



Study on processing and marketing of dry-salted shrimps in coastal regions of Veraval, Gujarat, India

Nitin K. Suyani^{1*}, U.G. Vandarwala¹, J.B. Solanki¹, S.S. Rathore² and Ketul Patel¹

¹College of Fisheries Science, Junagadh Agricultural University, Veraval, Gujarat, India

²College of Fisheries, Karnataka Veterinary, Animal and Fisheries Sciences University, Mangalore, Karnataka, India
nitin.suyani@engineer.com

Available online at: www.isca.in, www.isca.me

Received 2nd October 2019, revised 21st April 2020, accepted 5th May 2020

Abstract

Sun drying is an age-old practice for the preservation of fish all over the world. It is one of most popular method of food preservation with less sophisticated machinery required. Dry products has become an important diet of the coastal communities. Motto of the study was to spread awareness about the importance of packaging over the dried fishery products prior to marketing. For this drying of shrimps was done by the process of dry salting. Moisture (%) in shrimps was reduced to 19.89% from 80.80%. Dry-salted shrimps were packed in LDPE plastic pouches and tray and sold in the local fish market. Packaging of the dry products had great impact on the consumer's preferences towards buying the product. Also we explained the local fisherwomen about the importance of packaging. This will allow easy handling of product, avoid direct contact of products to the environment and preserve the quality of the products for prolonged period. Marketing of dried fishery products serves as an integral part in the economy of Veraval and coastal regions of India. It is expected that the local fisherwomen after the program will follow the standard hygiene procedure for marketing of different dried fishery products.

Keywords: Fisherwomen, moisture, plastic pouch, quality, shrimp.

Introduction

Shrimp a decapod crustacean is one of the commercially important commercial seafood in the world¹. The total marine landings of penaeid shrimps in India in 2018 was 1.92 Lakh tonnes². It is very popular in the world, with high nutritional value, what explains the high demands on the part of consumers. Also seafood are highly perishable commodity due to presence of free water and autolytic enzymes³. Shortly after the capture, a series of complex alterations occurs on the surface and inside the edible portion of all seafood, resulting in a decrease of its quality⁴. Therefore, shrimps are frozen immediately at very low temperature restricting the spoilage and extending its shelf life significantly. There are different chemicals and preservatives are used for the preserving and extending the shelf life of the fish and fishery products. 10 days storage study on STTP treated shrimp samples was carried out for physical, chemical and sensorial quality analysis⁵. However this type of storage facilities requires heavy machineries and different types of cryoprotectants or chemicals. Therefore drying is oldest traditional alternative method of preservation of seafood.

Drying is a widely accepted method of fish preservation because of utilization of renewable source of energy for the preservation of the fish and fishery products. Drying or marinating with additives results in highly relished products due to its characteristic flavor, taste and texture⁶. Longer shelf life and less requirement of sophisticated machinery for storage are the

specialty of dried products^{7,8}. Thus it plays an important role in employment generation, livelihood and economic opportunity for millions of people throughout the globe.

32% of the total marine fish linings is consumed in dried form and about 17% of the total is catch is reduced in dry fishery⁹. Dry salted products are used in various forms in preparation of different protein rich products for delicacy. However, demand of all dried products are more during the seasonal ban period because of lesser availability of fresh fish in the market¹⁰. Drying of fish mostly starts in post-monsoon and ends in pre-monsoon. Different forms of dried products prepared along Veraval region are whole fish form, fillet form, whole shrimps, peeled shrimps, etc. These dried fish products are exported to different parts of Gujarat region. It is also supplied to national market in different states of India¹¹.

The objective of this study was to evaluate the yield (%) of processed sun dry-salted shrimp, *Parapenaeopsis stylifera*. Also an attempt was made to analyze the profit ratio of dry-salted shrimp production, its financial feasibility and how the hygienically processed and packed dried shrimps differ from local market products.

Materials and methods

Product preparation: Drying was carried out at College of Fisheries Science, Junagadh Agricultural University, Veraval,

Gujarat, India in the year 2017. Total of 19Kg medium size (10-20g/shrimp) tiny shrimp (*Parapenaeopsis stylifera*) was purchased from Veraval fish landing center. Then it was washed with tap water, beheaded, hand peeled and again washed to remove all the extra parts of the body, dirt, slime, etc. Peeled shrimps were weighed for calculation of yield (%). After that salting of shrimps was done by adding appropriate amount to salt and kept overnight. After overnight salting excess water was removed and shrimps were spread over mats for sun-drying. At regular hourly intervals shrimps were checked for proper drying. At evening the shrimps were collected, weighed and stored properly for next day drying. After next day morning the shrimps were again spread over mats for sun-drying. Similarly three days drying was carried out and then shrimps were collected and stored in proper box till the proper packaging was not done.

Drying was carried out for 18 hours (6 hours per day) and hourly forecast of temperature, wind velocity and humidity of atmosphere was recorded from the Weather forecast application.

Initial and final moisture (%) was recorded using moisture MAC analyzer machine. Yield (%) was calculated by weight differences observed before and after drying. Once the product was prepared the dry-salted shrimps were packed in LDPE plastic pouch and trays and sealed with Pouch sealing machine.

Marketing of product was carried out at different locations of Veraval region i.e. Kharakuwa fish market, Bhidiya fish market & Fisheries college campus and economics of the processing and marketing was tabulated.

Statistical analysis: Statistical analysis was performed using Microsoft Excel ver. 2013.

Results and discussion

Weather condition: Figure-2 shows that the hourly temperature ranged between 29–34°C, wind velocity ranged from 2–12 m/hr⁻¹ and humidity ranged from 35–50% at different time intervals.

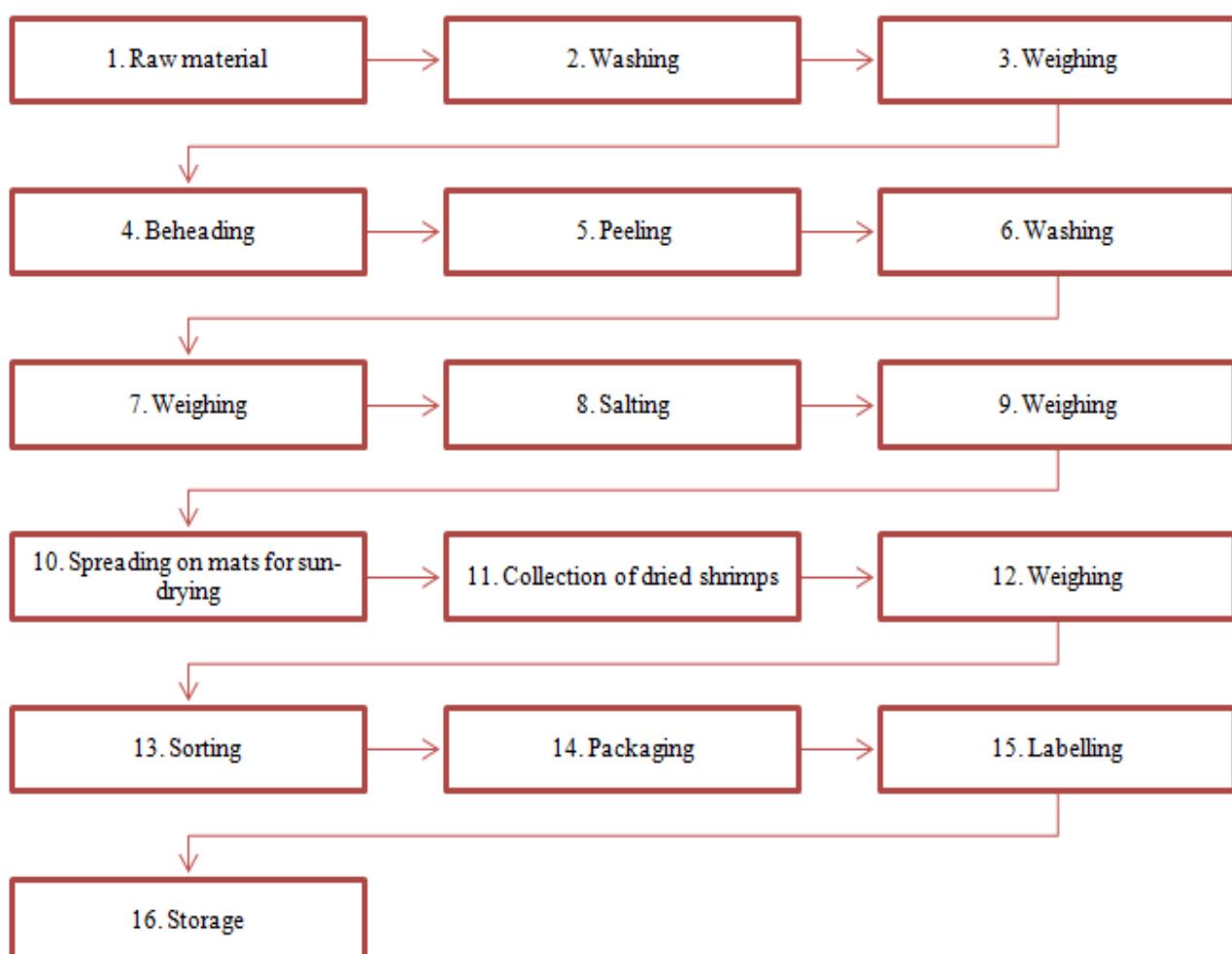


Figure-1: Process flow chart.

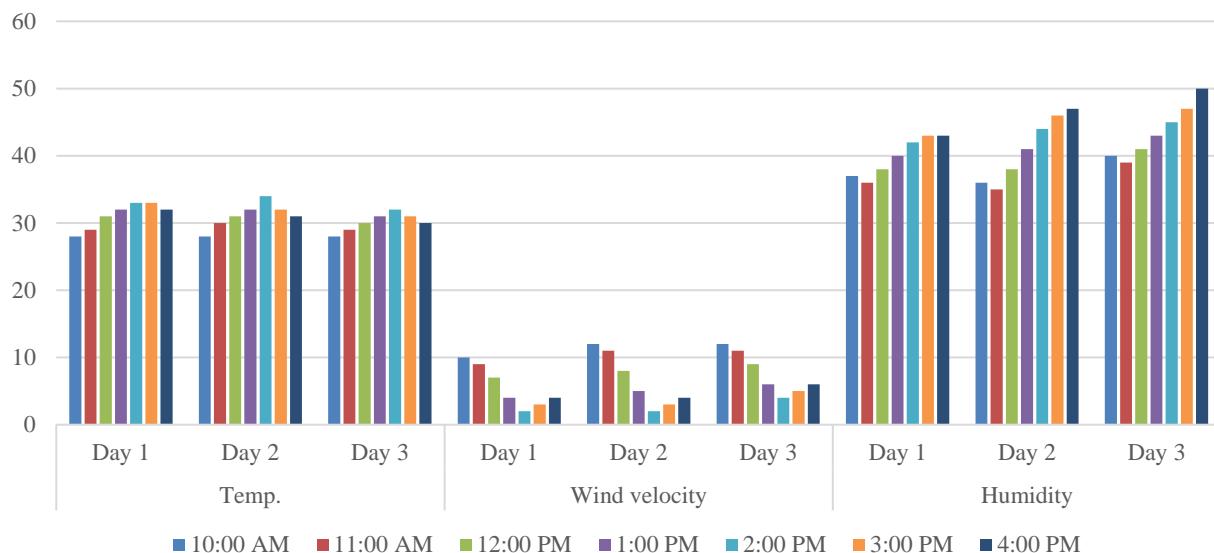


Figure-2: Hourly weather forecast data.

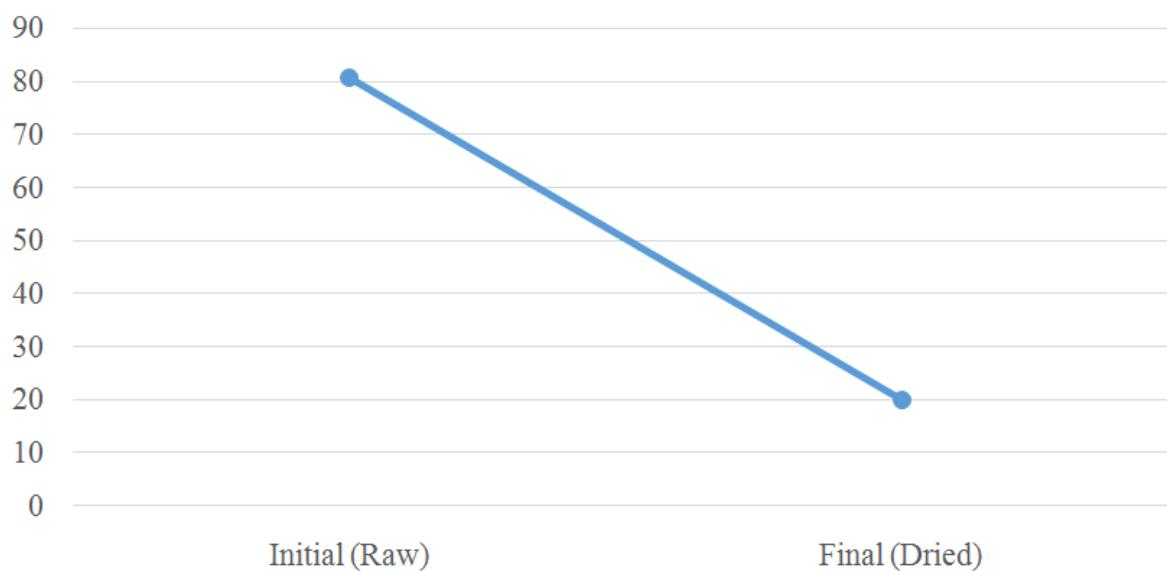


Figure-3: Moisture (%) in shrimps before and after drying.

Table-1: Yield (%) analysis of dry-salted shrimp production.

Particulars	Weight (Kg.)	Yield (%)
Raw material (Whole shrimps)	19.00	100
Peeled shrimps	8.00	42.10
Weight after salting (Overnight)	6.10	32.10
Weight after drying (18 hrs.)	3.50	18.42

Moisture (%) in dry-salted shrimps was reduced to 19.89% from 80.80% (raw shrimp). Quality loss is one of the main concerns and is recognized by changes in desired properties and characteristics of fish and fishery products. These alterations in quality are generally attributed to changes in physico-chemical and microbiological parameters.

Referring to Table-1, it could be observed that final yield (%) was higher compared to *Solenocera crassicornis* (12%) as reported¹². This is because the shrimps were not washed after salting and directly spread on mats for sun-drying.

Table-2: Economic analysis of dry-salted shrimp production.

Particulars	Value (Rs.)
Cost of shrimp	1520
Packaging cost (including transport and salt)	80
Total Cost	1600
Marketing	
Total Income (TI)	1800
Net Profit (NP)	200
Net Profit ratio (NP*100 / TI)	11.11%

Table-3: Difference between college product and local market product.

College Product	Market Product
Highly hygienic	Less hygienic
Best quality product	Medium or low quality product
Prepared from fresh shrimps	Prepared from spoiled or rejected raw material
Attractive color, texture	Poor appearance
High profit	Less profit
Product full covered by package	No covering or package
No contamination	More contamination
High review	Less review
Long storage period	Short storage period
Highly effective to consumer	Less effective to consumer

Dried shrimps were packed in a simple LDPE plastic pouch and trays and sealed so that contamination does not occur. Also this makes the products suitable for easy marketing and display in the local fish market. Referring to Table-2 it could be observed that drying business is a profitable if sufficient raw material is available in appropriate price. Though the packaging will increase the production cost but there are many advantages over the local product as mentioned in Table-3. The price of the processed dry salted shrimp ranged from Rs. 400-500/Kg in the local market compared to Rs. 350/Kg of locally processed dry products¹².



Figure-4: Local product vs College product.

Problems faced during drying: Major problem faced is of getting raw material in proper prices. Also improper drying conditions and changes in environmental conditions, lower yield (%), etc. also affect the dry products quality and marketing. Major problem faced by the local fishermen / fisherwomen in the local market is the non-availability of good infrastructure facilities, apart from that different other problems like poor hygienic condition, poor road facility, bad handling practices, improper drainage system and less governmental support.

Conclusion

No doubt drying is the most affordable method of shrimp preservation. Dried shrimps are healthy, nutritive and tasty products for consumption. Dry shrimp / fish production and trade offer a sustainable employment and income to the coastal fisherwomen because of high demand of dried fishery products in the domestic and international market. Shelf life of these products is more than six months. Our present study concluded that dry shrimp production was feasible financially as well as viable economically. It was observed that the dry shrimp packed with LDPE packages provides barrier between product and environment contaminates and also it attracts the customers for purchasing the dried products (Figure-4). Demonstration of improved fish drying methods and importance of packaging over the dried fishery products by the fisheries institutes and

research organizations should be promoted among the local fishermen. Thus provisions of different financial support schemes will help to improve the livelihood of fishers as well as to ensure extended reach to potential markets in urban areas for maximization of profit.

Suggestions for fishermen: i. Raw material for dry fish should be procured in fresh condition. ii. Drying should be done in winter & summer season. iii. Drying process should be carried out in hygienic conditions i.e. Rack drying or mat drying should be adopted. iv. Remove moisture content up to 80% to reduce water activity. v. Provide a simple covering or packaging once the dry product is ready for marketing to avoid the contamination.

Acknowledgment

The authors are thankful to Department of Fish Processing Technology, College of Fisheries Science, Junagadh Agricultural University, Veraval, Gujarat for providing the facilities to carry out the work successfully.

References

1. Oosterveer, P. (2006). Globalization and sustainable consumption of shrimp: consumers and governance in the global space of flows. *International Journal of Consumer Studies*, 30(5), 465-476.
2. CMFRI, FRAD. (2019). Marine Fish Landings in India - 2018. *Technical Report*, CMFRI, Kochi.
3. Fang, X., Sun, H., Huang, B. and Yuan, G. (2013). Effect of pomegranate peel extract on the melanosis of Pacific white shrimp (*Litopenaeus vannamei*) during iced storage. *J. Food Agric. Environ.*, 11(1), 105-109.
4. Tsironi, T., Dermesolouoglou, E., Giannakourou, M. and Taoukis, P. (2009). Shelf life modelling of frozen shrimp at variable temperature conditions. *J. Food Sci. Technol.*, 42, 664-671.
5. Suyani, N. K., Rathore, S. S., Vandarwala, U. G., Patel, K. and Rana, R. J. (2019). Physical, chemical and sensorial quality evaluation of phosphate treated and non-treated PUD shrimp (*Litopenaeus vannamei*) samples. *International Journal of Fisheries and Aquatic Studies*, 7(5), 296-299.
6. Anon. (2001). Hand book of Fisheries Statistics. Govt. of India, Ministry of Agriculture, New Delhi.
7. Reza, M. S., Bapary, M. A. J., Islam, M. N. and Kamal, M. (2009). Optimization of marine fish drying using solar tunnel dryer. *Journal of Food Processing and Preservation*, 33, 47-59.
8. Immaculate, K., Sinduja, P., Velammal, A. and Patterson, J. (2013). Quality and shelf life status of salted and sun dried fishes of tuticorin fishing villages in different seasons. *International Food Research Journal*, 20(4), 1855-1859.
9. Sivaraman, G. K., Visnuvinayagam, S. and Jha, A. K. (2015). Microbiological spoilage of dried fishes. *Indian council of agricultural research*, New Delhi.
10. Das, M., Prathibha, R., Maheswarudu, G., Dash, B. and Ramana, P. V. (2013). An overview of dry fish landings and trade at Visakhapatnam Fishing Harbour. Regional Centre of CMFRI, Visakhapatnam. *Marine Fisheries Information Service T&E Ser.*, 215, 3-7.
11. Ghorai, S. K., Bera, S. K., Jana, D. and Mishra, S. (2014). Status of the largest dry fish market of East India: a study on Egra Regulated Dry Fish Market, Egra, Purba Medinipur, West Bengal. *International Journal of Current Research and Academic Review*, 2(5), 54-65.
12. Sheetal, B., Desai, A. Y., Tandel, R. K. P. and Tandel, J. K. T. (2017). Production of different type of dry fish and its yield measurement at Veraval, Gujarat, India. *Research Journal of Recent Sciences*, 6(7), 28-32.