

## **Recipes from yellow clam *Meretrix casta* (Chemnitz)**

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### **ABSTRACT**

Seafood is an excellent provider of protein with high biological values. Fish, shellfish and other aquatic organisms are appropriate for food and have world-wide importance. They're wonderful sources of high quality proteins, superior to those in red meat and poultry foods. The human dietary amendments that characterize the "nutrition transition" include every quantitative and qualitative change in the human diets. The present study *Meretrix casta* meat is used for the preparation of excellent recipes like cake, soup and mint stuffed tomato with yellow clam using *M. casta* meat, that have the potential to be become a regular food item in the house hold diet with consumer acceptance. The differences in food habits over the length and breadth of the nation are most that available food resources are not being used properly due to the lack of information regarding their importance. The panel of judges vouched safe for taste and delicacy of the dishes in the present study. The panel detected that the dishes were a lot of as good as those created out of the much sought after seafood in taste, smell and flavor

**Keywords:** Cake; *Meretrix casta*; Nutrition transition; Soup

### **1. INTRODUCTION**

Seafood is a superb supply of protein with high biological value. Fish, shellfish and other aquatic organisms are an appropriate for food and have worldwide importance. They are glorious sources of top quality proteins superior to those in red meat and poultry foods. Man lives on land, which occupies quarter of the earth surface and takes most of his food from the land. Approximately the animal protein consumed by human beings comes from marine fisheries. Pigott and Tucker, (1990). It is benefits to human health related to the consumption of seafood are noted for multiple bodily organs and physiological functions. Seafood compares favorably with different protein sources as it offers superior macronutrients in the ideal form of lean proteins combined with healthy omega-3 fatty acid long chain polyunsaturated fatty acids (*n*-3 LC-PUFAs), and a wide array of extremely bio-available micronutrients. McManus et al., (2011).

The modern day man is interested in taking seafood more in view of its nutritional superiority than all other supply of food accessible to him. Seafood and its recognized necessary lipid components are attaining unexpected popularity as necessary nutritional contribution to men's diet. Although seafood in the diets has long been considered to provide health benefits only in the past decade has the emphasis moved from 'low fat, low calories and high protein' to different positive effects, such as prevention from blood clotting, make platelets less "sticky" and make red blood cell less rigid. It is promoting healthy diets and lifestyles to reduce the global burden of non-communicable diseases require a multispectral approach involving the assorted relevant sectors in societies. Any recommendation to that affect can have implications for all elements within the food chain. It is so helpful at this juncture to look at trends in consumption patterns worldwide and deliberates on the potential of the food and agriculture sector to meet the demands and challenges. In general, the economic development is in the midst of enhancements during a country's food provided and therefore, the gradual elimination of dietary deficiencies has improving the general nutritional status of the country's population. Changes in diets, patterns of work and leisure typically referred to as the "nutrition transition" are already conducive to the causal factors underlying non-communicable diseases even within the poorest countries. Moreover, the step of those changes looks to be fast, particularly in the low-income and countries. WHO, (2003).

The unfavorable nutritional changes include shifts a better structure of the diet towards a higher energy density diet with a larger role for fat and added sugars in human foods. The larger saturated fatty acid intake reduced intakes of complex carbohydrates and dietary fiber and reduced fruit and vegetable intakes. Drewnowski and Popkin, (1997). These dietary changes are compounded by lifestyle changes that reflect reduced physical activity at work leisure time leisure. Luzzi and Martino, (1996). At the same time, however, poor countries still face food shortages and nutrient inadequacies WHO, (2003). There has been an increasing pressure on the livestock sector to fulfill the growing demand for high-value animal protein. Despite fluctuations in supply and demand caused by the changing state of fisheries resources, the economic climate and environmental conditions, fisheries, as well as cultivation, have historically been, and stay a vital supply of food, employment and revenue in several countries and communities. FAO, (2002).

The globe demand for ocean food is expected to grow due to the increasing demand for protein wealthy food and change in preference from red meat to white meat for health reasons. The seafood has been claimed together of the quickest moving in the within the world market with high unit value. The share of ocean food in our total export of all commodities is three. 12 % whereas our share in world ocean market is just a pair of 31 %. Bojan, (2003). The Clam, Mussels, Edible oysters and Pearl oysters are commercially necessary bivalves on the Indian coastal region. Except pearl oysters, bivalves are fished either for their meat or shell since past. From 1961, pearl oysters were fished for the golden colored pearls. The status of bivalve fishery ranges from underneath exploitation in the northwest and northeast coasts to over utilization in the southern maritime states (Krippa and Appukuttan, 2003).

Technology up gradation and value addition has been instrumental in processing many shellfish product and with success promoting them in overseas countries and in urban domestic markets. In all its kinds of application, thermal process persists as the most widely used method of conserving and lengthening the helpful shelf life of food with the expansion of cities. The requirement to preserve foods longer increased as some folks might not grow their own vegetables nor keep animals. The developments of pasteurization and canning, a

much larger variety of foods may hold on and carried on long journeys, Pushparajan et al., (2013).

The current study tried dishes such as cake, soup and mint stuffed tomato with yellow clam using *M. casta* meat that have the potential to be a regular food item in the household diet with consumer acceptance and it offers a most cost effective protein as well as alternative nutrients for normal people.

## 2. MATERIALS AND METHODS

### 2. 1. Preparation of classic Angel yellow clam cake

For preparing the clam cake, 1 kg of the cultured live clams (size) were harvested and kept separately in a container one day earlier and then the clams were collected and washed thoroughly with tap water followed by chlorinated water (5 ppm) for further two hours to remove fecal matters. Only healthy clams were taken for boiling at a temperature of 75 °C for 5 minutes at oven. Then, the clam meats were suckled washed and dried at 100 °C in a hot air oven for 1 hour. These clam meats were powdered by using electrical mixture grinder for 3 minutes.

#### 2. 1. 1. Ingredients

- ½ cup of clam powder
- 1 cup of cake flour
- ¾ cup granulated sugar
- 1 teaspoon cream of tartar
- ¾ cup egg whites about 13 large eggs
- 1 teaspoon vanilla
- ½ teaspoon almond extract
- 2 teaspoon butter

#### 2. 1. 2. Protocol



**Figure 1.** Classic Angel yellow clam cake.

In a bowl, the flour and 3/4 cup of sugar together were mixed well and kept aside until preparing egg white. In a large bowl, the egg whites were beaten until it gets foamy, then the salt, cream of tartar, vanilla and almond were added to it and continued beating. By gradually adding the last 1 cup of sugar, until soft peaks form the egg white was beaten. Then, gently it was folded in about one-fourth of the flour mixture. The same procedure was repeated with the remaining mixture until all the flour is mixed in. A layer of butter was scraped onto an ungreased flat pan. Then, a thin layer with 5mm thickness of clam powder was spread evenly on over it, again the batter was scraped on this followed by adding a layer of clam powder and cake butter and finally it was baked for 45 to 50 minutes or until done in an oven. After this process, the cake pan immediately cooled forgetting delicious cake. Shows at Figure 1.

## **2. 2. Preparation of mint stuffed tomato with yellow clam**

### **2. 2. 1. Ingredients**

- 8 small plum tomatoes
- 1 teaspoon salt
- 1 cup (142 g) boiled yellow clams meat drained
- 1 stalk coriander, finely chopped
- 1 onion, finely chopped
- 1 garlic, minced
- 1 teaspoon lemon juice
- 1 teaspoon (15 ml) vegetable oil
- 1 teaspoon (15 ml) red wine (optional)
- 1 teaspoon chopped fresh parsley
- 1 teaspoon minced radish
- 1/4 teaspoon (1 ml) tomato sauce
- 1/4 teaspoon (1 ml) hot pepper sauce and mint leaves for garnish

### **2. 2. 2. Protocol**



**Figure 2.** Mint stuffed tomato with yellow clam.

Each plum tomato was halved crosswise, scooped out then discarded the seeds and a layer of flesh to make hollow cups. The boiled yellow clam meat, chopped coriander leaves, chopped onion, minced garlic, lemon juice, oil, wine, chopped parsley, chopped white radish, tomato sauce and hot pepper sauce were mixed well in a bowl to make clam mixture. After this mixture preparation, each tomato cup was filled with an equal amount of clam mixture and the peripheral region of the cup was garnished with mint leaves and served cold. Shows at Figure 2.

## **2. 3. Preparation of instant yellow clam soup**

### **2. 3. 1. Ingredients**

- 2 teaspoon clam powder
- ¼ cup fried clam meat
- 2 teaspoon carrot pieces
- 1 teaspoon corn flour
- ½ teaspoon onion powder
- ½ teaspoon tomato powder
- ½ teaspoon pepper powder
- ½ cup of milk
- 1 cup of boiled drinking water
- A pinch of table salt

### **2. 3. 2. Protocol**

The clam powder, fried clam meat, corn flour, carrot pieces, onion powder, tomato powder, pepper powder were mixed thoroughly in a bowl and this mixture was then added in to boiled water and finally boiled milk was then added to this soup and stirred gently finally a pinch of table salt was added to get appropriate taste. Shows at Figure 3.



**Figure 3.** Instant yellow clam soup.

## 2. 4. Organoleptic test

The organoleptic testing was the traditional method of determine the sensory qualities of food was done following the method of Graves and Peckham (1987). The quality of the food was evaluated by a combination of factors such as appearance (size, shape and color), texture (kinestheticks) and flavor (smell and taste). Hedonic taste was carried out on the basis of 5 points scale (5-Excellent, 4-Good, 3-Average, 2-Fair and 1-Poor). A score card also prepared for this purpose.

The score card was neat and has a place for the name of the scorer, the date and code number of the products. Confutation from using the same number again was avoided by numbering the products consecutively. The numerical scale to score numerically the palatability factor of the food products was clearly stated along with the descriptive team that accompanies the gradation. The score cares was also explained to the panel. The following point was considered for the proper evaluation of the dishes.

1. The sample for scoring was presented in an attractive manner.
2. Dishes of sample shape and color were used.
3. Each dish was provided with the code number of the product.
4. The score was not rushed, annoyed, irritated or interrupted after he/she started scoring.
5. The scorer was comfortably seated and not interrupted during the scoring process.
6. Proper and other products that may give the food an off flavor were avoided.
7. Neutralizing agent, water was given in between sample.

Finally, the result of score card was consolidated and reproduced. The sample was served after heating in a microwave oven for 3 minutes on a coded plate. Water was provided to restore taste sensitivity. Panelists were asked to assign a score of 1 to 9 (Table 2) as prescribed by Meilgaard, (1999). A score above 6.0 was considered the margin for acceptance.

## 3. RESULTS

A panel of 10 investigators evaluated the dishes. The organoleptic scores of the dishes included color, appearance, flavor, texture and taste. The evaluated average organoleptic scores of all the recipes for the study animal *M. casta* were shown in Table 1 and the prepared dishes were displayed in Fig 1-3.

**Table 1.** Evaluation of average organoleptic score.

Sl. No.	Dishes	Color	Appearance	Flavor	Texture	Taste
1.	Classic angel clam cake	4	5	5	4	5
2.	Mint stuffed tomato with yellow clam	5	5	4	5	5

3.	Instant yellow clam soup	5	4	5	4	5
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**Table 2.** Panelists score card.

Descriptor	Sensory score
Like extremely	8
Like very much	9
Like moderately	9
Like slightly	7
Neither like nor dislike	3
Dislike slightly	2
Dislike moderately	4
Dislike very much	1
Dislike extremely	0

#### 4. DISCUSSION

The first appraisal of food is through sight and therefore the color. The shape, size and surface all register good impressions. A part of the acceptance of a food depends on how it's. The looks of various types of clam dishes, no doubt appetizing the look of food plays a vital factor in its evaluation. The color should be neither too pale nor too intense, Kaban and Kaya, (2007). It should have an identical natural color. The acceptance of the food is related to another issue, the way food is felt in the mouth. The proprioception sensations are the power or resistance feelings of motion in the underlying blood vessels, bones, muscles and tendons once they are stimulated. Deng et al. (1983) have mentioned that, the feel is most significant character concerning shrimp sensory quality as exhibit dramatic changes during extended thermal process. Flavor is that the total necessary impressions shaped when food is eaten up. It's one among the foremost vital factors in evaluating the dishes and an impression concerning flavor is gained once food is eaten up and it's a mixture of the sensations of taste, smell and mouthful, Arularasan et al., (2010).

The panel of judges vouched safe to taste and delicacy of the dishes. The panel found out that the dishes, were a lot of good as those, made out of the much wanted sought after food in sea, smell and flavor. The terms acceptable, unacceptable, eatable and distasteful or lack of quality are accustomed describe whether or not the buyer likes or dislikes the given foods. Likes and dislikes or related to the forms of foods to that the buyer is accustomed to Croacker, (1945). Flavor and odor of the ready dishes within the gift study is nearly just like that of ready earlier of Gopal et al., 2001; Sreenath et al., (2007); Arularasan et al., (2010) and Bindu et al., (2011). the majority of Indian people still consume home - made food ready

from whole, broken or powdered rice, wheat, maize, sundry millets and pulse grains variations in food habits over the length and breadth of the nation are such a lot that available, food resources don't seem to be being used properly due to lack of knowledge about their importance.

There is no much studies on the cake, soup and stuff preparation on yellow clam in India to this point however, a number of the sooner employees on the preparations of recipes in gastropod include those the *Chicoreus ramosus* and *Fasciolaria trapezium*, Ragunathan et al., (1992) and Ramesh and Ayyak kannu, (1992a) *C. ramosus* (Ramesh and Ayyak kannu, (1992); Hylleberg, (1992); Ramesh and Ayyak kannu (1992b); Patterson ed ward and Ayyak kannu, (1992); Ayyak kannu, (1994); Ramesh and Ayyak kannu, (1994); Patterson et al., (1994) and Ramesh and Ayyak kannu, (1995), *F. trapezium* and Molluscan products, Gopakumar, (1996). In the present study showed that, the cheapest protein as well as other nutrients from yellow clam can be reached for ordinary folks and this study also may provide good employment source for coastal folk, if proper training is provided.

## 5. CONCLUSION

From the present study it is revealed that, the yellow clam offers a most cost effective protein as well as alternative nutrients for normal people. The major advantage of these recipes is that they are of purely natural origin and doesn't contain any artificial substances that may cause any side effects. In addition to that these are more delicious and have a good aroma that attracts the consumers towards it. It also promotes the employment opportunity for coastal people, if proper coaching is provided.

## Reference

- [1] Drewnowski, B. Popkin. The nutrition transition: new trends in the global diet. *Nutrition Reviews* 55(1997) 31-43.
- [2] Ferro-Luzzi, L. Martino, Obesity and physical activity In: The origins and consequences of obesity. Ciba Foundation Symposium. Chichester: John Wiley & sons. 201 (1996) 228-246.
- [3] Ragunathan J.K., Patterson Edward, K. Ayyakannu, *Phuket Mar. Biol. Cent. Spec.* 11 (1992) 9-15.
- [4] E.C. Croacker, Flavor. Mc-Graw Hill Book Co, New York. 1945.
- [5] Food and Agriculture Organization (2002). The state of food insecurity in the world 2001 (Rome).
- [6] Freeland-Graves, Gladys Peckham C. (1987). Foundations of Food Preparation (5th Edn). Macmillan, London.
- [7] G.M. Pigott, B.W. Tucker, Seafood: Effects of Technology on Nutrition, Marcel Dekker, Inc., New York and Basel, (1990) pp. 362.
- [8] J. Bojan, Current status and prospects and prospects of seafood export. India International Seafood Show Souvenir (2003) p. 13-16.
- [9] J. Hylleberg, *Phuket Mar. Biol. Cent. Spec.* 10 (1992) 11-13.

- [10] J.K. Patterson, M.X. Ramesh, K. Ayyakkannu, *Phuket Mar. Biol. Cent. Spec.* 13 (1994) 17-28.
- [11] K. Gopakumar, *Phuket Mar. Biol. Cent. Spec* 16 (1996) 17-22.
- [12] K. Ayyakkannu, Hand book on 'A delicacy in sea food *Chicoreus* Recipe-Series-1. Tropical Marine Mollusc Programme, A DANIDA sponsored Programme, Published by CAS in Marine Biology, Annamalai University, India, (1994).
- [13] M. Meilgaard, Civille G.V., Carr B.T., Sensory evaluation techniques. 3rd ed. Boca Raton, Fla: CRC Press. (1999) pp. 387.
- [14] M.X. Ramesh, K. Ayyakkannu (b), *Phuket Mar. Biol. Cent. Spec.* 11 (1992) 23-26.
- [15] M.X. Ramesh, K. Ayyakkannu, *Phuket Mar. Biol. Cent. Spec.* 15 (1995) 21-28.
- [16] M.X. Ramesh, K. Ayyakkannu, *Phuket Mar. Biol. Cent. Spec.* 13 (1994) 13-16.
- [17] M.X. Ramesh, K. Ayyakkannu(a), *Phuket Mar. Biol. Cent. Spec.* 10 (1992) 14.
- [18] Ma L.Y., Deng J.C., Ahmed E.M., Adams J.P., *J Food Sci.* 48 (1983) 360-363.
- [19] N. Pushparajan, P. Soundarapandian, D. Varadharajan, *Open Access Scientific Reports* 1(3) (2012) 190.
- [20] Oz F, Kaban G., M. Kaya, *Food Chem* 104 (2007) 67-72.
- [21] P. Sreenath Martin, K.A. Xavier, C.N. Ravishankar, J. Bindu, T.K. Srinivasa Gopal, *Int. J. Food Sci. Technol.* 42 (2007) 148-1155.
- [22] Report of the joint WHO/FAO expert consultation WHO Technical Report Series. Diet, nutrition and the prevention of chronic diseases. No. 916 (TRS 916), (2003) 13.
- [23] S. Arularasan., P.S. Lyla, K. Kesavan, S. Ajmal Khan, *Advance Journal of Food Science and Technology* 2(1) (2010): 31-35.
- [24] T.K. Srinivasa Gopal, P.K. Vijayan, K.K. Balachandran, P. Madhavan, Iyer T.S.G., *Food Control* 12 (2001) 523-527.
- [25] V. Kripa, K.K. Appukuttan, Marine Bivalves. In: Joseph, M.M., Jayaprakash, A.A. (Eds.), Status of exploited marine fishery resources of India. *Central Marine Fisheries Research Institute, Kochi*, (2003), p. 211-220.

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