Fermented Fish Products in Thailand

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Introduction

The use of fermentation techniques are common traditional practices for the preservation of fish for food in Thailand. Salt or brine solution is the main ingredient used to preserve fish, shrimp, squid, mollusc, etc. The proportion of fish and salt vary from product to product. Also the processing time and temperature influence the quality of the end product. Fish sauce, shrimp paste, salted bowel, and *budu* can be made by adding salt to marine fish and many species of fresh water fish. The proportion of fish to salt depends on the size and initial quality of the fish. After salting and mixing, the product is kept tightly sealed and allowed to age. During the anaerobic fermentation period the product components will be autolysed by enzymatic reaction together with microorganism activities at around 38 ± 5°C. Then 5-10 percent of roasted ground rice or rice bran will be added, mixed well and kept in earthern jar after the carbohydrate source has been added. The pH of the product usually drops from 5.8 to 4.2-4.7 in 2-5 months during aging.

The objective of our studies was to identify conditions that speed up the fermentation process, and study factors that play an important role in determining the aroma, flavor and color of the finished fermentation products.

Fish/salt/carbohydrate products

Pla-ra is the most popular fermentation product in Thailand. It is used as a main dish in rural areas. 97% of the fresh water fish catch is normally used for fermented fish. Snakehead *(Ophicephalus striatus), pla-kra-dee (Trichogaster trichopterus* Pollus.), *pla-soi (Cyclochilichthus* sp.*)*, silvercarp *(Cirrhinus jullieni)* and *pla-ta-pien (Puntius gonionotus* Bleeker) are scaled, gutted, beheaded and chopped into small pieces and 20-25 percent salt is added. The fish-salt mixture is kept tightly scaled for 2-3 nights or up to a month in earthen jars and then about 5 percent rice bran or 10-15 percent of roasted ground rice is added and kept tightly sealed in earthen jar for 3-6 months during fermentation process; saturated brine is added to cover 3 inches above the top layer of the product (Chart 1). The fermentation process

Chart I. Processing of fermented fish *(Pla-ra)*

Snakehead, Goramy,
common carp, silver carp
catfish and selected marine fish
↓
scaling, gutting
chopping and washing
↓
Mix well with
25% salt, leave overnight
or several months
↓
Add 5-15% roasted
ground rice, rice bran;
keep tightly sealed
in earthen jar
↓
Age more than 2 months
for good quality
fermented fish
(pinkish-colour)

Table 1. Proximate analysis of *Pla-ra* (fermented fish) made from several species

Species used	Moisture (%)	Protein (%)	Fat (%)	Ash (%)	Calcium (%)	Phosphorus (%)
Snakehead	57.39	14.57	12.46	15.90	—	—
Climbing perch	60.56	11.00	4.50	20.84	3.75	6.24
Goramy	61.18	11.85	3.61	20.89	2.60	7.11
Pla-chao	47.49	16.60	30.03	4.16	1.29	4.07

will be hastened if less salt is used. When carbohydrate is added the fermentation activity will start; the carbohydrate will be converted to sugar by enzymatic reaction and the sugar will be converted into acid (lactic acid) or alcohol, and CO_2 gas will be released by lactic acid-producing bacteria. This environment together with the salt content also results in a partial preservation of the fish.

After *pla-ra* is kept tightly sealed in earthen jars for 1 month the typical characteristic pink colour and aromatic flavour is apparent; the texture and the taste of the *pla-ra* is indicated by the distinct slight acid flavour and saltiness and a pleasant odour. The longer the fermentation period the more apparent the aromatic flavour.

Quality

The quality of *pla-ra* depends on

a) species of fish used,

b) quality of fish used, and

c) techniques used in the fermentation process.

The proximate analysis of pla-ra mode from several species is shown as Table 1.

Characteristics of *Pla-ra* technology

a) It was found that good quality *pla-ra* will result if the proportion of salt to fish is 1 to 2 and the product is incubated at 25-30°C; this procedure will give a distinct aromatic flavour to the sauce.

b) Each species of fish will give a special flavour.

c) Use of a small amount of salt and a poor quality of fish will result in more spoilage. Marine fish (chub mackerel, scad, lizard, threadfin bream and anchovy) are used to produce *pla-ra* but they are not popular because of the trimethylamine odour. Also, the more *Proteus* sp. in the product the faster the oxygen in TMA-O will be used up by anaerobic spoilage microorganisms. The result is a bad odour resulting from using marine fish in fermentation products.

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