



Refinement of Simple Solar Tent Dryer for Production of Quality Dried Fish

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ABSTRACT

Krishi Vigyan Kendra, Udalguri, Assam Agricultural University carried out an experiment on modification over traditional solar tent dryer for better drying and lesser the infestation of flies using the fish *Puntius sophore* during September - October, 2019 in Chanbari and Jhargaon village under Bhergaon and Rowta Agricultural Developmental Block of Udalguri District, Assam. The fishes were dried experimentally under modified solar tent dryer and same species of fish were dried traditional solar tent dryer. Organoleptic evaluations showed no physical damage, no discolouration and no insect infestation of fishes under modified solar tent dryer but in case of traditional solar tent dryer insect infestation were observed. The study reveals that the modified solar tent dried fish products are hygienic compared to that of traditional solar tent dryer dried products of same species.

Key Words: Insect, Organoleptic, *Puntius sophore*, Solar tent dryer.

INTRODUCTION

Drying is an efficient and cheap method for food preservation especially to preserve fish and shrimp for a long time in many parts of the world. The demand for dried fish and shrimp has also been driven by the characteristic flavour of each product. The traditional fish-drying practices on the sand of the bank of *Beel*, on raised bamboo racks and on the bamboo made covering are very common in different districts of Assam. The drying process in the sun takes about 1 week depending on the climatic conditions. But, the longer duration of drying causes considerable spoilage, blowfly infestation, broken pieces and contamination with filth and soil particles. Some reports indicated that losses from insects, animals and weather may be up to 30 to 40% (Hollick, 1999 and Wall *et al*, 2001). There is also widespread use of different types of insecticides to avoid insect infestation during the traditional drying process that make the product unattractive to the consumers (Reza *et al*, 2005). Besides, considerable postharvest losses

were reported to occur during processing, storage and during different stages of marketing channel. The physical and organoleptic qualities of most of the traditional sun-dried products available in the market are not satisfactory for human consumption.

The Solar tent dryer is made up of a polythene sheet worn over a wooden frame. It works through evaporative drying using the green house principle. When set up in the sun, solar energy passes through the transparent polythene but gets trapped within it thereby raising the internal temperature. Cool air flowing in through an opening gets heated up and moves out moisture from fish lay on racks in the dryer. Solar dryer speeds up the drying process considerably, resulting in a high quality product with extended shelf life. Even under high humid conditions, solar dryers could have other advantages such as: (i) it is rain-proof and hence can be kept in continuous operation even in bad weather. (ii) Drying in an enclosed environment protects the products from dust, dirt, attack by birds, rodents and insect infestation.

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In traditional solar tent dryer, sometimes it is observed that flies can get entered inside the tent through the vent made to serve as outlet of the hot air from the dryer. This study shows results of trials and modification of traditional solar tent dryer for a better product output with extended shelf life.

MATERIALS AND METHODS

Materials used for the construction of modified solar tent dryer include: transparent polythene sheet, wooden frame, rock, mosquito net and a drying rack. The dimension of the solar tent dryer was 2m × 1.5m × 1.5m length, breath and height respectively. In constructing the solar tent dryer, pieces of straight wooden poles each measuring 180 cm were taken. Two of the poles were tied together at one end and the two other ends were tied at 150 cm apart with help of another wooden pole. The same was done for the fourth, fifth and sixth wooden poles which were tied in the opposite direction at a distance of 200 cm apart. Three other wooden poles of measuring 220 cm were then taken and fastened on the top, front side and back side of the two pairs of wooden poles to form a tent-like structure. Transparent polythene was sewn into shape of the wooden framework covering all the sides. At the extreme narrow tops of the triangular part of the tent, openings of 15 x 15 cm were made and screened with mosquito net to serve as outlet of the hot air from the dryer. About 25 pieces of rocks with an average weight of 12 kg each were stacked within the base of the wooden framework. The rocks are painted black so that they serve as capacitor by absorbing, retaining and releasing radiant energy needed for the fish drying. A rack of bamboo fencing was set inside the tent above the rocks with the intention that a continuous flow of air towards the tent is obtained.

Materials used for the construction of traditional solar tent dryer include: transparent polythene sheet, black polythene sheet, wooden frame and a drying rack. The construction process is the same as above except screening of mosquito net and stacking of rock on the base of dryer. Here, transparent

polythene was sewn into shape of the wooden framework except covering the back side and the back side of the tent was sewn with black polythene. On the other hand, the bamboo made rack at base was covered with black polythene sheet.

Fixing of the dryer

Both the dryers were exposed to the sun from 9 O'clock in the morning to 4 O'clock in the afternoon (7 hours/day). The tents were positioned facing the direction of the prevailing wind, to allow air readily into the tent, since the drying process is a combination of air movement and heat. The dryers were set-up 30 minutes before fish were put inside.

Solar drying of fish

Drying of fish was done in a locally made solar tent drier. Fish used for this study was *Puntius sophore* as this fish is abundantly available in the study area and has high demand in dried form. Fish were placed in the bamboo meshed rack inside the dryer.

RESULTS AND DISCUSSION

The occurrence of flies in traditional solar tent dryer and modified solar tent dryer for both the batch during the study period is showed in Fig 1. Results showed that an average of 15 flies was counted in traditional solar tent dryer while 2 flies were counted in modified solar tent dryer in first batch of drying. Likewise, in the second batch of drying an average of 12 flies were seen in traditional solar tent dryer while in modified solar tent dryer, no fly or insect was observed.

Fig 2 shows the mean temperatures inside traditional solar tent dryer and modified solar tent dryer and outside within the trial period. Temperatures for 1st batch and 2nd batch for the month of September, 2019 were recorded respectively. Results showed that the mean temperature in traditional solar tent dryer was 40.29°C and 34.57°C for 1st batch and 2nd batch while 42°C and 35.57°C was recorded for modified solar tent dryer for the same months and years respectively. Similarly, temperature recorded

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Table 1: Organoleptic quality of dry fish from *Puntius sophore* prepared under Modified Solar Tent Dryer and Traditional Solar Tent Dryer.

Parameters	Product type	Dry fish product
Appearance	Modified Solar Tent Dryer	4.67
	Traditional Solar Tent Dryer	4.35
Colour	Modified Solar Tent Dryer	4.67
	Traditional Solar Tent Dryer	4.35
Odour	Modified Solar Tent Dryer	4.64
	Traditional Solar Tent Dryer	4.30
Texture	Modified Solar Tent Dryer	4.56
	Traditional Solar Tent Dryer	4.28

for the ambient was 34.71°C and 28°C for the same months and years respectively. From the figure it was revealed that modified solar tent dryer had high temperatures than that of traditional one as well as ambient conditions.

The sensory quality of the dry fish depends on the quality of the raw materials and process engaged in drying. The initial sensory quality of the dry fish depends on the quality of the raw materials (Nath *et al*, 2018). Organoleptic quality of dry fish product

prepared from *Puntius sophore* under traditional and modified Solar Tent Dryer is presented in Table 1. Sensory scores for appearance, colour, odour and texture of the Modified Solar Tent Dryer products were above 4.5 whereas scores for the similar quality attributes in the case of Traditional Solar Tent Dryer were between 4 and 4.5 and were within the acceptable limit. Nath and Majumder 2013 reported similar result for dry fish product available in market and prepared under STD.

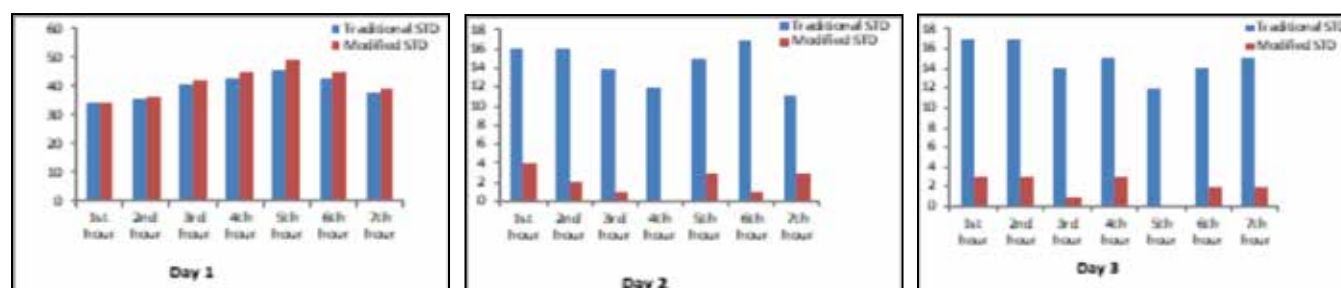


Fig 1: Avg. total number of fly/insect counted inside the Traditional and Modified Solar Tent Dryer in every hour of interval over a drying period of 3 days.

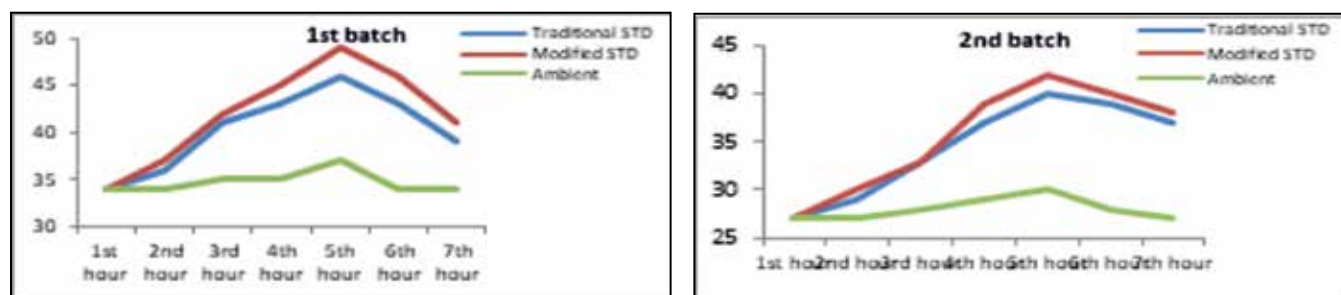


Fig 2: Avg. temperature recorded inside the Traditional and Modified Solar Tent Dryer as well as ambient in every hour of interval over a drying period of 3 days.

On the basis of performance of the two dryers, conditions for fish drying such as temperature as well as the number of occurrences of flies/insects in the dryer and organoleptic quality of dried product, the study revealed that Solar Tent Dryer which was refined as an improvement of Traditional Solar Tent dryer was better. Hence, it was recommended for fish farmers for quality dry fish production.

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