PLEUROTUS OSTREATUS CULTIVATED IN AGROINDUSTRIAL WASTES COULD BE USED AS AN ANTIOXIDANT ADDITIVE IN MEAT PRODUCTS

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I. INTRODUCTION

The search for natural alternatives to synthetic antioxidants responds to the growing demand for healthier and more sustainable meat products. Some synthetic antioxidants are associated with adverse effects on human health when consumed in uncontrolled quantities, while some of these can generate toxic byproducts during processing or storage [1]. In this context, *Pleurotus ostreatus* known as oyster mushroom, exhibits valuable antioxidant properties for use as a meat product additive, and these properties are related to their bioactive compounds that can scavenge or reduce free-radical and radical-cations from macromolecules. However, its chemical composition and antioxidant properties may be modified by the type of substrate used for its growth [2]. Thus, the aim of this study was to evaluate the effect of replacing wheat straw with spent coffee grounds (SCG) and potato peels residue (PPR) in the substrate's formulation on the phenolic composition and antioxidant properties of *P*. *ostreatus*.

II. MATERIALS AND METHODS

P. *ostreatus* (IE-8 strain) was grown using wheat straw as basal substrate and mixed at different ratios of supplementing residues, as follows: Control, wheat straw at 100%; T1, wheat straw at 80% + 10% of SCG + 10% of PPR; T2, wheat straw at 70% + 15% of SCG + 15% of PPR. Thereafter, fruiting bodies were dried at 60 °C for 12 h and then pulverized at 20 mesh of particle size. Bioactive compounds were extracted from the mushroom powder using water as an extraction solvent. The extracts were subjected to polyphenols content evaluation (phenolics, TPHC; tannins, TTC; chlorogenic acid, CGA). Also, free-radical and radical cation scavenging activity (FRSA and RCSA), as well as reducing power ability (RPA) were tested. Butylhydroxytoluene (BHT) was used as a positive control. Minced pork (*M*. *semimembranosus*, 24 h *postmortem*; 1.5% salt; 10% fat) was used as meat ingredient in four formulation treatments: Control, without antioxidant; T1 and T2 at 500 ppm, extracts from *P*. ostreatus grown as previously mentioned; BHT, synthetic antioxidant at 500 ppm), cooked in a water bath (65 °C for 60 min), and subjected to pH and thiobarbituric acid reactive substances (TBARS) assays [3,4]. Data (n=6) were subjected to ANOVA and Tukey-Kramer's multiple comparison tests at $P<0.05$ (NCSS v11).

III. RESULTS AND DISCUSSION

As depicted in Table 1, T1 showed the highest TTC and CGA values, while T1 and T2 showed the lowest TPHC values ($P<0.05$). With respect to antioxidant activity, the positive control used showed the highest FRSA, RCSA, and RPA values ($P<0.05$); however, mushroom extracts showed higher antioxidant properties when compared to the no-antioxidant control ($P<0.05$). In agreement with the current results, it has been reported that *P*. *ostreatus* and *P*. *pulmonarius* grown in wheat straw show FRSA, RCSA, and RPA activities, which were related to the presence of phenolic compounds [4]. Also,

it has been reported that agro-industrial wastes (coffee pulp, rice straw, corncobs, and their mixtures) increased FRSA and RCSA values of *P. djamor* [3].

Table 1 – Polyphenols content and antioxidant activity of *P. ostreatus* water extract.

	TPHC	TTC	CGA	FRSA	RCSA	RPA
Control	20.50±0.45b	34.33±0.52b	22.01±0.88a	55.20±0.64a	25.77±0.61a	0.74±0.01a
T1	16.00±0.89a	46.00±0.89c	26.35±0.50b	61.00±0.89b	46.00±0.89b	0.81±0.01b
T2	16.08±0.90a	25.33±0.52a	22.67±0.68a	61.13±0.72b	46.23±0.64b	0.79±0.02b
BHT	-	-	-	90.17±0.75c	51.40±0.47c	0.96±0.01c

As noted in Figure 1, meat samples treated with the oyster mushroom (T1 and T2) showed higher pH values than the no-treatment control ($P<0.05$). Also, T1 showed the lowest TBARS values ($P<0.05$). In agreement with our results, it has been reported that *P. ostreatus* and *P. pulmonarius* grown in wheat straw, exert a positive effect against lipid oxidation process as indicated by the lower TBARS values [4]. In addition, the inclusion of *P. ostreatus* extracts to pork meat has increased oxidative stability by reducing pH and TBARS changes during refrigerated storage [5].

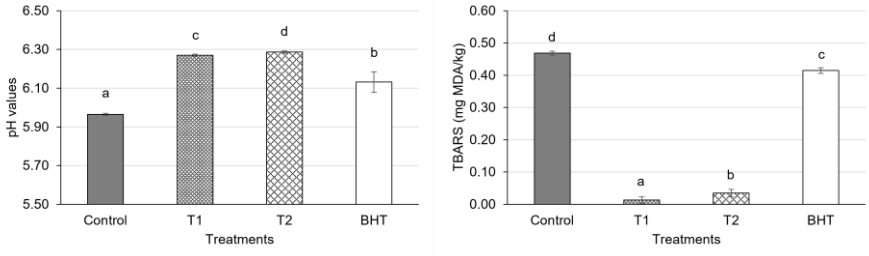

Figure 1. Effect of treatment and cooking period on pH and TBARS values of pork meat.

IV. CONCLUSION

Pleurotus ostreatus is an alternative source of antioxidant compounds that can be used as a natural additive in the meat industry.

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