Application of an hazelnut by-product for innovative functional food production: preliminary results

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Abstracts

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Results showed no aflatoxins, neither in stalks and peels nor in mushrooms. *Lysteria monocytogenes* was absent in all samples (based on 25 g). Complexively, *Pleurotus ostreatus* show less microbial charge with respect to *Pleurotus pulmonaris*. *S. aureus* and *Enterococcus*, *and Enterobacteriacea* were below the minimum limit of $5 \cdot 10^3$ and $3 \cdot 10^2$ CFU/g respectively, for all *Pleurotus ostreatus*; for *Pleurotus pulmonarius* results were higher than the minimum limit and below 10^6 CFU/g. *Pleurotus ostreatus* also show less amount of *Streptococcus* and *Pseudomonas* ($<10^5$ and $<10^4$ CFU/g, respectively and complexively) in comparison to *Pleurotus pulmonarius* ($< 10^6$ and $<10^5$ CFU/g, respectively and complexively). For mesophylus, and yeast and mould, same conclusion can be drawn.

Discovering the best method of growing mushrooms has been a long and complicated task based on life experience of growers and research workers. Therefore, results can be considered encouraging in the view of application of cassava residues in mushrooms cultivation.

[P4.05]

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In the European Union, each year, food industries produced nearly 300 million of tons of organic by-products that represented an additional cost for their disposal. It becomes necessary on one hand an optimization of the process/product finalized to reduce the by-products production and on the other hand a valorisation of the residue obtained. In last years many researchers focused their works on the valorisation of the by-products as functional ingredients for novel foods production due to the bioactive compounds contained like fibre and polyphenols.

Hazelnut skin represents 2.5% by weight of the raw material and it is discarded upon roasting. Until now it has been used as animal bedding but a lot of research underlined its potentiality as a source of natural antioxidant and dietary fibre.

The aim of this research was to evaluate the feasibility of use the Tonda Gentile Trilobata hazelnut skin as ingredient into a ripened cheese. Hazelnut skin was added at a rate of 3% (w/w) of fibre so that the resulting product could be labelled as "fibre source" as required by the European Community Regulation.

The samples were evaluated in term of gross composition (ash, moisture, protein, fat, carbohydrates, dietary fibre), total phenolic content with Folin-Ciocalteu method, radical scavenging activity with DPPH$^{\cdot}$ method, fatty acids, proteolysis with Urea PAGE, sensory characteristics.

The results underlined that the hazelnut skin addition increases dietary fibre and antioxidant content of cheeses without change the macro-compositional characteristics of obtained products and consumer's appreciation. It will be necessary new research to evaluate the effects of different cultivars or the process by which the by-product is obtained on the compositional and nutritional characteristics on the dairy products where it will be added.

[P4.06]

Gaining added value by component extraction from wheat DG (Distiller's Grains)

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DG is an agro-industrial by-product from distilleries and first generation bio-ethanol producers, which currently goes into animal feed as distiller's dried grains with solubles (DDGS), where it is mainly used as a protein supplement for ruminant animals (smaller quantities are used in non-ruminants because of the high fibre content). Drying for DDGS production is energy intensive making it the 3rd most expensive process in the distillery, but is necessary to reduce the volume prior to transport (35% dry solids initially) and also to avoid spoilage and storage issues. The two major producers of wheat DG in the UK have a combined capacity of nearly 2 million dry tons per annum, while the USA produced 30-36 million tons (of corn DDGS) in 2013.

Wheat DG has three valuable components (33-40% protein, 3.5-4.5% oil and 40-46% sugars) that could increase the total value if separated and we are currently working on determining the optimal order and conditions for their extraction. Our preliminary results indicate that 87-100% of the oils can be extracted using supercritical CO_2, while following oil extraction, 30-70% of the proteins can be extracted. This leaves a material that is rich in fibre that can be used for second generation biofuel production. In preliminary tests the equivalent of 44 US gallons of ethanol per ton of wheat DG has been produced from steam-exploded and enzyme-hydrolysed DG using a thermophilic *Geobacillus* species. We envisage that, despite an initial protein removal step, the remaining solid material after these extractions could still have added value as protein concentrate for animal feed, potentially useful for mono-gastrics. In this presentation the optimal component extraction process from an economic