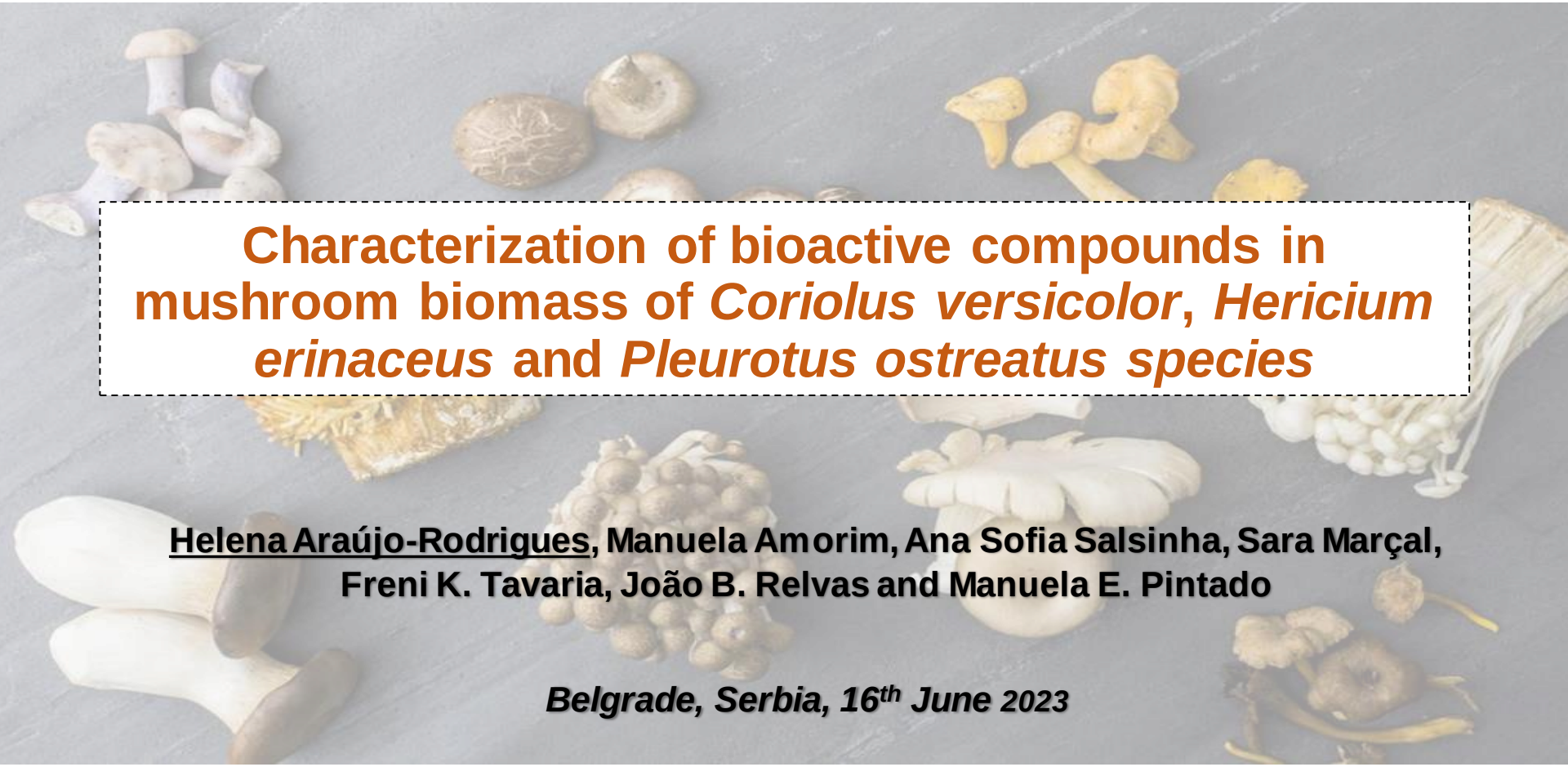
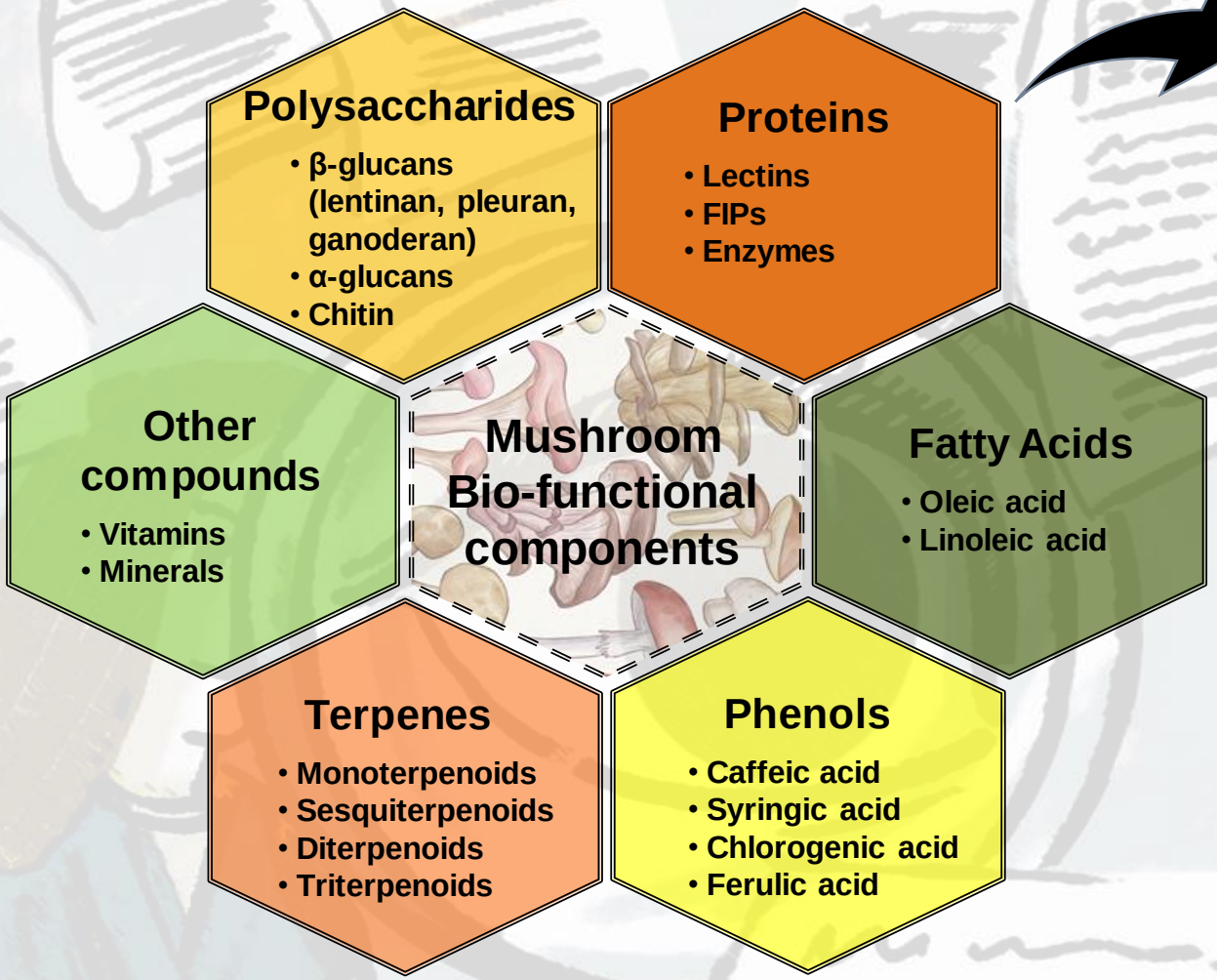
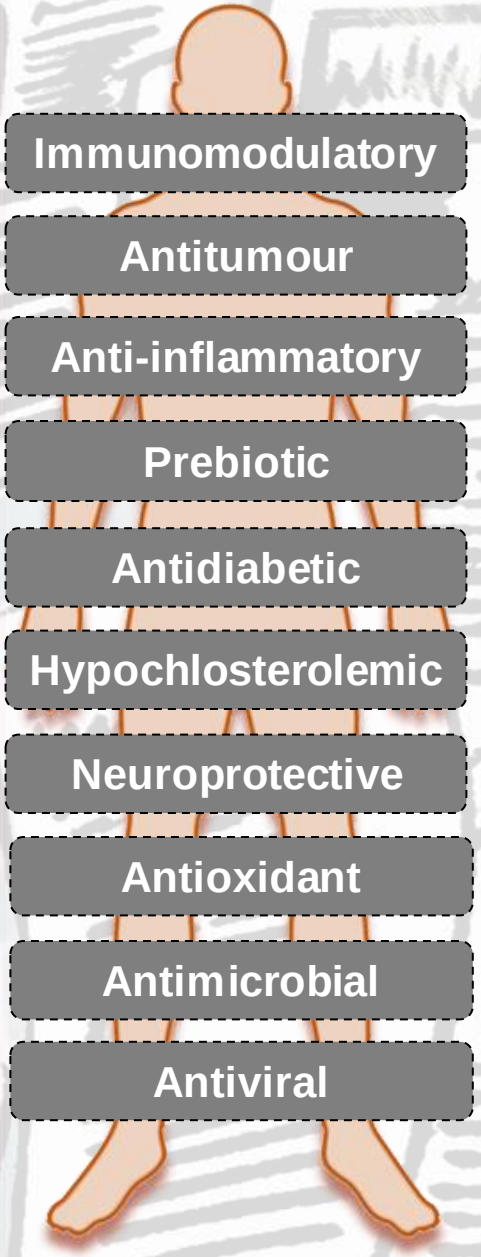


Characterization of bioactive compounds in mushroom biomass of *Coriolus versicolor*, *Hericium erinaceus* and *Pleurotus ostreatus* species

Helena Araújo-Rodrigues, Manuela Amorim, Ana Sofia Salsinha, Sara Marçal, Freni K. Tavaria, João B. Relvas and Manuela E. Pintado

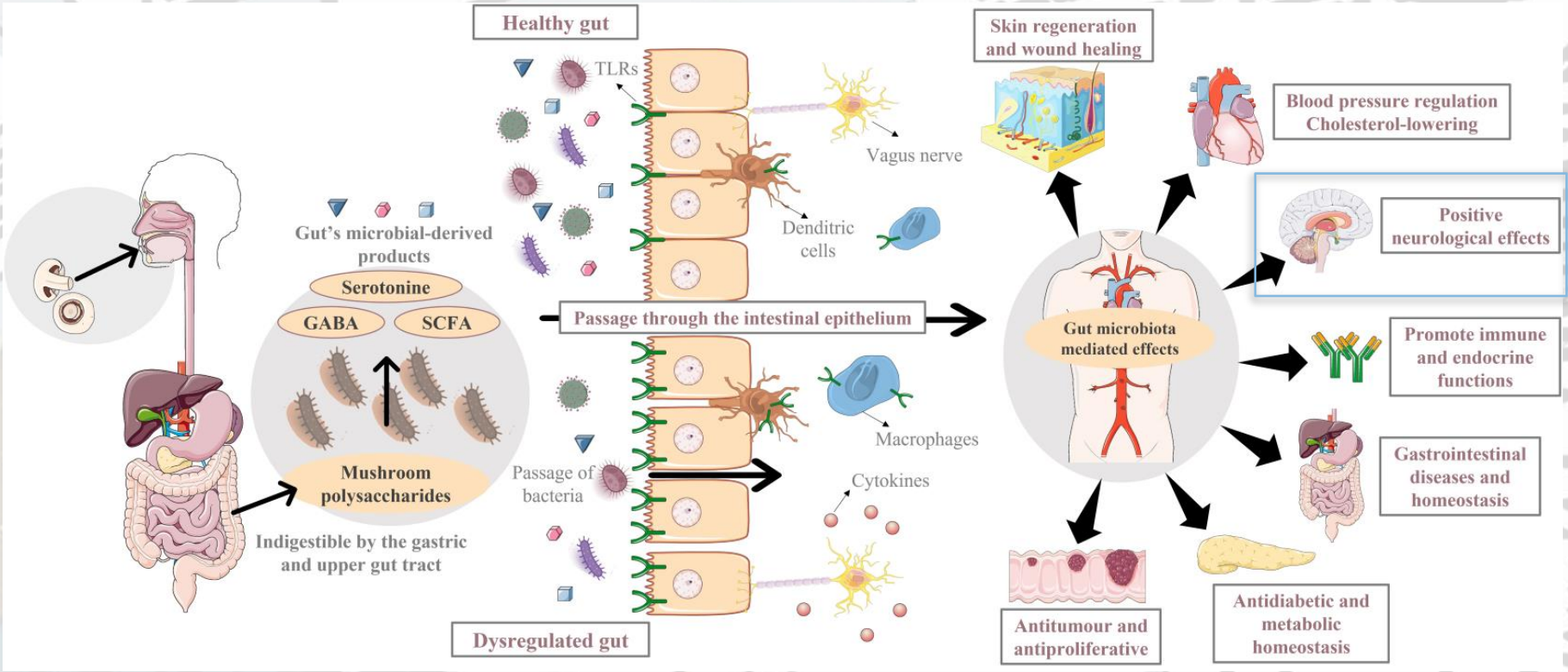
Belgrade, Serbia, 16th June 2023





Araújo-Rodrigues, H., Sousa, A. S., Pintado, M. E. (2022). Macromolecules in Fungi with Pharmaceutical Potential. In *Edible Fungi* (pp. 232-272).
Cerletti C, Esposito S, Iacoviello L. (2021). Edible mushrooms and beta-glucans: Impact on human health. Nutrients, 13(7).
Sousa, A. S., Araújo-Rodrigues, H., Pintado, M. E. (2022). The health-promoting potential of edible mushroom proteins. *Current Pharmaceutical Design*.

Prebiotics: "a substrate that is selectively utilized by host microorganisms conferring a health benefit" (Gibson *et al*., 2017)



Gut microbiota dysbiosis has been directly connected with the development of several disorders

Li et al. (2021). Role of dietary edible mushrooms in the modulation of gut microbiota. *Journal of Functional Foods*, 83, 104538.
Yin et al. (2020). The impact of mushroom polysaccharides on gut microbiota and its beneficial effects to host: A review. *Carbohydrate Polymers*, 250, 116942.
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Objectives and methodology

Mycology Research Laboratories
Global Leader in Mushroom Nutrition

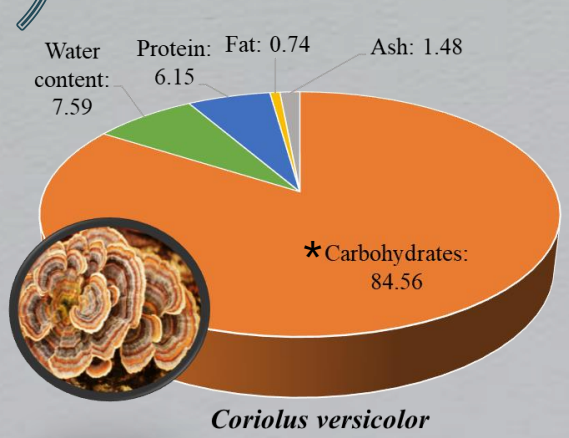
Impact of mushroom nutrition on gut microbiota modulation and association with neuroprotection

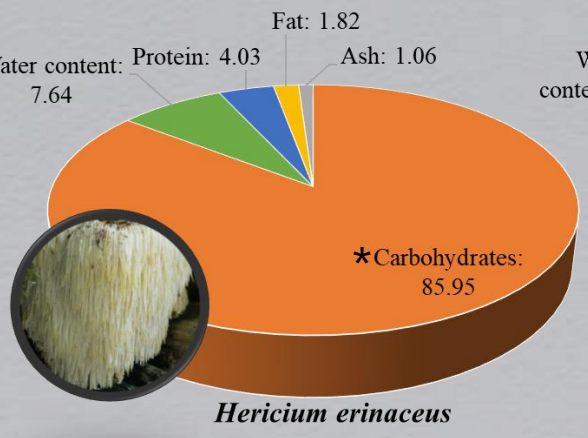
Assess chemical composition and identify main bioactive compounds of mushroom biomass

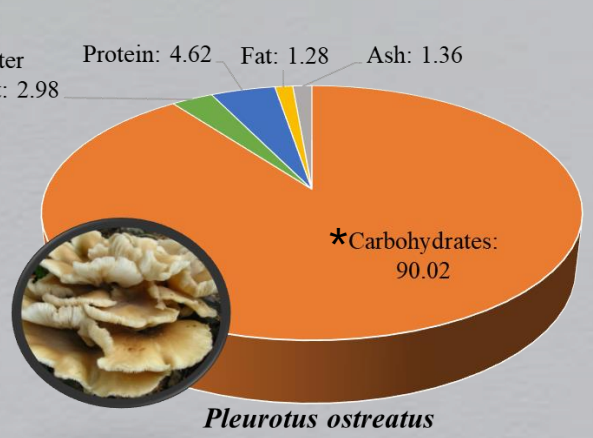
***Coriolus versicolor* (CV)** | ***Hericium erinaceus* (HE)** | ***Pleurotus ostreatus* (PO)**

- Centesimal composition
- Dietary fiber composition
- α-glucans and β-glucans content
- Polysaccharides MW distribution
- Proteins and peptides MW distribution
- Sugars profile
- Total/ free amino acids profile
- Mineral profile
- Fatty acids profile
- Ergoesterol content
- Tocopherols profile
- Total phenolic compounds
- Total antioxidant capacity of free and bound phenolic fraction

Chemical composition







Glucans content

	C. versicolor	*H. erinaceus*	*P. ostreatus*
Total glucans[1]	76.15±5.06[a]	79.87±0.57[a]	80.45±5.05[a]
α-glucans[1]	71.49±7.26[a]	76.98±4.33[a]	77.49±2.22[a]
β-glucans[1,*]	4.67±1.28[a]	2.89±0.55[a]	2.96±0.52[a]

All determinations were carried out in triplicate and the result expressed in mean ± standard deviation. Different superscript letters within the same row indicate significant differences ($p < 0.05$). [1] (g/ 100 g DW); *It was calculated by difference.

Free and total amino acids

Amino acids (mg/ 100 g DM)

Aas	CV	HE	PO	CV	HE	PO
	Free			Total		
Asp	24.47±2.82^{a}	N.D.	3.51±0.41^{b}	845.62±82.71^{a}	771.90±11.54^{a}	806.65±38.07^{a}
Glu	42.48±.6.16^{a}	3.60±0.55^{b}	14.42±1.53^{c}	939.24±66.87^{a}	797.34±9.50^{a}	861.08±66.66^{a}
Asn	18.40±2.69^{a}	N.D.	0.46±0.11^{b}	606.10±41.51^{a}	523.51±5.27^{a}	614.09±59.52^{a}
Ser	N.D.	N.D.	N.D.	N.D.	N.D.	27.49±0.38^{a}
His*	0.00±0.00^{a}	0.00±0.00^{b}	0.00±0.00^{b}	0.01±0.00^{a}	0.00±0.00^{b}	0.01±0.00^{a}
Gln	38.95±4.27^{a}	N.D.	N.D.	211.65±24.88^{a}	N.D.	N.D.
Gyn	21.18±3.26^{a}	2.83±0.45^{b}	1.07±0.18^{b}	317.33±64.18^{a}	392.13±0.03^{a}	331.20±3.19^{a}
Thr*	20.33±2.96^{a}	4.20±0.53^{b}	0.67±0.04^{b}	348.74±40.20^{a}	405.55±4.48^{a,b}	473.93±31.11^{b}
Arg	28.31±1.49^{a}	N.D.	16.98±2.18^{b}	638.32±61.63^{a}	566.27±6.89^{a}	626.03±63.10^{a}
Ala	34.06±0.99^{a}	3.96±0.58^{b}	5.07±0.16^{b}	615.74±50.21^{a}	525.58±3.06^{a}	603.51±68.11^{a}
Gaba	24.27±3.99^{a}	2.88±0.25^{b}	3.33±0.04^{b}	125.99±12.84^{a}	77.62±0.98^{b}	80.26±4.29^{b}
Tyr	5.15±0.05^{a}	0.64±0.02^{b}	1.30±0.17^{c}	374.56±54.99^{a}	342.98±1.92^{a}	365.16±44.71^{a}
Val*	17.32±0.04^{a}	1.38±0.20^{b}	0.47±0.04^{c}	460.37±47.11^{a}	414.47±5.39^{a}	490.78±29.87^{a}
Met	N.D.	N.D.	N.D.	31.62±1.43^{a}	62.03±0.05^{b}	34.35±9.51^{a}
Trp*	2.32±0.20^{a}	0.16±0.01^{b}	0.09±0.01^{b}	62.92±7.37^{a}	58.98±0.69^{a}	65.10±2.47^{a}
Phe*	18.32±1.03^{a}	1.47±0.20^{b}	1.15±0.06^{b}	325.55±12.07^{a}	298.96±2.15^{a}	337.91±41.07^{a}
Ile*	17.25±0.89^{a}	0.83±0.12^{b}	N.D.	495.60±37.64^{a}	451.66±12.70^{a}	**590.31±82.28**^{a}
Leu*	20.38±2.15^{a}	4.14±0.00^{b}	2.70±0.35^{b}	540.79±67.20^{a}	511.60±3.61^{a}	560.78±51.31^{a}
Total	**349.75±21.86**^{a}	**28.25±1.75**^{b}	**63.78±2.02**^{c}	**6940.1±318.2**^{a}	**6308.3±494.1**^{a}	**6841.2±444.9**^{a}

All determinations were carried out in triplicate and the result expressed as mean ± standard deviation. Different superscript letters within the same row indicate significant differences ($p < 0.05$). * Essential AA; N.D. not detected.

Mineral composition

Mineral profile (mg/ 100 g DM)



Mineral	*C. versicolor*	*H. erinaceus*	*P. ostreatus*
Mo	0.04±0.01^{a}	0.07±0.01^{b}	0.10±0.01^{b}
Zn	1.85±0.05^{a}	2.03±0.05^{b}	2.37±0.03^{c}
Cd	0.01±0.00^{a}	0.02±0.00^{b}	0.01±0.00^{a}
P	410.67±8.41^{a}	314.00±5.18^{b}	397.12±8.05^{a}
Ni	0.01±0.00^{a}	0.01±0.00^{a}	0.05±0.01^{b}
Mn	3.87±0.08^{a}	2.38±0.03^{b}	4.17±0.07^{c}
Fe	2.03±0.09^{a}	0.39±0.03^{b}	0.76±0.04^{c}
Mg	163.70±2.12^{a}	118.77±1.18^{b}	149.57±1.88^{c}
Ca	24.41±0.37^{a}	22.05±0.26^{b}	14.74±0.21^{c}
Cu	0.40±0.01^{a}	0.27±0.00^{b}	0.35±0.01^{c}
Na	14.51±0.37^{a}	5.01±0.02^{b}	0.94±0.10^{c}
K	242.70±2.17^{a}	164.52±1.63^{b}	285.10±3.49^{c}
Total	864.19±9.93^{a}	629.54±7.21^{b}	855.29±12.35^{a}

All determinations were carried out in triplicate and the result expressed as mean ± standard deviation.

Different superscript letters within the same row indicate significant differences ($p < 0.05$).

Fatty acid profile

Fat profile (g/ 100 g DM)

Species	*Coriolus versicolor*	*Hericium erinaceus*	*Pleurotus ostreatus*
Total SFA	0.22±0.02[a]	0.48±0.05[b]	0.34±0.02[c]
Total MUFA	0.32±0.03[a]	0.91±0.08[b]	0.57±0.02[c]
Total PUFA	0.30±0.03[a]	0.72±0.05[b]	0.53±0.03[c]

SFA – saturated fatty acids

MUFA – monounsaturated fatty acids

PUFA – polyunsaturated fatty acids

All determinations were carried out in triplicate and the result expressed as mean ± standard deviation. Different superscript letters within the same row indicate significant differences ($p < 0.05$).

Most prevalent fatty acids:

- Palmitic acid (C16:0)
- Stearic acid (C18:0)
- Oleic acid (C18:1 c9)
- Linoleic acid (LA, Ω-6)
  - (C18:2 c9c12)
- γ-linolenic acid (Ω-6)
  - (C18:3 c6c9c13)
- Paullinic acid (C20:1 c13)
- α-Linolenic Acid (ALA, Ω-3)
  - (C18:3 c9c12c15)
  - C20:3 c11c14c17
- Lignoceric acid (C24:0)

Sterol profile

Ergosterol (mg/ 100 g DM)



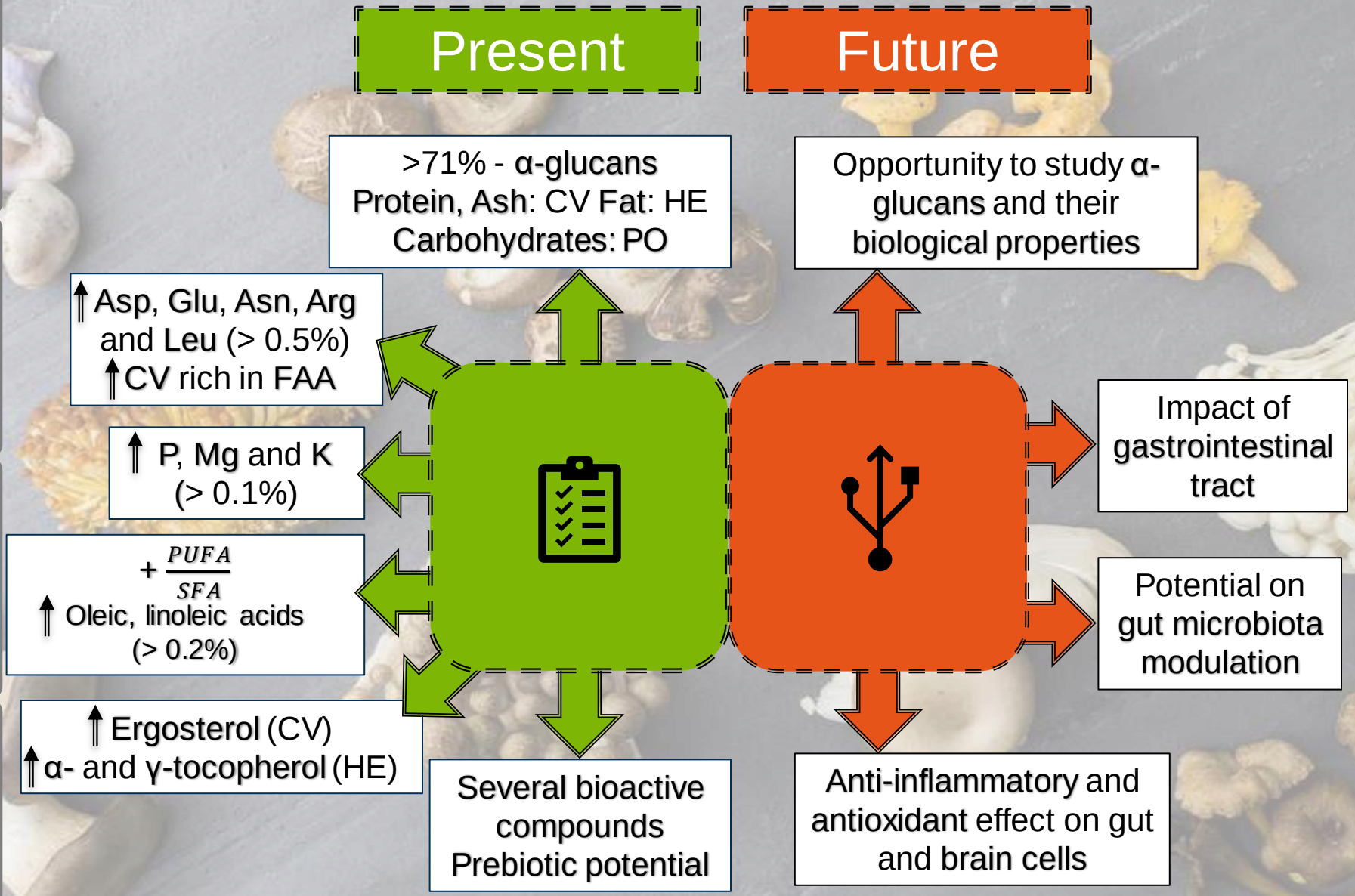
Sterol	*Coriolus versicolor*	*Hericium erinaceus*	*Pleurotus ostreatus*
Ergosterol	8.97±0.68[a]	1.57±0.07[b]	5.20±0.34[c]

Tocopherols profile

Tocopherol (µg/ 100 g DM)

Tocopherol	*C. versicolor*	*H. erinaceus*	*P. ostreatus*
α-Tocopherol	94.20±2.58[a]	410.81±45.80[b]	16.75±1.82[c]
β-Tocopherol	7.04±1.24[a]	29.17±0.96[b]	0.46±0.01[c]
γ-Tocopherol	79.30±2.02[a]	312.42±10.01[b]	52.69±5.21[c]
δ-tocoferol	13.26±1.92[a]	64.35±2.48[b]	10.48±2.25[a]
Total	193.81±7.42[a]	816.74±42.17[b]	80.38±5.99[c]

All determinations were carried out in triplicate. Different superscript letters within the same row indicate significant differences ($p < 0.05$).


Present
Future
>71% - α-glucans
Protein, Ash: CV Fat: HE
Carbohydrates: PO
Opportunity to study α-glucans and their biological properties
↑Asp, Glu, Asn, Arg and Leu (> 0.5%)
↑CV rich in FAA
↑ P, Mg and K (> 0.1%)
+ $\frac{PUFA}{SFA}$
↑ Oleic, linoleic acids (> 0.2%)
↑ Ergosterol (CV)
↑α- and γ-tocopherol (HE)
Several bioactive compounds
Prebiotic potential
Anti-inflammatory and antioxidant effect on gut and brain cells
Impact of gastrointestinal tract
Potential on gut microbiota modulation

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Helena Araújo-Rodrigues: hrodrigues@ucp.pt