Pre-processing protocol for the drying of peeled and undeveined (PUD) Penaeus vannamei

Viji P., Sireesha S., Jesmi Debbarma and Madhusudana Rao B.*
Visakhapatnam Research Centre of ICAR-CIFT, Visakhapatnam-03
*pankyammaviji@gmail.com

Dried shrimp is one of the most delicious seafood in many parts of the world. In India, the drying of shrimp is a major entrepreneurship in the coastal states. Apart from the direct use, dried shrimp is used as raw material for the production of shrimp snacks such as wafers, crackers, chips, etc. So, the demand and production of dried shrimp are always expected to increase over the years. Most commonly, small-sized shrimps are dried as shell-on. Color is the most important quality criterion deciding the consumer acceptability of dried shrimp, but the color of shell-on dried shrimp is not always appealing as melanosis development in the shell imparts a blackish tinge to the dried shrimp.

Andhra Pradesh is the leading producer of Pacific white shrimp Penaeus vannamei in India. Though drying of *P. vannamei* is an uncommon practice in India, it can be used as a cost-effective method to preserve the catch after unexpected harvesting during disease outbreaks on the farm. Pickle made from dried shrimp is a delicacy in some districts of Andhra Pradesh. Shell-less dried shrimp is used as the raw material for making dried shrimp pickles. For making pickles out of dried shrimp, comparatively bigger-sized shrimps are chosen. In this communication, a pre-process protocol for drying *P. vannamei* is discussed.

Penaeus vannamei of average size 10 g was selected. One batch of shrimp was beheaded, peeled, and divided into three lots and blanched in 3% brine containing 0.1% citric acid for 30 sec (A1) 60 sec (A2), and 90 sec (A3). The peeled and blanched shrimps (A1, A2 and A3) were dried at 55-60°C for 8 h in a hot air oven. Another batch of fresh shrimp was beheaded and blanched for 30 sec, 60 sec, and 90 sec, coded as B1, B2, and B3, respectively. This batch of shrimps (B1, B2, and B3) were peeled after blanching and dried as earlier. One batch of peeled shrimp (C1) and shell on control (C2) was dried without the blanching process. Blanching loss, drying yield, rehydration rate, and color attributes of the dried shrimps were compared.

The blanching loss of the shrimps that were blanched after peeling (A1-A3) was markedly higher than those peeled after blanching (B1-B3) (Fig1). Consequently, the yield after drying was higher for the shrimps that were peeled after blanching. As expected, the increase in time of blanching increased the blanching loss markedly, but the effect of blanching time on the yield of dried shrimp was negligible.

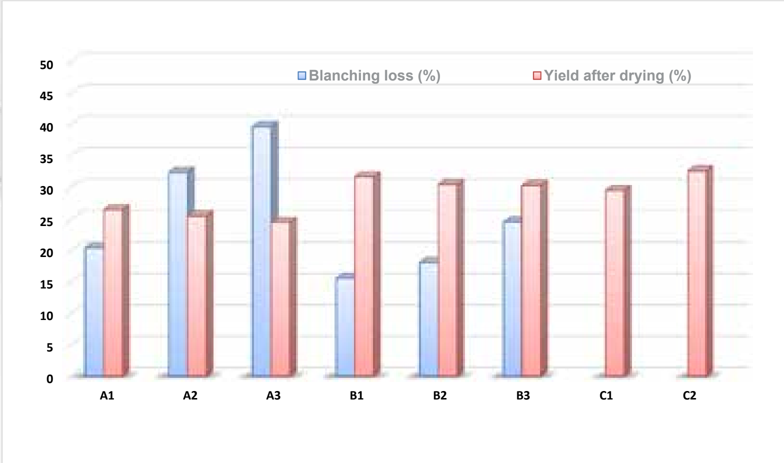

Fig 1. Blanching loss and yield of dried P. vannamei

Rehydration property is an important criterion for dried food products. It represents the water-absorbing efficiency of the dried food while soaking in water. Different blanching processes influenced the rehydration rate of dried shrimp (Fig 2). Peeled and blanched shrimps (A1-A3) showed a higher rehydration rate compared to blanched and peeled shrimps (B1-B3). This can be explained by the reason that during the blanching of peeled shrimp, more moisture and soluble materials were lost, giving rise to more capillaries, which might have facilitated the absorption of water into the muscle. Many studies suggest that cellular and structural arrangements in the food matrix influence the flow of water during rehydration (Gautam et al., 2021). It is also important to note that rate of rehydration increased as the time of the blanching period increased. The control sample dried with a shell had the highest rehydration rate among all dried shrimp samples because more water is entrapped in the space between the shell and meat.

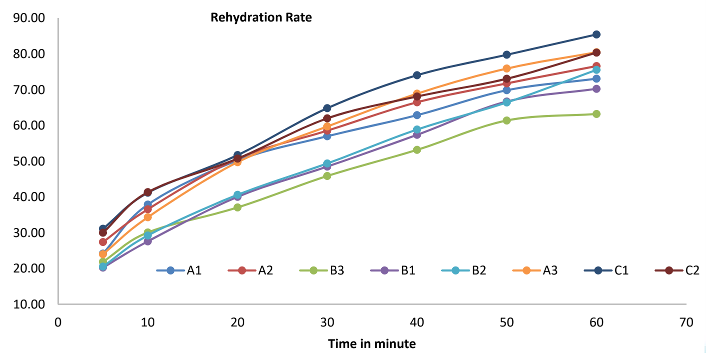

Fig 2. Rehydration rate of dried P. vannamei

The important finding of the study was the effect of blanching processes on the color attributes of dried shrimp. Visual examination clearly pointed out a marked difference in the redness of dried shrimp processed by different methods (Plate 1). This finding was supported by the instrumental color attributes as the a^* value (greenness to redness) was significantly higher in blanched and peeled shrimps than in peeled and blanched shrimp (Table 1). Astaxanthin is the carotenoid pigment found in shrimp that changes to a reddish tinge after drying. In peeled and blanched shrimp (A1-A3), a major loss of carotenoids on the surface of shrimp might have occurred whereas in samples B1-B3, since peeling was done after blanching, the epithelial layer between shell and meat that possesses more astaxanthin pigment retained intact and preserved the pigments. The lightness value (L^*) and yellowness value (b^*) were more in samples A1-A3 compared to samples B1-B3. Another observation was that the curling of shrimp meat during the blanching process was reduced when blanching the shell on the shrimp.

Table 1. Hunter values (n=5) of peeled and dried P. vannamei

Sample	L*	a*	b*
A1	48.88 ± 0.56	21.39 ± 0.74	28.87 ±0.87
A2	45.19 ±1.55	21.47 ± 1.28	27.98 ±0.84
A3	45.71 ±1.51	23.01 ±0.30	28.24 ±0.65
B1	39.04 ±1.05	24.04 ±0.77	25.78 ±0.97
B2	38.39 ±1.53	24.67 ±0.99	25.80 ±0.89
B3	41.40 ±1.19	24.40 ±0.61	26.35 ±0.30
C1	35.13 ± 0.50	18.98 ±0.77	24.45 ±0.34
C2	41.91 ±0.92	13.16±1.13	19.39 ±0.95

In conclusion, the study illustrates that peeling of shrimp after blanching process is more advantageous in reducing the blanching loss and improving the redness value and yield of dried shrimp. Moreover, 30 sec blanching time was found reducing the blanching loss. These findings from the study are useful for the seafood entrepreneurs in deciding the best process protocol for drying peeled shrimps.

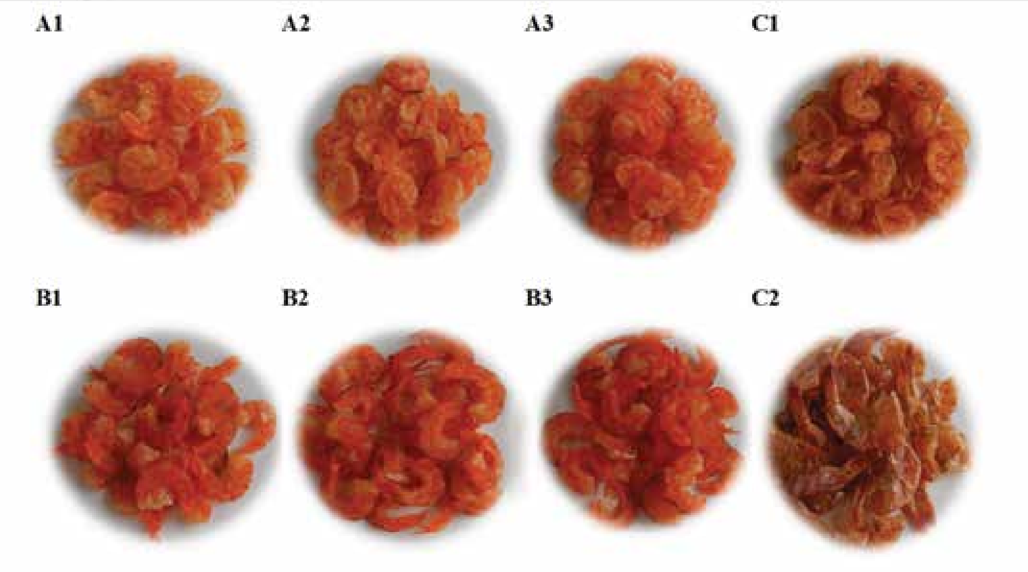

Plate 1. Peeled and dried Penaeus vannamei

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