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Research Note

Proximate Composition, Amino Acid Profile and Mineral Content of Beach Clam (*Donax cuneatus*)

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Seafood is usually referred to as a complete protein source since it contains all the essential amino acids needed for human health. It is a low calorie food compared to other protein-rich foods like meat and poultry. Besides, the protein in seafood is easier to digest than red meat and poultry due to very less connective tissue in the muscle. Reports reveal that, eating fish and shellfish regularly is beneficial in many ways. Marine invertebrates are widely used as food and feed supplement around the world. Molluscan proteins are rich in essential amino acids which are required for the maintenance of growth and reproduction. Molluscs are a good dietary source of minerals and B complex vitamin. As the world population is growing, the demand for seafood is also increasing rapidly. Though marine bivalves are important dietary group among molluscs, the literature available on certain species regarding their nutritive value is scarce (Thivakaran, 1988).

Beach clam, *Donax cuneatus* is a marine bivalves widely consumed by fishermen in many parts of the world. The proximate composition and biochemical constituents of *D. cuneatus* were analysed to understand its nutritive value and to promote the species as a nutritious seafood item.

The live specimens of beach clam *D. cuneatus* collected from latitude 11º53'37.07''N and longitude 79º49'40.0''E Veerampattinam beach, Pondicherry, were brought to the lab in aerated plastic containers filled with sea water. They were washed in distilled water to get rid of debris. The shells were opened and the soft tissues was removed from their valves and rinsed with deionized water to remove extraneous materials and homogenized using blender for analysis.

The moisture content was estimated using oven-dry method (AOAC, 1994). Amount of protein in the sample was estimated following the method of Lowry et al. (1951) with BSA as standard. Total carbohydrate in the tissue was estimated as per Ashwell (1966) using D-glucose as standard. Lipid determination was carried out using the method of Folch et al. (1956). Ash content of the tissue was determined by incineration in a carbolite Sheffield LMF3 muffle furnace at 500ºC (AOAC, 1994). The mineral content present in the sample was estimated by following the methodology adopted in Indian Pharmacopoeia (2010). Amount of amino acid present in the tissue sample was estimated using HPLC (Agilent 1100 RP-HPLC, C_{18} column, 150 mm length, 5.0 µm particle size and 4.6 mm – ID) (Bruckner et al., 1991).

Moisture content in *D. cuneatus* was found to be 77.04%. Earlier, Beyza & Hulya (2010) reported similar results for the freshwater mussels; *Unio terminalis* (80.36%) and *Potamida littoralis* (81.69%). Clams provide high quality protein with almost all the dietary essential amino acids for the maintenance and growth of human body (King et al., 1990). In the present study, *D. cuneatus* had 42.05% of protein content on dry weight basis which is similar to the other molluscan sources like *Hemifusus pugilinus* (40 - 78%) (Ananda Kumar et al., 1986) and *Meretrix casta* (45.67%) (Srilatha et al., 2013). Carbohydrate content is less when compared to proteins and lipids aquatic animals (Babu et al., 2012). The amount of carbohydrate present in

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D. cuneatus was found to be 14.73% on dry weight basis which is similar to *Strombus canarium* (10.49% to 14.56%) and *Babylonia spirata* (16.85%) (Arularasan et al., 2010; Periyasamy et al., 2012). Lipids are extremely important in maintaining structural and physiological integrity of cellular and sub-cellular membranes. Lipid content in *D. cuneatus* was estimated as 9.75% on dry weight basis. Srilatha et al. (2013) reported 5.63 and 4.34% lipid content in *M. casta* from two different study areas. Rajan (1987) reported 8.3% lipid content in *D. cuneatus*. The ash content was 2.59% which is similar to that of *U. terminalis* and *P. littoralis* (Ersoy & Sereflisan, 2010). The mineral content of *D. cuneatus* is shown in Table 1. The mineral content was found similar to that of snails *Achatina* spp. and *Limicoleria* spp. (Jatto et al., 2010).

Table 1. Mineral content in *D. cuneatus.*

Minerals	(% of total ash)
Magnesium	0.92%
Calcium	2.46%
Chloride	1.75%
Sulfate	10.20%

The samples analysed was found to contain fifteen amino acids with high amount of serine, glutamic acid, glycine, arginine, alanine and valine (Table 2). It was reported that crustacean muscles contain high concentration of free amino acids such as arginine, glycine, proline, glutamine and alanine (Cobb et al., 1975). Similarly, Babu et al. (2012) reported methionine (14.54%), threonine (1.21%) and leucine (10.78%) as major essential amino acids while glutamine 10.87%, glutamic acid 10.85% and arginine 10.66% were the major non-essential amino acids in *Gafrarium tumidum.*

Biochemical composition is the yardstick to measure and assess the nutritional quality of food sources. It is well known that the biochemical composition of edible tissues of marine invertebrate is influenced by their nutritional habits, age, sex, season, seawater temperature and salinity. The study clearly indicates that the clam, *D. cuneatus* as an important source of dietary protein as other sea foods, and can be an alternate to high cholesterol containing meats such as chicken, beef or other red meat (Shanmugam et al., 2007). Therefore *D. cuneatus* can be recommended as a healthy diet for human consumption.

Table 2. Amount of amino acid present in *D. cuneatus.*

Amino acid	Amino acid level ($\mu g\ mg^{-1}$)
Aspartic acid	11.7
Glutamic acid	66.15
Serine	73.5
Histidine	5.89
Glycine	20.17
Threonine	2.26
Arginine	72.73
Alanine	21
Tyrosine	8.51
Methionine	13.41
Valine	17.32
Phenylalanine	10.73
Isoleucine	8.12
Leucine	17.82
Lysine	22.63

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