

# CHARACTERISATION AND SEASONAL VARIATION OF LIPID AND FATTY ACID COMPOSITION OF COQUINA CLAM, *DONAX TRUNCULUS* (MOLLUSCA, BIVALVIA) FROM THE GULF OF TUNIS

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## Abstract

The lipid content and fatty acid composition of the coquina clam *Donax trunculus* (Mollusca, bivalvia) sampled from the sandy beach of Borj Cedria (BC) situated in the Gulf of Tunis (the North Eastern coast of Tunisia) were analysed. Total lipid content in dry weight was ranged from 4.8 to 7.3 % and the major fatty acids in *D. trunculus* tissues were palmitic (C16:0), stearic (C18:0), eicosapentaenoic (EPA) (C20:5n-3) and docosahexaenoic (DHA) (C22:6n-3) acids. In comparison with saturated fatty acids (SFA) and monounsaturated fatty acids (MUFA), polyunsaturated fatty acids (PUFA) constituted the highest proportion during the four seasons.

**Keywords:** *Bivalves, Physiology*

## Introduction

*Donax trunculus* (Linnaeus 1758) (Mollusca: Bivalvia) is an Atlantic-Mediterranean warm-temperate species. Among bivalves, it is one of the most harvested clams in the world [1]. Generally, gametogenesis takes place during winter and spring and gamete emission starts in late spring and continues until summer. In Tunisia, *D. trunculus* shows a large distribution with high density along the sandy beaches especially in the Gulf of Tunis coasts. To the best of our knowledge, informations concerning the quality requisites of *D. trunculus* in lipid and fatty acid composition do not exist. Therefore, the purpose of this work is to study the natural seasonal variations in lipids and fatty acid composition of *D. trunculus*.

## Materials and methods

Specimens of *D. trunculus* were collected at approximately monthly intervals between July 2004 and may 2005 along the sandy beach of Borj Cedria at a depth of 50 cm. Total lipid from each sample (six replicates of the whole animal per season) was extracted with chloroform: methanol (2:1, v/v) [3]. Fatty acids from total lipids were acid catalysed transmethylated [4] and subsequently analysed by high resolution gas chromatography. Tukey Honest Significant Differences (HSD) multiple comparisons test was conducted to determine differences at a significance level of 5 % ( $p < 0.05$ ).

## Results and Discussion

Total lipid content in dry weight of *Donax* tissues was accumulated especially during winter (7.37 %) and summer (5.9 %). The variation of lipid content could be explained by the abundance and quality of the available food in the *Donax* environment and by the accumulation or utilization of lipid reserves prior to gametogenesis.

Results on seasonal variations of the fatty acid composition, expressed in percent of total fatty acids, (Table 1) indicate that the major fatty acids in *D. trunculus* tissues were C16:0, C18:0, C20:5n-3 and C22:6n-3 acids. Compared with SFA and MUFA, PUFA constituted the highest proportion. PUFA were generally low during summer ( $38.7 \pm 2.2\%$ ), and high during winter ( $46 \pm 2.2\%$ ,  $p = 0.00019$ ). SFA varied between  $28.8 \pm 1.9\%$  and  $34.7 \pm 2.4\%$  respectively during winter and summer. No significant seasonal changes were observed in MUFA which represent the lowest proportion of total fatty acids. The seasonal variations of PUFA could hardly be correlated with the different phases of the annual reproductive cycle of the animals; this may explain the main function of these fatty acids in gamete formation. During the period under study, *D. trunculus* was characterised by high levels of n-3 PUFA (24.5-34.9 %), important in the human diet especially for their prevention of cardiovascular diseases, low levels of n-6 PUFA (6.4-9.7 %) and relatively high n-3/n-6 PUFA ratio values (3.5-5.6).

Due to their low lipid and the high percentage of healthy n-3 PUFA especially in winter and spring, periods of reserve accumulation, we can conclude that *D. trunculus* can be considered as a food item with interesting dietetic properties.

Tab. 1. Seasonal variations in lipid (g/100g dry weight) and fatty acid composition (% of total fatty acids) (means  $\pm$  standard deviation) in the total mass of *Donax trunculus*

Fatty acids	Summer	Autumn	Winter	Spring
SFA	34.7 $\pm$ 2.4	31.6 $\pm$ 1.1	28.8 $\pm$ 1.9	29.6 $\pm$ 0.6
MUFA	16.8 $\pm$ 2.3	17.2 $\pm$ 5.2	13 $\pm$ 2.2	15.5 $\pm$ 2.1
PUFA	38.7 $\pm$ 2.2	41.8 $\pm$ 1	46 $\pm$ 2.2	46.1 $\pm$ 1.2
PUFAn-3	25.9 $\pm$ 0.7	24.5 $\pm$ 1.5	33 $\pm$ 1.5	34.9 $\pm$ 1.4
PUFAn-6	8.0 $\pm$ 1.2	9.7 $\pm$ 0.6	7.1 $\pm$ 0.5	6.4 $\pm$ 0.4
Lipids	5.9 $\pm$ 1.4	4.8 $\pm$ 0.9	7.3 $\pm$ 2.1	4.9 $\pm$ 1.9
n-3/n-6	3.5 $\pm$ 0.7	3.7 $\pm$ 1	4.8 $\pm$ 1.5	5.6 $\pm$ 0.6

## References

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