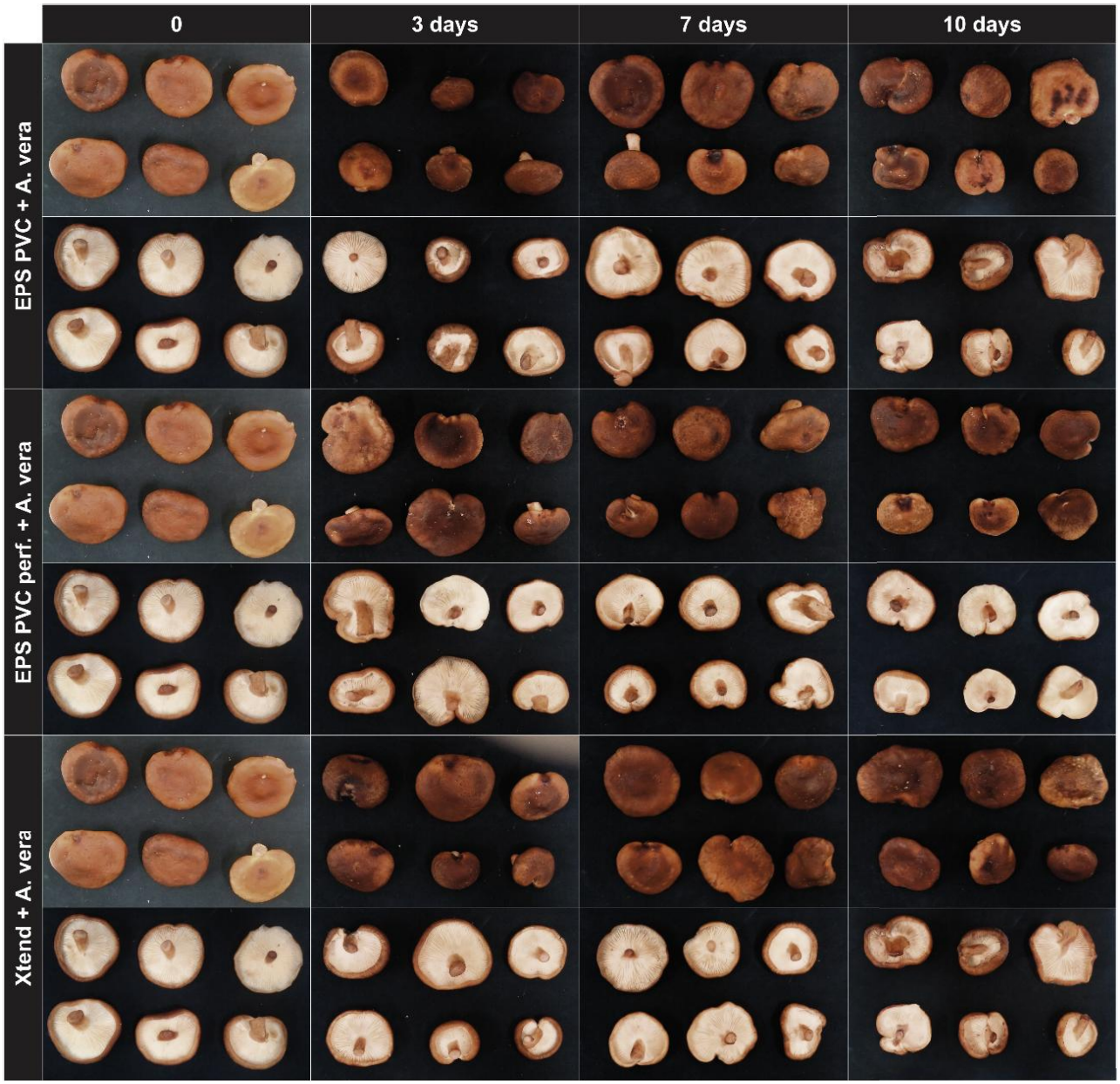
The changes in visual aspect are related to both weight loss and respiratory and enzymatic activity in mushrooms, which explains the less significant effects in Xtend® packaging. However, when *Aloe vera* coating was applied to the mushrooms, they started to undergo less variation in their physical characteristics and coloration during storage for all treatments, but mainly for those in Xtend® packaging (Figure 4). Moreover, besides its antimicrobial action, the coating provided the cap surface of fresh shiitake mushroom with greater shine and tonality, which can favor the visual aspect of this product for consumers.

The visual aspects evaluated here are subjective and non-standardized. However, they reveal an important effect of packaging configurations and the use of *Aloe vera* coating. In future studies, it is recommended to enhance the evaluation by performing sensory analyses, both visual and organoleptic.

CO_2 concentration

The gaseous composition inside the package is a factor directly related to the respiratory rate of the perishable product and the permeability characteristics of the film material. Shiitake mushrooms, like the main edible mushrooms, have

Figure 4 - Visual aspect of shiitake mushrooms packaged in three different configurations, coated with *Aloe vera*, stored at 4 ºC for 10 days



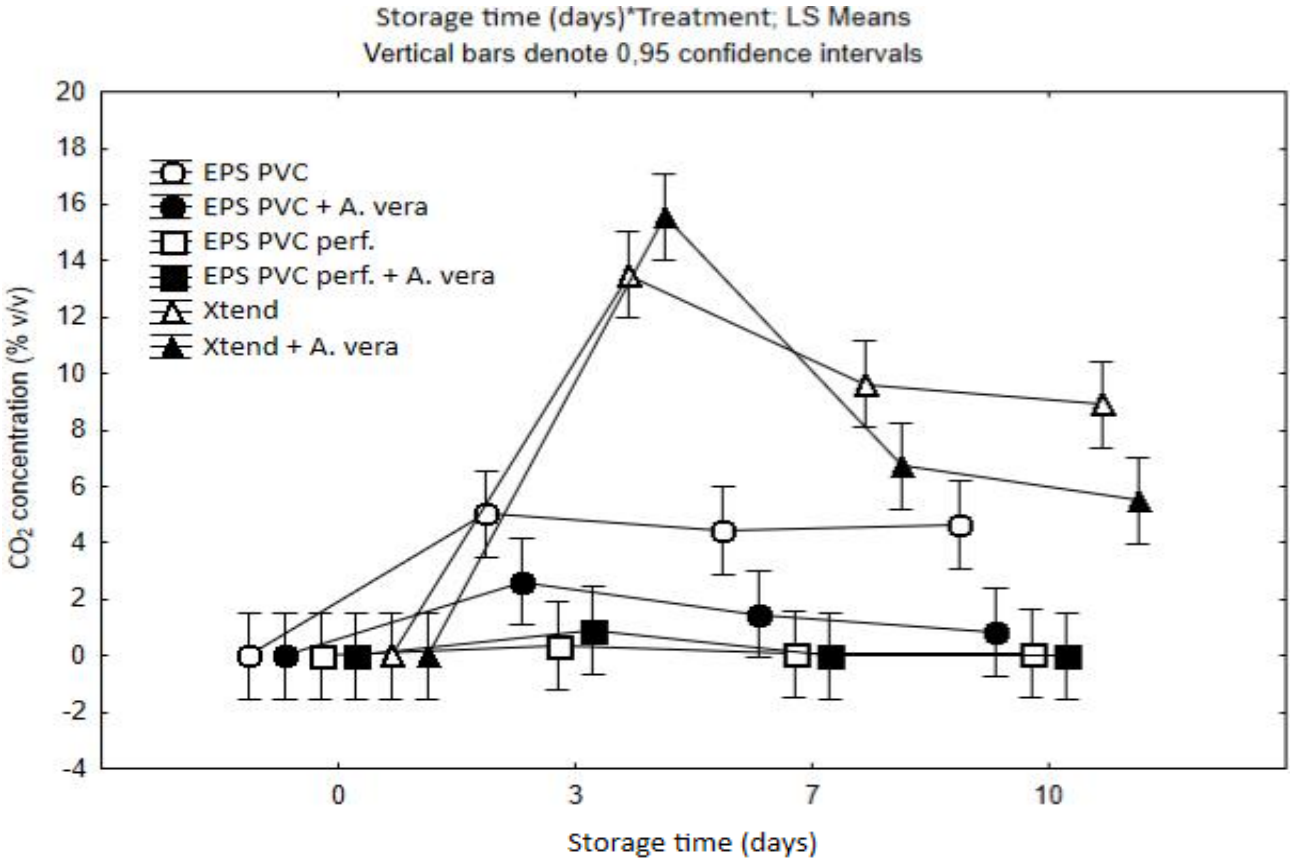
a high respiratory rate (RUX *et al*., 2015), which requires appropriate storage conditions (low temperature and high relative humidity) to minimize the effects on their shelf life.

Figure 5 shows that the CO_2 concentration was higher in Xtend® packaging, with marked increase in the first 3 days, a period in which the most intense metabolic activity of the product occurs, and an important decrease during storage time up to 10 days. EPS PVC packaging also showed an increase in concentration after 3 days of storage, with a subsequent decrease, but at lower levels than Xtend® packaging. The EPS PVC perf. packaging, in turn, showed concentrations close to 0 throughout the period. It is also observed that for all treatments, the addition of *Aloe vera* coating resulted in a significant reduction in CO_2 concentration.

The Xtend® packages, given the characteristics of their material and, above all, their selective permeability to gases, provided CO_2 retention inside the package, but in accordance with the manufacturer's specifications, controlling the gaseous composition and the relative humidity inside the package (BOVI *et al*., 2016). This effect, in turn, provides control of the respiratory activity of mushrooms. In the case of EPS PVC packaging, although there was retention at lower levels, there is no control of the gaseous composition, but the permeability of the PVC film means that part of the CO_2 produced by mushroom respiration remains inside the packaging, intensifying the respiratory activity (RUX *et al*., 2015). This effect did not occur in EPS PVC perf. packaging, since the perforations enable an equilibrium to be reached between inner and outer atmosphere, indicating zero concentrations of CO_2 throughout storage.

Despite the specific characteristics of each material, responsible for the permeability to gases and water vapor of the package, the *Aloe vera* coating showed a significant effect on the treatments, reducing CO_2 concentration compared to the same package with no coating. This is because *Aloe vera* gel acts as a barrier to O_2 and CO_2 and, combined with refrigerated storage conditions, reduces respiratory activity and weight loss, besides providing important antimicrobial action (MIRSHEKARI; MADANI; GOLDING, 2019; MOHEBBI *et al*., 2012). Thus, use of the proposed coating for fresh shiitake mushrooms can bring important benefits to prolong their shelf life by minimizing their metabolic activity and, therefore, delaying senescence processes.

Figure 5 - Evolution of CO_2 concentration (% v/v) inside three different packaging configurations for shiitake mushrooms, with and without *Aloe vera* coating. Samples were stored at 4 °C for 10 days. Vertical bars represent 95% confidence intervals



O_2 permeability in the different materials also ensured non-hermetic packaging conditions that, associated with the CO_2 levels obtained, provided an unfavorable environment for the development of *Clostridium botulinum* (HAUSCHILD, 1990; MALAKAR *et al*., 2013). This shows that the treatments evaluated in this study, especially the Xtend® packages and the use of *Aloe vera* coating, are promising to provide food safety against *C. botulinum.*

Microbiological Analyses

Edible mushrooms are perishable products susceptible to microbiological contamination, which affects their safety for human consumption and accelerates their metabolic processes and deterioration. Packaging and storage conditions play an important role in preserving their safety, but do not fully ensure such protection. Studies show that the use of standard packaging (EPS PVC) for fresh mushrooms makes them highly susceptible to pathogenic microorganisms, such as total coliforms, *Escherichia coli*, and molds and yeasts (CANADA, 2013; MALAKAR *et al*., 2013; MIRSHEKARI; MADANI; GOLDING, 2019). Thus, the adoption of alternatives that provide antimicrobial action is essential.

The initial populations of total coliforms and *Escherichia coli* in fresh uncoated shiitake mushrooms were, on average, 1100 MPN g-1 and 36 MPN g-1, respectively, showing significant variation during storage for EPS PVC and EPS PVC perf. packaging (Table 1). For the Xtend® packages and especially for the mushrooms coated with *Aloe vera*, the populations observed were significantly low and with very little variation over the 10 days of storage. No presence of *Salmonella* spp. was observed in any of the treatments throughout the entire study period, in compliance with food microbiological standards for edible fungi (AGÊNCIA NACIONAL DE SANITARY SURVEILLANCE, 2019; EUROPEAN COMMISSION, 2005). The presence of molds was observed in all the initial samples, but showed a reduction during storage, reaching null values of method detection after 10 days of storage (Figure 6). This reduction was more pronounced in samples with *Aloe vera* coating, although the difference was not significant between treatments. For yeasts, the treatments also showed a reduction trend over time, more pronounced among treatments with *Aloe vera* coating (Figure 7). For uncoated samples, however, the EPS PVC and EPS PVC perf. packages showed a significant increase in the microbiological load of yeasts after 7 days of storage.

It was observed that refrigerated storage of mushrooms enabled a reduction or stabilization of the levels of evaluated microorganisms over a period of 10 days in most treatments. However, it is noted that conventional packaging (EPS PVC) and packing with perforations (EPS PVC perf.) had the highest populations during storage. When comparing the results obtained with the limits established for *E. coli*, it is observed that all treatments with *Aloe vera* meet current standards with values below 10^2 CFU g^{-1} (AGÊNCIA NACIONAL DE SANITARY SURVEILLANCE, 2019; EUROPEAN COMMISSION, 2005), indicating that coating is a viable alternative for reducing contamination and maintaining microbiological quality. It is known that the most relevant pathogens in fresh fruit and vegetables are *Salmonella* and *E. coli* (MURRAY *et al*., 2017). Considering that current methods of disinfection are not always able to reduce contamination by such microorganisms, the use of *Aloe vera* coating can act synergistically to benefit the microbiological quality of these vegetables.

Table 1 - Total coliform and *Escherichia coli* (MPN g-1) counts in shiitake mushrooms packed in three different configurations, with and without *Aloe vera* coating. Samples were stored at 4 °C for 10 days

Microbe group	Treatment	Storage time (days)			
		0	3	7	10
Total coliforms	EPS PVC	1100	29	15	1100
	EPS PVC + A. vera	0	11	15	28
	EPS PVC perf.	1100	23	75	1100
	EPS PVC perf. + A. vera	0	0	15	27
	Xtend	1100	0	0	0
	Xtend + A. vera	0	0	4	7
Escherichia coli	EPS PVC	36	38	36	11
	EPS PVC + A. vera	0	0	15	28
	EPS PVC perf.	36	1100	11	35
	EPS PVC perf. + A. vera	0	0	15	22
	Xtend	36	0	0	0
	Xtend + A. vera	0	9	4	7

Figure 6 - Mold count (Log_{10} CFU g-1) in shiitake mushrooms packaged in three different configurations, with and without *Aloe vera* coating. Samples were stored at 4 ºC for 10 days. Vertical bars represent 95% confidence intervals

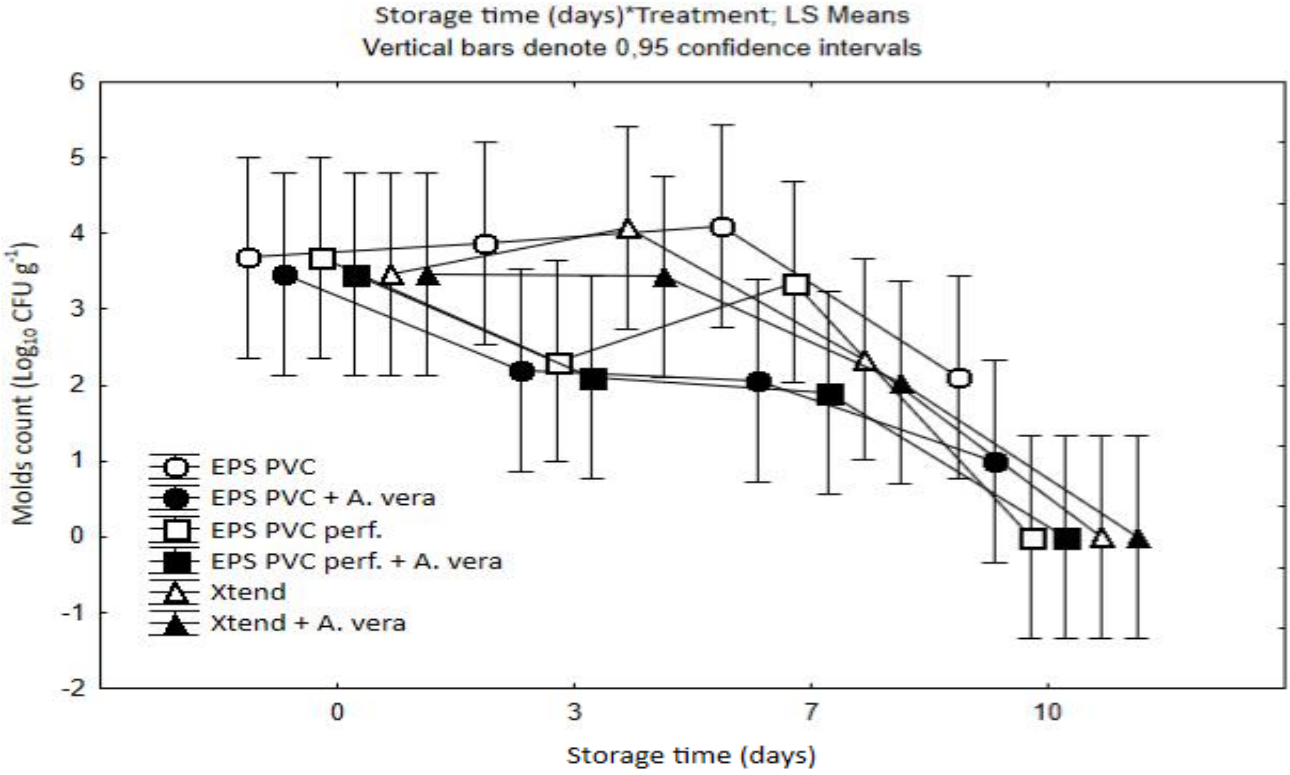
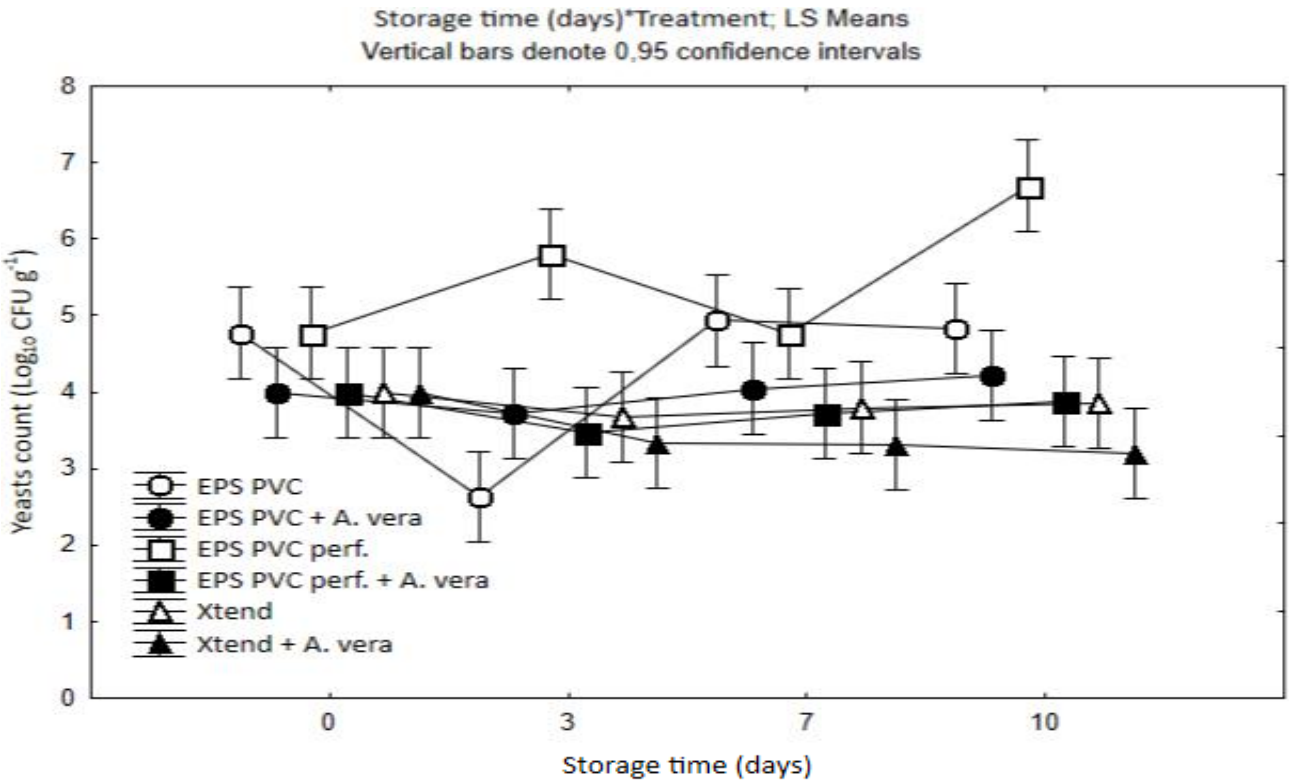


Figure 7 - Yeast count (Log_{10} CFU g-1) in shiitake mushrooms packaged in three different configurations, with and without *Aloe vera* coating. Samples were stored at 4 ºC for 10 days. Vertical bars represent 95% confidence intervals



For Xtend® packages, despite the high initial microbiological load in the mushrooms, packaging was able to reduce the method detection level to zero during storage. This is due to the permeability characteristics of the material, which provide an unsuitable internal atmosphere for microbial development, especially when associated with refrigerated storage (PESIS *et al*., 2000).

The main point of the discussion, however, is the important and significant antimicrobial action of the *Aloe vera* coating, which proved to be effective in providing mushrooms with antimicrobial action, enabling reduced microbiological load during storage and extended lifetime of the food, ensuring safety with regard to the microorganisms analyzed in this study. The effect is corroborated by the properties of *Aloe vera*, reported as being antimicrobial in several studies (MIRSHEKARI; MADANI; GOLDING, 2019; MOHEBBI *et al*., 2012; SOGVAR; KOUSHESH SABA; EMAMIFAR, 2016), which makes it possible to infer that its use in the composition of edible mushroom coatings can be key to ensuring food safety. In this sense, coating can be an important alternative in the absence of Xtend® packaging. The results also show that the concentration used, reported in a recent study (MIRSHEKARI; MADANI; GOLDING, 2019), satisfactorily applies to fresh shiitake mushrooms.

EPS PVC packaging showed values that can be worrying when refrigerated storage conditions are not respected — which is quite common in the edible mushroom production chain — considering that the development of molds and yeasts in food can be favored by water vapor retention inside the package and the creation of anaerobic environments in airtight packages (CENCI, 2011; MOHEBBI *et al*., 2012). In turn, Xtend® packaging played an important role in preserving food safety due to its controlled atmosphere, providing inadequate conditions for the development of pathogenic microorganisms (PESIS *et al*., 2000).

The occurrence of these populations is harmful to consumption, in addition to speeding up the deterioration process, making the food unsuitable for consumption, which is quite worrying in the food production and distribution sector (JIANG *et al*., 2018). However, it is essential to adopt good practices in all pre- and post-harvest stages, ensuring quality and safe edible mushrooms for consumption, further expanding their presence on the consumer's table.

CONCLUSIONS

The use of *Aloe vera* coating on shiitake mushrooms preserves their quality attributes and provides food safety through antimicrobial action, prolonging their shelf life. Xtend® packaging has proven to be potentially suitable to replace EPS PVC packaging in the marketing of fresh mushrooms, reducing weight loss and preserving food quality and safety. EPS PVC packages, with unperforated or perforated film, are a concern for food safety along the distribution chain. However, considering the technical obstacles to replacing EPS PVC packaging, the use of *Aloe vera* coating contributes to reducing microbiological contamination. Future studies are needed to better understand the coating mechanisms that benefit the physicochemical and sensory attributes of mushrooms. In general, good post-harvest practices and maintenance of the cold chain are essential to achieving the proposed gains in quality and safety.

ACKNOWLEDGEMENTS

The authors thank Yuri Cogumelos for providing the mushrooms and Johnson Matthey and Stepac for providing the Xtend® packages evaluated in this study. They also thank the Packaging Technology Center of the Institute of Food Technology and the Post-Harvest Technology Laboratory of FEAGRI/UNICAMP for allowing the experiments to be conducted in their facilities, as well as Espaço da Escrita – Pró-Reitoria de Pesquisa – UNICAMP – for the language services provided.

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