Mycochemical study of polysaccharides from edible mushroom *Cortinarius caperatus* (Gypsy mushroom)

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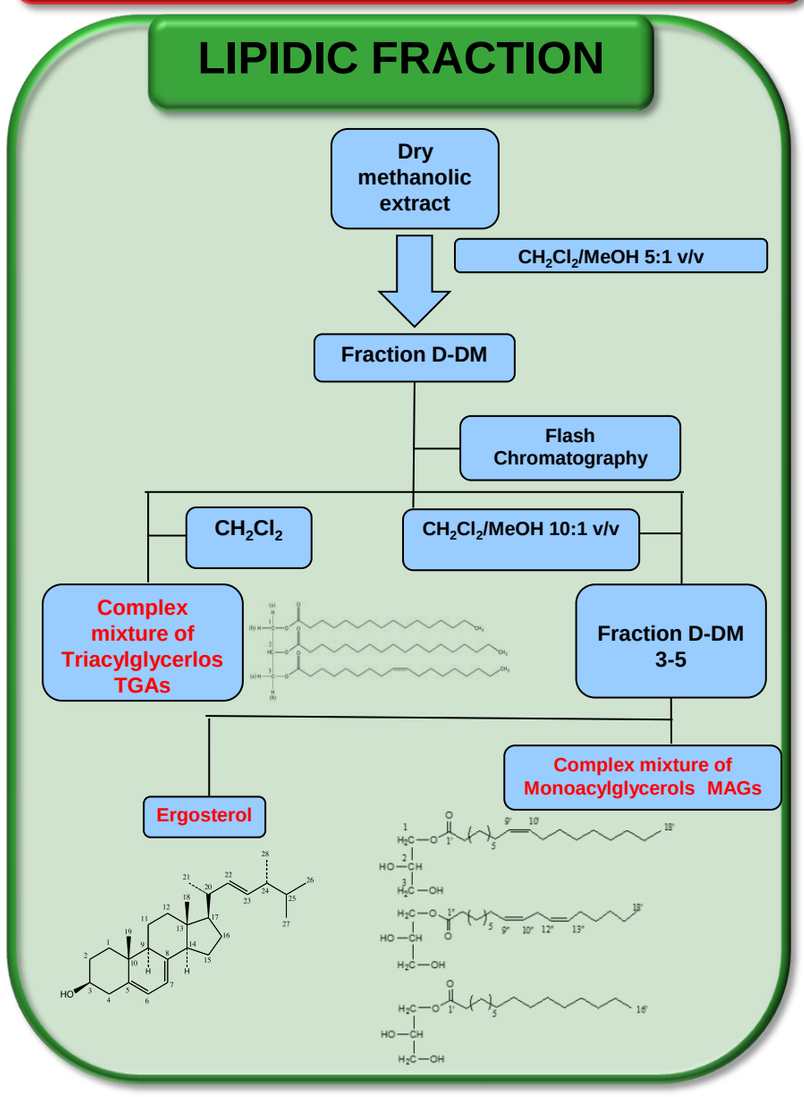
INTRODUCTION

Among basidiomycete molecules, cell wall polysaccharides have been recognized as a major class of bioactive constituents. [1] They are safe molecules and they have a wide spectrum of biological activities, such as immunostimulatory and antioxidant, therefore they possess a prominent role in health benefits coming from mushroom consumption. These properties make mushroom polysaccharides potential candidates for nutraceutical applications and bioactive ingredients production. [2]

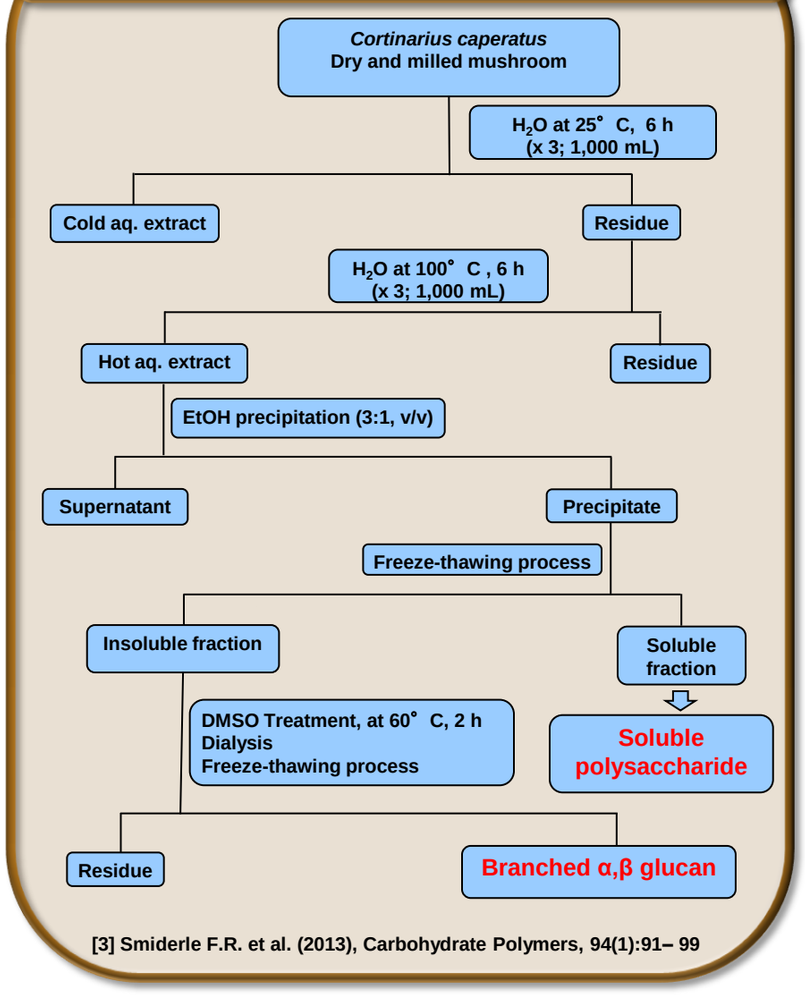
[1] - Zhang M. et al. (2007), Trends in Food Science & Technology 18, 4-19
[2] - Zhu F. et al (2015), Journal of Food Composition and Analysis 41, 165-173

PURIFICATION PROCEDURES

LIPIDIC FRACTION



POLYSACCHARIDIC FRACTION[3]



[3] Smiderle F.R. et al. (2013), Carbohydrate Polymers, 94(1):91– 99

STRUCTURAL ELUCIDATION OF ISOLATED POLYSACCHARIDES

Structural elucidation of isolated polysaccharides has been performed using mono- and bi-dimensional NMR spectroscopy (^{1}H-NMR, ^{13}C-NMR, DEPT, ^{1}H-^{1}H COSY, DQCOSY, TOCSY, HSQC, and HMBC), together with GC analysis of sylilated monosaccharides and methylation analysis [4] to determine the monosaccharide composition and the linkage type, respectively.

[4] - Ciucanu I. & Kerek F. (1984), Carbohydrate Research, 131(2): 209-217

Soluble Polysaccharide

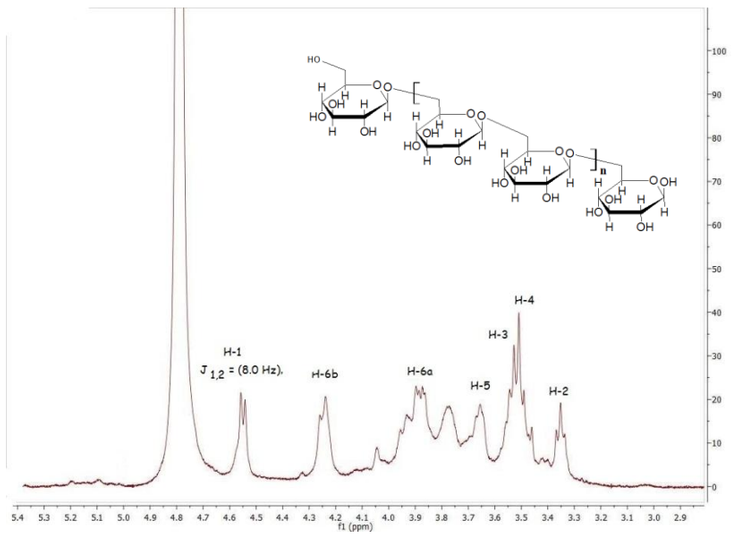


Fig. 1 ^{1}H-NMR spectrum of the soluble polysaccharide β 1,6 glucan

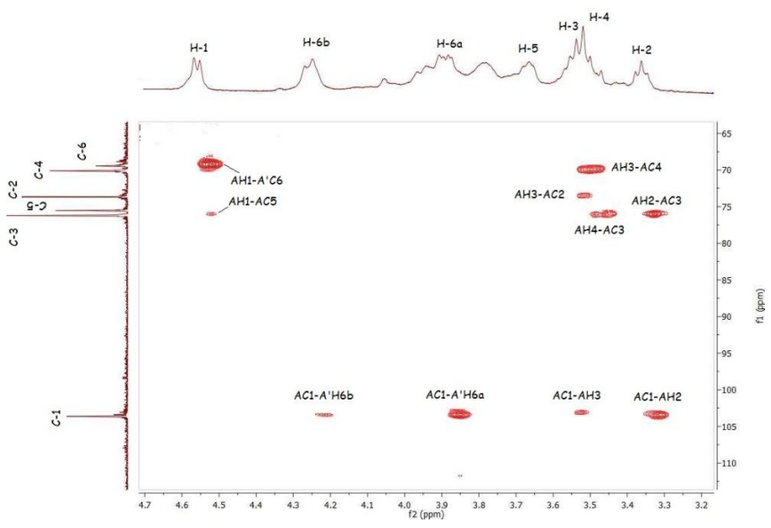


Fig. 2 HMBC spectrum of the soluble polysaccharide β 1,6 glucan

Insoluble Polysaccharide

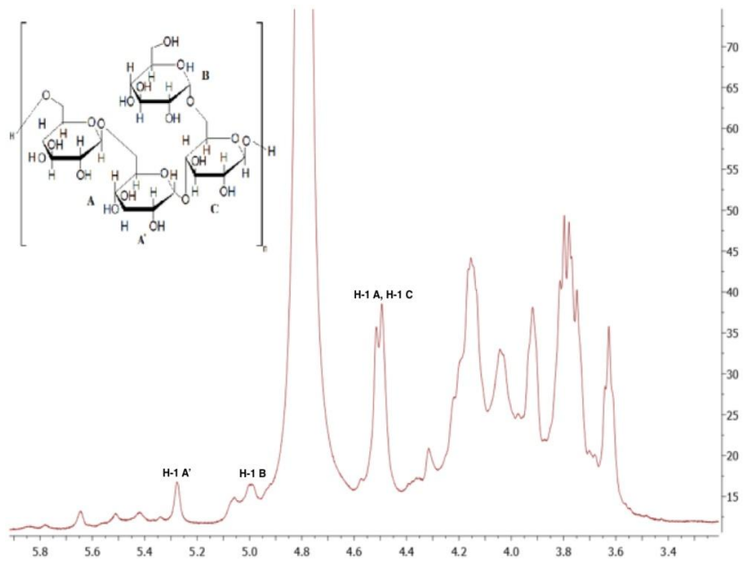


Fig. 3 ^{1}H-NMR of the branched α,β glucan

Sugar linkage	Residue	C1	C2	C3	C4	C5	C6
6)-β-(1-	A	103.40	73.64	76.06	70.01	75.40	**69.33**
6)-α-(1-	A'	100.70	73.55	--	70.10	--	**68.76**
α-(1-	B	98.37	--	--	69.11	--	61.25
4,6)-β-(1-	C	103.40	--	--	**76.14**	--	**67.03**

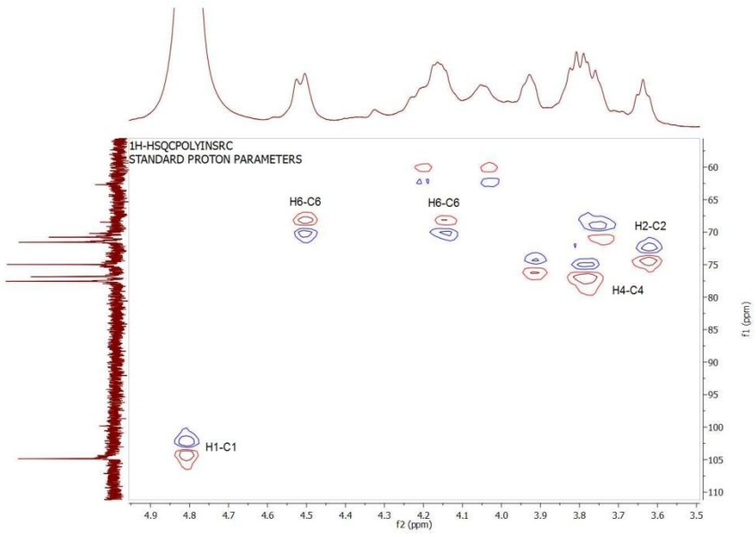


Fig. 4 HSQC of the branched α,β glucan

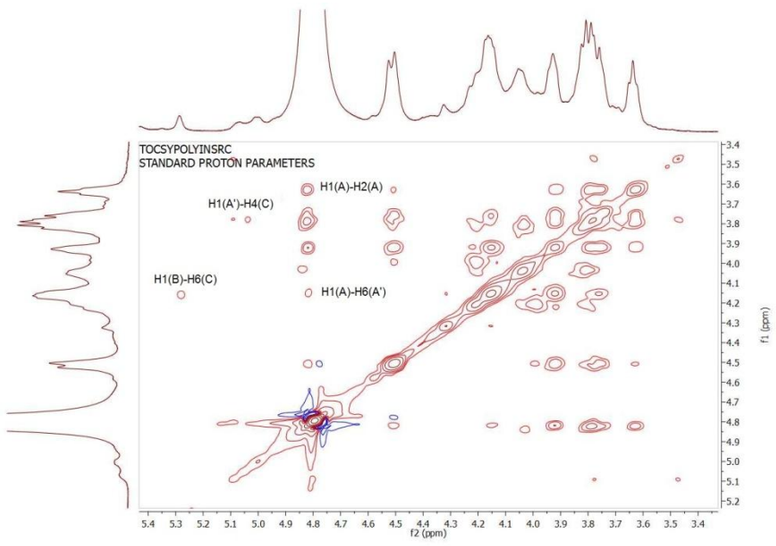
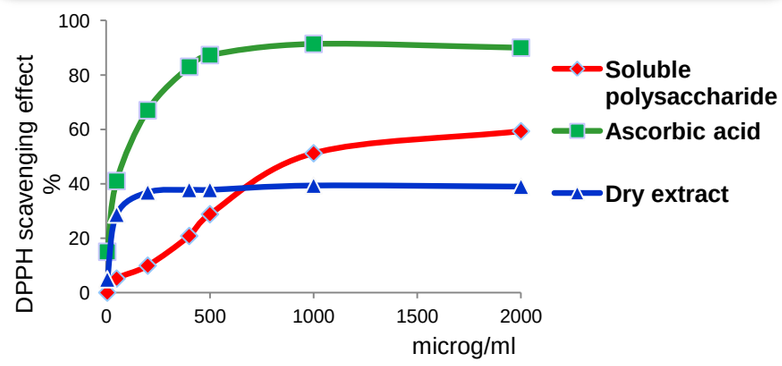


Fig. 5 TOCSY of the branched α,β glucan

ANTIOXIDANT ACTIVITY



The antioxidant activity of the soluble polysaccharide fraction has been evaluated as radical-scavenging activity by DPPH assay and the β-(1→6)-D-glucan showed significative antioxidant activity.

RESULTS

Fractionation of the hot aqueous extract of *Cortinarius caperatus* led to isolation of two polysaccharidic fractions characterized by spectroscopic analyses (^{1}H-NMR, ^{13}C-NMR, DEPT, ^{1}H-^{1}H COSY, DQCOSY, TOCSY, HSQC, HMBC and HMQC), mass spectrometry (EI-MS, ESI-MS), infrared spectroscopy (FT-IR), chemical reactions of hydrolysis and derivatization followed by GC and HPLC analyses. [5] The mycochemical study revealed a water-soluble fraction characterized as β-(1→6)-D-glucan, whose presence inside *C. caperatus* has never, to the best of our knowledge, been reported before. Moreover, a purified water insoluble fraction has been characterized as a branched α,β glucan (Figures 3-5).

[5] - Ruthes A. C. et al. (2015), Carbohydrate Polymers 117, 753-761