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Variation of Nutritional Compostion and Percentage of Edibility of Cultured and Wild Oyster (*Crassostrea Madrasensis*) from 2014-2015 in Puttalam Lagoon, Sri Lanka

1. Abstract

Oysters are nutritious and highly esteemed sea food throughout the world. The mass scale natural ava the oyster in Puttalam lagoon suggesting suitability of the habitat for oyster culture. The study was ca popularize the culture based fisheries of oysters for the sustainable utilization and management of oyster resource while popularizing it as an alternative protein source among Sri Lankans. In this c seasonal variation of biochemical composition in cultured and wild oyster; *Crassostrea madrasensis* Lagoon, Sri Lanka was determined. Biochemical compositions and Percentage Edibility (PE) of culture Oyster were studied two stations of the Puttalam lagoon during July 2014 to July 2015. Protein, moistu oil and ash were determined based on the AOAC (2000) official methods and carbohydrate and dry ma were calculated based on the results. Monthly fluctuations of water quality parameters such as temp salinity were also recorded at each station.

Seasonal percentage values of protein, lipid, ash, moisture, carbohydrate, PE and dry weight of culture oysters in both stations ranged from 5.13%-10.03%, 0.88% - 2.93%, 0.82% - 3.76%, 81.43% - 91.16 8.04%, 2.10% - 23.12% and 8.84% - 18.57 % respectively. The difference in protein content, moisture c weight and PE between wild and cultured oysters was significant ($p<0.05$) and the considerable variati wild and cultured oysters. However, between two sites a significant difference was not observed in lip ash content and carbohydrate content in oysters.

Mean protein content, dry weight and PE values of the species are high in both cultured populations ind Puttalam lagoon could be a favored site for large-scale cultivation. PE of cultured oysters recorded throughout the year with respect to wild oysters with its maximum PE values from December to March

The results obtained in this study suggest that the best harvesting period was fro m December to March f oysters in Puttalam lagoon. Extensive cultures of oysters in the lagoon could be a solution to elimina on natural oyster beds and facilitate environmentally sustainable aquaculture generating economic coastal people.

Keywords: Crassostrea madrasensis, Oyster culture, Wild oyster, Bioc composition

2. Introduction and research problem/issue

Bivalves play an important role of the national economy of many countries (Vakily, 1992) and consider cost subsistence food for many coastal people in developing countries (Ampofo-Yeboah, 2000, Yan 1991-1996) . Most of the edible bivalves such as oysters and mussels, which have been popular in countries for a long time, are also becoming popular in developing countries. They are a highly esteem and considered a delicacy in USA, Europe, Japan etc. (Asha *et al.*, 2014). Bivalves are known to be go for the provision of protein, carbohydrate, lipids, vitamin, fatty acids, vitamin and minerals. Among th are considered to be a valuable food items as they constitute a rich source of many of the elements, e providing a balanced diet (Nagabhushanam and Bidarkar, 1978).

Oysters are one of the best known and most widely cultivated marine animals (Asha *et al.*, 2014) and play an important role in the national economies of many countries. Sri Lanka as a tropical c rich edible bivalve diversity as oysters, mussels, clams, cockles and pearl oysters around the coasta oysters are widely distributed in the coastal belt around Sri Lanka (Fernando, 1977). The edible oyster, *C madrasensis* is naturally found in the Kala Oya estuary at Puttalam lagoon, Sri Lanka (Ind Wanninayake, 1994, Wanninayake and Subasinghe, 2012). Bivalve fisheries such as oysters and clam are the major small scale fisheries operated by coastal poor people in Sri Lanka. The presence of the tour in the coastal line of Sri Lanka is creating an attractive marketing atmosphere for the expansion of industry and local fishing communities have become interested in supplying oysters to the growing export markets (Indrasena and Wanninayake, 1994, Subasinghe *et al.*) .The natural population of th Puttalam lagoon suggesting suitability of the habitat for oyster culture. Being filter feeders, the oyst primary production in water into nutritious sea food.

Since there is no known study on seasonal variations of biochemical composition of oysters in Sri understanding on nutritional profile will creates an alternative protein source and economic income for t Also this could facilitates its popularization in the Sri Lanka where its currently known only to sm communities as a source of protein. Also the understanding of biochemical composition in different se be valuable for sustainable utilization and management this natural resource.

3. Research Methodology

The study was conducted at the Puttalam Lagoon which is situated in the North Western Province of Cultured oysters; C*rassostrea madrasensis* were collected from the suspended culture racks from two ex locations known as Kanadakuliya and Gangewadiya and wild oysters; C*rassostrea madrasensis* wer from the Gangewadiya area which are rich in natural oyster beds in the Puttalam lagoon.

The study was conducted during July 2014 - July 2015. Samples were collected monthly intervals experimental locations. At each station average of 10 -15 oysters were collected from culture racks beds. Collected samples were depurated using clean sea water for few hours for removal of impur samples were transported to the laboratory under iced condition and were thoroughly washed to remov dirt. The

shell was removed and the surface water was blotted with filter paper; edible meat was sepa the shells and flesh was weight. Then body tissue were dried at 105°C for overnight in the hot air o determination of moisture content based on AOAC method 950.46 (AOAC, 2000). Then, the dried powdered and the required quantity of powder was taken for the estimation of crude protein and As AOAC official method 923.03 and 938.08 respectively.

Oil content was analyzed based on the Bligh and Dyer method with fresh body tissues (Bligh and D Carbohydrate was obtained by the subtraction of the protein, ash and oil values from 100. Percentag (PE) was determined by calculating the percentage ratio of the wet meat weight to the whole we individual specimen (Nagabhushanam and Bidarkar, 1977). Monthly fluctuations of water quality param as temperature and salinity were also recorded at each station.

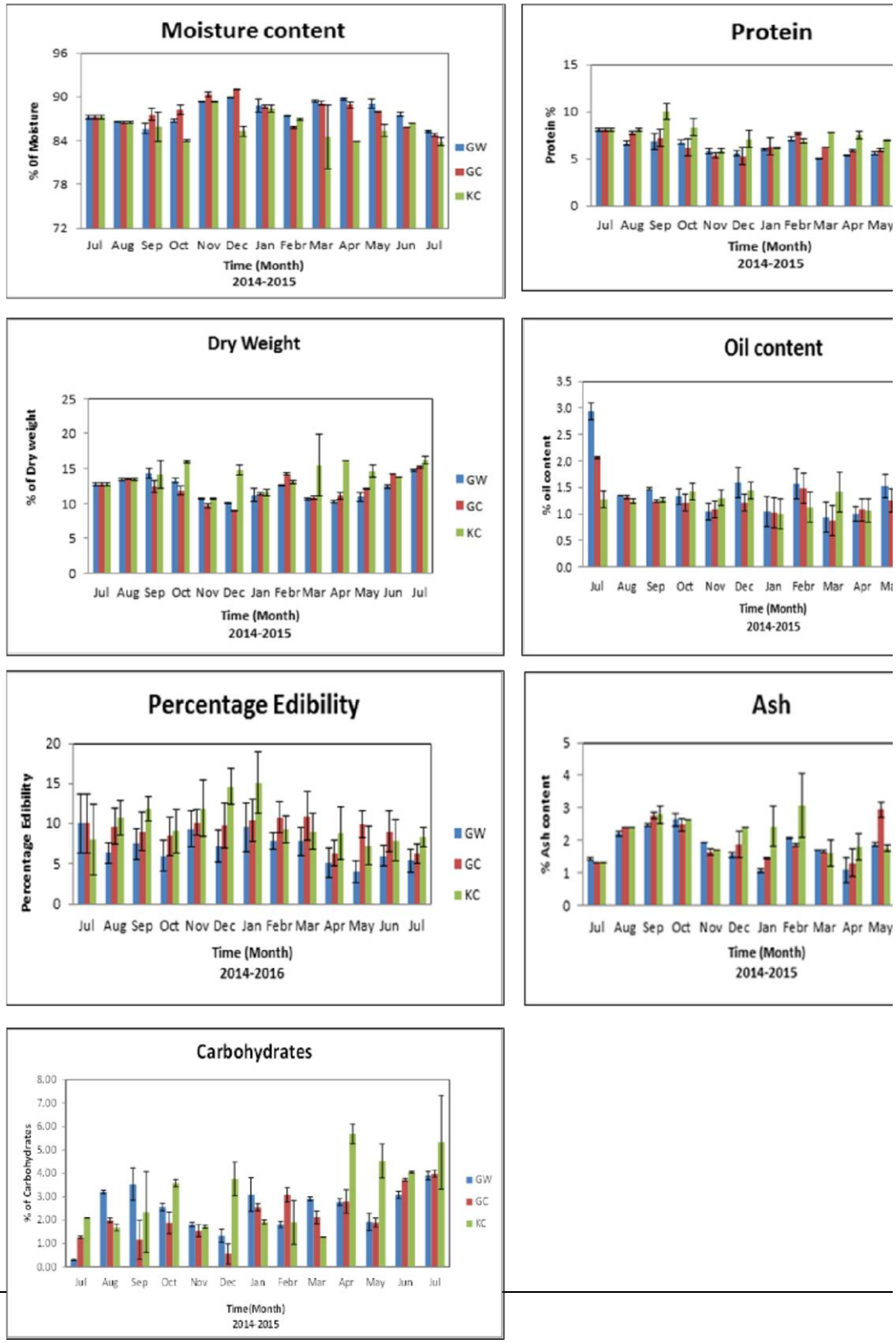
4. Results and findings

Seasonal values of protein, lipid, ash, moisture, carbohydrate, PE and dry weight of wild oysters from from 5.06% to 7.25%, from 0.91% to 2.93%, from 0.8158% to 2.7640%, from 85.1652% to 90.0077%, from 2.59% to 17.1121% from 9.9923% to 14.8348% respectively and oysters cultured in Gangewadiy to 8.09%, from 0.88% to 2.08%, from 1.3077% to 3.1135%, from 84.691% to 91.1605%, from 0.25% to 44.68% and from 8.8395% to 15.3087% respectively. Seasonal values of protein, lipid, ash, moist and dry weight of cultured oysters from Kandakuliya ranged from 5.56% to 10.03%, from 1.00% to 1.6 8.1011 %, from 83.4970% to 89.4459%, from 1.25% to 6.74%, from 3.66% to 4.01% to 58.14% a 18.5726% respectively. The difference in protein content, moisture content, dry weight and PE betw oysters was significant ($p<0.05$) and the considerable variation between wild and cultured oysters and not observed in lipid content, ash content and carbohydrate content in oysters. Figure 01 shows the biochemical compositions and Percentage Edibility of cultured and wild oysters of Kandalkuliya and G

The highest protein content 10.03±0.90 % was recorded from oysters cultured in Kandakuliya in Septe percentage 5.02±0.06 was recorded from wild oysters collected from Gangewadiya in March 2015 Kandakuliya and wild oysters showed highly significant difference ($P<0.002$) while there were no between wild and cultured oysters in Gangewadiya area and both culture sites. The maxim 91.0712±0.1263% and minimum Dry matter 8.9288±0.1263% was recorded in December from

Gangewadiya. The minimum moisture content (83.8962±0.5646 %) was recorded in oysters cultured o 2015 from and dry matter (16.1038±0.5646%) content was high respectively in same station. There difference in moisture content and dry matter content between cultured oysters in both sites and wil oysters in Kandakuliya station ($P<0.001$). But there were no significant difference in moisture content a between wild oysters and cultured oysters in Gangewadiya station.

Figure 01: seasonal variations of biochemical compositions and Percentage Edibility of cultured



Kandalkuliya and Gangewadiya stations. GW- Gange Wadiya Wild Oysters, GC-Gange Wadiya C Kandakuliya Cultured Oysters

Oil content was maximum (2.93±1.18%) in July 2014 of wild oysters collected from Gangewadi (0.88±0.28%) in March, 2015 of cultured oysters in same station. The highest Ash content 5.4479±3 from oysters cultured in Kandakuliya station in September and the lowest 1.0879±03848% was recor April 2015. Oysters cultured in Kandakuliya recorded the highest carbohydrate content 5.69±0.43 i lowest 0.30±0.03% was recorded in July 2014 from wild oysters of Gangewadiya station.

The Percentage Edibility (PE) significantly fluctuated between cultured and wild oysters, while the cultured oysters in both sites recorded high value throughout the year than wild oyster. There were high between wild oysters and culture sites ($P<0.000$) while no significant difference was recorded between highest PE values 15.0754±3.8520% were recorded in January 2015 of cultured oysters of Kandakuli 4.0259±1.3011 % was recorded in May 2014 of wild oysters in Gangewadiya site. The variation of sa more or less similar pattern among two culture sites and the results suggest the best harvesting period wa to March for cultured oysters of Kandakuliya and December to March for cultured oysters of Gangewa

5. **Conclusions, implications and significance**

The mass scale natural availability of edible oyster beds has significant potential in terms of oyster cul lagoon. Extensive cultures farming at lagoon could be a solution to eliminate pressure on natural oys environmentally sustainable aquaculture. PE and biochemical parameters proved that suitable conditi cultivation in the Puttalam lagoon and there were significant difference between wild oysters and variation of salinity and PE showed more or less similar pattern among two culture sites and the re harvesting period was gained in December to March for cultured oysters of Kandakuliya and December oysters of Gangewadiya site.

6. **References (Selected)**

- Ampofo-Yeboah, A. (2000). Aspects of the fishery, ecology and biology of the fresh sp. Lamarck, 1807) in northern Ghana. University of Cape Coast, Ghana.
- Aoac. (2000). *Official Methods of Analysis* 17th ed. Association of Analytical Chemi USA.
- Asha, K. K., Anandan, R., Mathew, S. and Lakshmanan, P. T. (2014). Biochem

Crassostreamadrasensis and its nutritional attributes. *Egyptian Journal of Aquatic Research*

- Berner, L. and Jensen, B. (1991). Preparation of fatty acid methyl esters (FAME).

- Bligh, E. G. and Dyer, W. J. (1959). A rapid method for total lipid extraction and p *Journal of Biochemistry and Physiology* **37,** 911-917.
- Chen, L. (2011). Sensory and chemical characteristics of eastern oysters (*Crasso* thesis, State University.
- Cruz-Romero, M. C., Kerry, J. P. and Kelly, A. L. (2008). Fatty acids, volatile compoun in high-pressure-treated oysters (*Crassostreagigas*). *Innovative Food Science and Emerging T*
- Fernando, D. H. (1977). Lamellibranchiate fauna of the estuarine and coastal areas *(Ceylon) Bulletin of the Fisheries Research Station* **27,** 29-54.
- Indrasena and Wanninayake, W. M. T. B. (1994) . Experimental oyster culture in the in the Puttalam Lagoon in Sri Lanka. *Bulletin of the Aquaculture Asssociation of Canada* **94,** 3
- Korringa, P. (1976). Farming the cupped oysters of the genus *Crassostrea*, develo and fisheries science. *Elsevier Scientific Publishing Company* **2,** 224.
- Mallia, J. V., Muthiah, P. & Thomas, P.C. (2006). Growth of triploid oyster, *Cr* (Preston). *Aquaculture Research* **37,** 718-724.
- Nagabhushanam, R. and Bidarkar, D. S. (1978). Studies on seasonal change constituents of the oyster *Crassostreaculcullata*. *Indian Journal of Fisheries* **25** 156-164.
- Nagi, H. M. (2008). Environmental studies on mangrove cover changes in Goa, and it population.Ph.D thesis, Goa University, India.
- Subasinghe, M. M., Wanninayake, W. M. T. B. and De Croos, M. D. S. T. 2013. Bio mangrove oyster (Crassostreamadrasensis) in developing the capture based aquacultur

Proceedings of the nineteenth annual scientific session of the Sri Lanka Association for F Resources: Sri Lanka.

- Vakily, J. M. (1992). Determination and comparison of bivalve growth, with emph other tropical areas. International center for living aquatic resources management, Manila, P
- Wanninayake, W. M. T. B. and Subasinghe, M. M. (2012). Community bas (Crassostreamadrasensis) culture at Kala Oya estuary of Puttalam lagoon, Sri Lanka: New chal *Proceedings of the 1st International Conference on Animal Nutrition and Environment*, 894-8
- Yankson, K., Plahar, W. A. and Obodai, E. A. (1991-1996) . Seasonal changes in bio of the mangrove oyster, *Crasostreatulipa* (Lamarck) occuring in two coastal water bodies in G *of Sience***31-36,** 37-43.

