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Effect of Various Types of Drying on Fresh Marine Shrimps (Penaeus notialis)

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Abstract: ***Shrimps are sparkling and saltwater animal on aquatic habitat. They may be regarded as one of the quickest developing food commodities in international exchange, because of their perceived health blessings, and importantly, being a source of protein. The consequences of predominant drying methods; hot air oven, tray drying and forced tray drying have been investigated. From the result of the look at, it changed into discovered that the oven-dried shrimp had higher moisture content material than the tray and forced dried shrimp . There had been sizable variations for aroma, look, colour, taste and shelf life.***

Keywords: Hot air oven, Forced tray dyer, Tray dryer, Shrimp, Drying, Sensory attributes, Quality parameters

1. Introduction

Drying is seemingly perhaps the most well known strategies for saving organic products, vegetables and different food sources. Quality pointers, for example, shading, flavour, surface, accessibility of supplements among others decide the food esteem, shopper acknowledgment and to an enormous degree, the market estimation of dried food items. Since drying is profoundly energy escalated it is similarly significant that drying measures be energy productive. Advances as of now conveyed for excellent item drying incorporate among others, freeze drying, microwave drying and some convective methodologies like warmth siphon and adsorption drying. Contrasted with air drying, non-convective drying strategies are yet to make huge advances into industry for different reasons. Freeze drying for example is expensive regardless of the high quality of its items; application is restricted to high-valued products. Microwave drying utilizes high evaluation and more costly. Also, issues like uneven, textural harm and restricted entrance of microwave radiation inside the item happen in microwave drying. As of late in this manner, microwave drying is progressively being utilized related to convective dryers to shape their product quality. [1,2]

Till now, more than 85% of all mechanical dryers are of the convective sort. At low drying temperatures, regular convective dryers have low thermal efficiencies. Drying at high temperatures is the standard method to improve efficiency, however to the detriment of product quality. Drying techniques depend on dehumidification of drying air. Adsorption dryers require extra energy for adsorbent recovery. For temperature swing adsorption measures, high temperature heat is required [5].In this work, the effect of various types of drying on shrimps is studied. Since shrimps, are dietary staple food sources in numerous nations and there is presently an increment sought after for fish's as they are a generally excellent wellspring of polyunsaturated unsaturated fats called omega and unsaturated fats. Shrimps with their characteristic saw well-being wellness and culinary credits are progressively the protein selection of individuals universally. They contain about 18%-20% protein, 75%-80% water, low fat (4.5%), amino acids and minerals, for example, selenium, copper, zinc, and calcium in right extent.

Shrimps additionally contain polyunsaturated unsaturated fats important to improve human wellbeing and are likewise rich in astaxanthin and nutrient B12 with cell reinforcement properties. Drying of shrimps reduces the moisture content of foods to a safe level, which impacts some technological advantages, such as increased shelf life, ease of handling and transportation, impartment of desirable characteristics such as odor, flavor, color, and taste. Completely dried-shrimp or powdered-shrimps have been widely accepted, as they can be used as spices in soups or foods for flavor and protein source [4,5].Different drying methods have been used to process and preserve shrimps such as freeze-drying , super-heated air drying, heat pump drying, solar drying, jet-emitted bed drying and hot air drying. Solar drier and hot air have been the most common and cheapest processing methods of preserving shrimps because they require less sophisticated efforts and inputs. However, drying usually affect some food materials but not much evidence has been provided on its effects on the quality attributes of shrimps, acceptability and market value of the resulting dried shrimps [6, 7].

Therefore, this study is aimed to determine the best method for drying shrimp that will not affect its nutritional and sensory properties. Tray dryer, Forced tray dryer and hot air oven are the three available dryers for our studies.

2. Aim of the project

This work aims to study the effect of various types of dryers and their efficiency in drying aquatic shrimps for industrial purpose.

3. Materials and Method

Fresh marine shrimps (*Penaeus notialis*) were purchased and transported on ice in a cold box to the laboratory from a

nearby fish market. The shrimps were washed in potable water to reduce the level of microbial loads accompanying it from its muddy habitat, physical contaminants were also removed.

4. Preparation of sample and drying

Cleaned shrimps were concentrated with 10 gm of salt for around 1 hr. 1/3 portion of it was taken for tray drying, forced tray drying and hot air oven respectively. Shrimp samples were dried at 60^{o}C for about 3 hrs and the efficiency of drying was noted for every 20 minutes. Sensory evaluation.The sensory evaluation for overall acceptability was carried out after cooking the selected sample and it was done by 10 trained panellists using 9 point hedonic scales viz., Like extremely (9), Like very much (8), Like moderately (7), Like slightly (6), Neither like nor dislike (5), Dislike slightly (4), Dislike moderately (3), Dislike very much (2), Dislike extremely (1).

5. Statistical Analysis

Triplicates analyses were carried out while analysis of variance (ANOVA) was performed by one-way procedures with the application of Duncan's multiple range tests and descriptive statistics using SPSS 16. Difference between means was tested for, using the Least Significant Difference (LSD) and significance was defined at P.

Table 1: Moisture content in shrimp samples using different dryers

Time (min)	Tray (g/100g)	Forced (g/100g)	Hot Air oven (g/100g)
0	0.578±0.12	0.5±0.02	0.729±0.11
20	0.578±0.10	0.44±0.01	0.723±0.10
40	0.57±0.03	0.42±0.21	0.708±0.06
60	0.565±0.11	0.36±0.14	0.698±0.08
80	0.547±0.06	0.25±0.12	0.657±0.12
100	0.548±0.11	0.16±0.06	0.642±0.05
120	0.522±0.15	0.08±0.08	0.627±0.14
140	0.511±0.10	0.04±0.12	0.608±0.01
160	0.402±0.01	0.02±0.11	0.566±0.01
180	0.376±0.10	0	0.561±0.10

Results are the means±standard deviation of 3 measurements.

6. Results and Discussion

6.1 Evaluation of sensory parameters of shrimps dried using various types of dryers.

Fresh samples have a slightly salty odour and pink colour, whereas the samples dried using tray dryer posses' dark red colour Fig.1(a), hard in texture. While the samples dried using forced tray dryer were pleasant Fig.1(b) than tray dryer and the texture was semi-hard. Sample dried using hot air oven was over dried and reddish in color Fig1.(c)

According to Yanar et al., [13], the market value of shrimp is dependent on the visual appearance of their body color, and this is attributed to the presence of the astaxanthin. This carotenoid pigment is responsible for the red-orange tissue pigmentation of shrimp meat. Darkening may have occurred because of Maillard browning reactions which took place during drying. The extent of these reactions in hot air oven may have been more pronounced, resulting in darker shrimp meat compared to tray-dried samples. Barret et al. (2010) and Adeola et al. (2016) reported that the taste, flavour and appearance were the key three sensory factors determining the acceptability of processed shrimp

Figure 1 (a)

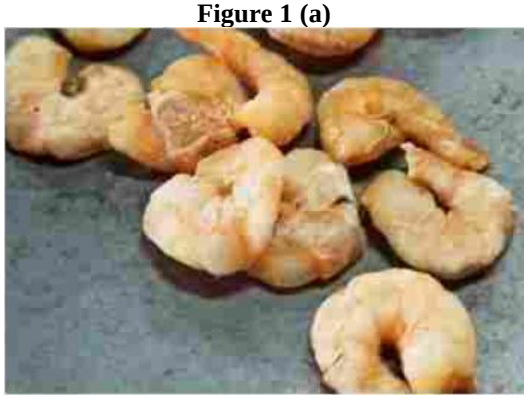

Figure 1 (b)

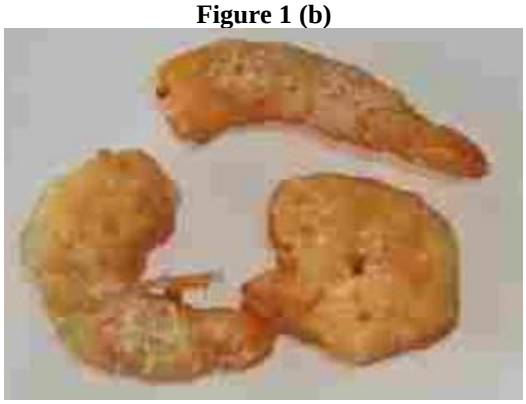

Figure 1 (c)

Figure 1: Shrimps dried using various types of dryers

6.2 Determination of drying efficiency of various dryers

After the drying of fresh samples using different dryers it was found that the samples dried using forced tray dryer maintained acceptable color, texture and improved shelf life Fig.2.Samples dried using forced tray dryer were pleasant Fig.1 (b) than tray dryer and the texture was semi-hard. The drying curve below shows the efficiency of drying using the above three dryers. From the obtained results the work came to a conclusion that forced tray drying is more effective in drying shrimps for commercial scale.

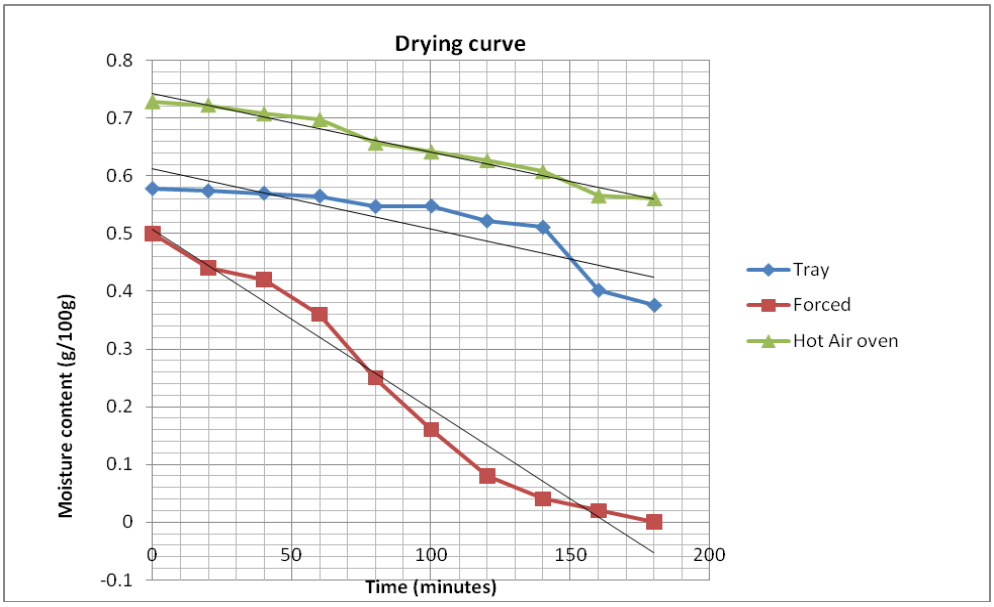

Figure 2: Drying Curve

7. Conclusion

The study revealed the effects of three drying methods on fresh aquatic shrimps'. Although, there were slight variations in the moisture content of shrimps which are dried at 60° C. Forced dried shrimps had the lowest moisture content than the other tray dried and oven-dried shrimps whereas; ovendried shrimps had the highest moisture content. Based on the sensory scores, forced dried at 60° C had the highest rating in terms of overall acceptability and was acceptable among the different drying conditions.

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January, 2018.