UTILIZATION OF LEAVES OF KUNYIT (*CURCUMA DOMESTICA* VAL.), RUKU-RUKU (*OCIMUM GRATISSIMUM*. L) AND MANGKOKAN (*NOTHOPANAX CUTELLARIUM* MERR.) IN STEAMED FISH (*RASTRELLIGER* SP) PROCESSING

Novelina and Melina Sari

Faculty of **Agricultural** Technology, Andalas University

ABSTRACT

This research was carried **out to test the influence** of kunyit **leaves** (*Curcuma domestica* Val.), **ruku-ruku leaves** (*Ocimum gratissimum.* L) **and** mangkokan **leaves** (*Nothopanax cutellarium* **Merr.)** on **the** organoleptic **quality and shelf life** of the **steamed fish** stored **at** room **temperature. The results showed that the use** of **the leaves influenced the** chemical composition of **steamed fish. The sensory evaluation** showed **that fish steamed using the leaves** of **ruku-ruku was** most **likened. At** the 7th **day** of storage, **the total plate count of steamed fish using the leaves of ruku-ruku** that was **the** lowest, **i.e.** $3x10^3$, **whereas** the control contained 3.2×10^4 **and** it **was found negative** for *Salmonella* **and** *E.coli.*

INTRODUCTION

Fish is one of **the high risk foods** that **can spoil easily. Fish** spoilage could be **caused by** biochemical **and** microbiological **factors. Based** on **that,** it **is needed** processing **methods** that can **stop** the enzymes **activity** and **spoilage** microorganisms **thus** it will **extend** the fish shelf **life (Irawan (1995)** *in* **Puspita, 2003).**

Steaming is one **of the** conventional methods **to** preserve fish. **It** is **the** combination method of **salting and boiling** process. The **function** of salt **is** to **preserve and** improve the taste of **fish.** In **Indonesia,** steaming fish is a **product** that **can be** sold **and** eaten **directly.** (Suseno,1978).

The turmeric leaves, ruku-ruku **leaves and** mangkokan **leaves are** often **used** as spices in fish **processing.** These **foliages** are used to

give flavor of fish. **Several** studies reported that many foliage plants have the anti microbial activity. This study aimed to analyze the influence of the leaves on the sensory quality and shelf **life** of steamed fish.

METHODOLOGY

Materials

The materials used **was** fresh fish of Rastrelliger SP from the fish market in Padang, West Sumatra, salt, turmeric leaves, **ruku-ruku leaves,** mangkokan **leaves** and aluminum foil. Media used for bacteria growth were PCA (Plate Count Agar), Sallmonella-Shigella **Agar** *(SS)*, Nutrient ***Agar*** **(NA),** Brililliant Green Lactose Bile Broth (BGLBB), **and Eosin Methylene** Blue **(EMB).**

Methods

Fish Steaming

Fish was cleaned, sorted, and washed. It was then added with salt (3% of total fish weight) for 15-20 minutes, re-washed and dried. Salt (2% of total **fish *weight)* was** re-added. The fish was covered by leaves **as** much as 2.5% of total **fish** weight. There were **3** types **of** leaves used separately i.e. turmeric leaves, ruku-ruku **leaves** and mangkokan leaves. Prior to use, the leaves was shredded into small pieces. Each fish was **wrapped in** aluminum foil and cooked in the autoclave for 60 minutes at **1-2** atm **of** pressure. Fish **was** then removed from autoclave and immediately dried in oven for ***2*** hours. Every hour the fish position was reversed. The **steamed** fish was then stored until it was not appropriate to be **consumed.**

The microbiological analysis of steamed fish consisted of total **plate** count, total coliform, and **Salmonella.** Moisture content, ash content, salinity, texture **using** penetrometer, organoleptic test, and shelf life **during storage** at the room temperature were also analyzed.

RESULT AND DISCUSSION

Moisture Content

The steamed fish underwent evaporation during heating process, thus its moisture content was lower than the fresh fish. The reduction of steamed fish moisture content was also influenced by the addition of salt. Salt absorbed the free water on fish surface.

The moisture content of steamed fish after 6th day storage at room temperature increased but it was still in the range of the Indonesian Standard (SNI) for steamed fish. The maximum moisture content of steamed fish was 70% (wb). Increas in moisture content of steamed fish was influenced by water of the leaves and water absorption in package from the steamed fish to balance its moisture content with humidity relativity of the package.

Texture

The hardness of steamed fish for each treatment decreased after 6th day storage. During 6th to 8th day, the hardness of steamed fish treated with leaves decreased; while the control increased. Sumbawa (2008) reported that fish texture depended on total water and ratio of bond water and free water, higher water amount and free water in fish then fish hardness tends to decrease.

ORGANOLEPTIC TEST

The organoleptic test was done on fresh steamed fish using scoring test with interval 1 to 9. The sensory attributes analyzed were appearance, odor, taste, texture, slime and mold. The organoleptic score of each treatment of steamed fish was depicted on Table 1. The steamed fish with ruku-ruku leaves treatment was the most product liked by panelists.

Table 1. Organoleptic score of steamed fish

Treatment	characteristic					
	Appearance	odor	taste	texture	slime	mold
Ruku-ruku	7,4	7,95	7,75	7,9	8,2	9
Mangkokan	7,15	7,25	7,05	7,7	7,95	9
control	7,25	7,35	7	7,7	8,35	9
tumeric	6,75	7,75	7,35	7,7	7,75	9

SHELF LIFE

After 6^{th} day storage at room temperature, the steamed fish control spoiled were still *good* to be consumed. Therefore, the storage of steamed fish treated by leaves was continued and at the 8^{th} day they finally showed some signs of decay and were not appropriate to be consumed.

The decline quality of steamed fish was marked by increasing of rancidity, slimy, and odor, as well as decreasing of hardness texture. The spoilage of steamed fish control was faster than the steamed fish treated by leaves. This spoilage was caused by the degradation of protein and fat became alkali compounds which can further cause odor and taste.

TOTAL PLATE COUNT

Total plate count of steamed fish treated by leaves ranged between $1.0x10^3$ - $3.2x10^4$ on day 5 and day 7. Meanwhile the standard of total plate count of steamed fish was $1.0x10^5$; thus it was suggested that the products were still appropriate to be consumed for up to day 7 of storage.

Table 2. Total plate count of steamed fish on day 5 and day 7

day	treatment	Total plate count (CFU/gram)
5	A (Control)	1,1 x 10"
	B (Tumeric)	7,0 x 10^3
	C (Ruku-Ruku)	1,0 x 10^3
	D (Mangkokan)	8,0 x 10^3
7	A (Control]	3,2 x 10^4
	B (Tumeric)	2,2 x 10^4
	C (Ruku-Ruku)	3,0 x **103**
	D (Mangkokan)	1,0 x 10^4

It was observed that the control had thin slime followed by odor and rancidity on day 6 of storage. Meanwhile, the steamed fishes treated by leaves were still good, probably due to the existence of antioxidant in leaves that stop the oxidation process.

The total plate count of steamed fish treated by leaves was low because of antimicrobial and volatile compounds contained in leaves such as sesquiterpene in turmeric leaves, thymol in ruku-ruku leaves, as well as alkaloid and polyphenol in mangkokan leaves.

The total plate count of control and steamed fish treated by leaves was not too different because there was interaction between salt and antimicrobial compounds of leaves. Higher salt content in steamed fish will reduce the antimicrobial activity of leaves. Ardiansyah *et al* (2003) reported that the influence of salt towards antimicrobial activity of beluntas leaves extract was varied and depended on its concentration and bacteria species.

TOTAL COLIFORM AND *SALMONELLA*

Analysis of total coliform and Salmonella in steamed fish after storage up to day 7 showed that none of these bacteria was found. It might be caused by the pH of steamed fish (< 5) that did not allow coliform to grow.

Salmonella sp was the gram negative bacteria, facultative anaerobic and inactive at temperature 60°C for 15-20 minutes

(Hayes, 1985 *in* Jennie *et al,* 2001). All steamed fish were free *of Salmonella.*

CONCLUSIONS

The use of the turmeric leaves (*Curcuma domestica* val.), ruku-*ruku* **leaves** (*Ocimum gratissimum.* L) and **mangkokan** leaves (*Nothopanax cutellarium* merr.) on steamed fish (*Rastrelliger* sp) processing influenced the sensory characteristic and shelf life of steamed fish. The shelf life of steamed fish treated by leaves was longer than control during storage at room temperature.

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