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THE CHEMICAL COMPOSITION AND ANTIOXIDANT POTENTIAL OF MICROALGAE *Chaetocerus costatus*

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SUMMARY

This study compared antioxidant potential and chemical composition of the marine diatom *Chaetocerus costatus* (CIM953) extracted in following solvents: acetone, ethanol and hexane. Extraction was done using ultrasound assisted extraction (UAE)

INTRODUCTION

Diatoms are one of the unexplored groups of marine microalgae for various biotechnological applications.

Achieving maximum extraction yield is crucial for further research and commercial use of this promising resourse.

MATERIALS & METHODS

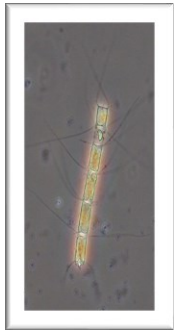
CULTIVATION

F/2 medium
18 °C
18 h(light): 6 h(dark)

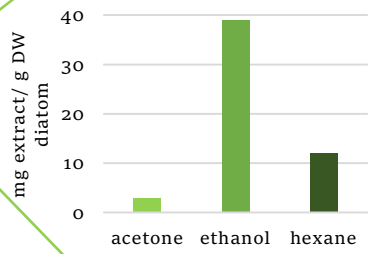
frezze-drying

EXTRACTION

UAE
30 min
40 °C



EXTRACTION YIELD



CHEMICAL COMPOSTION (UHPLC-ESI-HRMS)

ANTIOXIDANT ASSAYS (DPPH & ORAC)

RESULTS

Main detected compounds

Compound name	MF	Peak area (arbitrary units) Acetone	Ethanol	Hexane
PIGMENTS & DERIVATIVES				
Loliolide	$C_{11}H_{16}O_3$	$4{,}63\times10_6$	-	-
Halocynthiaxanthin acetate	$C_{42}H_{56}O_5$	$2{,}47\times10_6$	$2{,}55\times10^5$	-
Fucoxanthin	$C_{42}H_{58}O_6$	$5{,}13\times10^6$	$4{,}55\times10^5$	-
13²-hydroxy-pheophytin *a*	$C_{55}H_{74}N_4O_6$	$1{,}53\times10^6$	$7{,}00\times10^6$	-
Pheophytin *a*	$C_{55}H_{74}N_4O_5$	$3{,}58\times10_7$	$7{,}06\times10^5$	$1{,}41\times10^4$
FATTY ACID DERIVATIVES				
Hexadecasphinganine	$C_{16}H_{35}NO_2$	$4{,}51\times10^6$	$2{,}08\times10^5$	$8{,}56\times10_5$
Monopalmitin (2,3-Dihydroxypropyl hexadecanoate)	$C_{19}H_{38}O_4$	$3{,}77\times10_6$	$6{,}49\times10^5$	$7{,}05\times10_5$
Oleamide (Octadec-9-enamide)	$C_{18}H_{35}NO$	$6{,}56\times10_6$	$7{,}00\times10^6$	$7{,}03\times10_6$
Monostearin (2,3-Dihydroxypropyl octadecanoate)	$C_{21}H_{42}O_4$	$3.70\times10_6$	3.51×10^6	$3.98\times10_6$
Erucamide (Docos-13-enamide)	$C_{22}H_{43}NO$	2.18×10^6	$2{,}00\times10^6$	$3{,}12\times10^5$
STEROIDS & DERIVATIVES				
Chola-5,22-dien-3-ol	$C_{24}H_{38}O$	$9{,}00\times10_4$	$7{,}72\times10^4$	$7{,}76\times10^4$
β-Stigmasterol	$C_{29}H_{46}$	$1{,}02\times10^3$	$9{,}60\times10^3$	$8{,}80\times10^3$
Campesterol	$C_{28}H_{48}O$	$1{,}96\times10^5$	-	-
(3β)-3-Hydroxystigmast-5-en-7-one	$C_{29}H_{48}O_2$	$7{,}60\times10_5$	$2{,}30\times10^5$	$7{,}77\times10^3$
24-Hydroperoxy-24-vinyl-cholesterol	$C_{29}H_{48}O_3$	$5{,}13\times10^4$	$1{,}58\times10^4$	-

ANTIOXIDANT ASSAYS

Solvent	DPPH (% inhibition)	ORAC (μ mM TE/L)
Acetone	3,51±0,47	50,66±2,22
Ethanol	9,17±0,99	37,10±3,29
Hexane	ND	ND

TE – trolox equivalent; ND – not detected

CONCLUSIONS

- ✓ Extraction with etanol gave a significantly higher yield compared to acetone and hexane
- ✓ The DPPH assay showed almost three times higher DPPh inhibition in percent, while the ORAC assay showed 27% higher activity of the acetone extract
- ✓ There was no significant difference between the etanolic and acetonic extract, while hexane gave the lowest number of compounds detected

✓ BASED ON THE RESULTS OF THIS STUDY, ETANOL IS THE BEST SOLVENT FOR EFFECTIVE DIATOM EXTRACTION!

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