International Journal of ChemTech Research
CODEN (USA): IJCRGG, ISSN: 0974-4290, ISSN(Online):2455-9555
Vol.10 No.3, pp 01-10, 2017

Effect of Combination Treatment of Concentration Liquid Smoke, Immertion Duration, Packaging and old Type Storagedifferent Levels of Protein Nila Fish Fillet (*Oreochromis niloticus*)

I Ketut Budaraga

Agricultural Technology Department, Faculty of Agricultural Ekasakti University, Veteran Dalam street 21b Padang City West Sumatera, Indonesia.

Abstract : This study aims to determine the protein content of fillet of tilapia (*Oreochromis niloticus*) given preservation with liquid smoke derived from a combination of liquid smoke treatment concentration, soaking time, types of packaging and storage time are different. This study was conducted experimentally using factorial experiment with a completely randomized design patterns (RAL) 5 x 3 x 3 x 5 with 3 replicates in order to obtain 675 experimental units. A factor consists of the concentration of liquid smoke consisting of Control (smokeless liquid / 0%), 5% and 10%, 15% and 20%; factor B consists of soaking time with liquid smoke is composed of three (3) levels ie soaking time 5 minutes, 10 minutes and 15 minutes; factor C consists of the type of packaging consists of three (3) levels ie without packaging (control), packaging polyethylene (PE) and packaging of polypropylene (PP) and factor D consists of the storage time (days) consists of 5 (five) levels ie 0,3,6,9 and 12 days. The parameters measured were the levels of protein. Results of research on the analysis of variance showed no real interaction on a combination of four treatments of soaking, the difference in concentration, types of packaging and storage time are different. The combination of soaking 5 minutes, 5% concentration of liquid smoke with two types of packaging (polyethylene, polypropylene and without packaging) on the day of the storage 0 tilapia fillet smoked showed the highest protein content of 79 percent.
Key words : fish fillet, immersion, concentration, packaging, storage, protein.

I. Introduction

Among the species of freshwater fish are now being developed and grown in the provinces of West Sumatra are Tilapia (*Oreochromis niloticus*). The potential of aquaculture land estimated area of 12,300 hectares [1]. This is because these fish easy life, fast breeding, the meat is white and it was quite tasty. Processing methods can be developed against the fish is a fish processing fish. Resullt fillet processing such as fillets of fish including food very quickly decompose (high perishable food). As perishable foodstuffs, then the quality of the fish must be maintained as much as possible to get into the hands of consumers. For that we need good handling and preservation and processing into products ready to be eaten but awetnya power longer. One way of processing that has long been known to the public is the curing of fish.

Fumigation is a technique of embedding and incorporating various chemical compounds of smoke into foodstuffs [2]. Fogging was intended to extend the shelf life of a material, but in line with the increase in public

acceptance of the product smoke then that goal began to turn to the flavor, which gives aroma and distinctive taste and prevents rancidity of the meat due to the oxidation of fat. Fumigation can be done traditionally or in modern [3]. Traditional fumigation can be done in the cold and heat by burning wood or sawdust, where the smoked fish direct contact with the smoke. While modern fumigation using liquid smoke (steam dispersion in the fluid as a result of condensation of smoke from wood pyrolysis) as media fumigation. Generally wider community, especially the coastal communities do fumigation with traditional fumigation techniques. Though the technique of curing it has a lot of shortcomings, among other things take a long time, is not efficient in the use of firewood, the uniformity of the product to produce color and flavor desired difficult to control, environmental pollution, and the most dangerous is the residual tar and hydrocarbon compounds polycyclic aromatic (Benzo(a)pyren) deposited in food that can be harmful to health. In areas producing smoked fish, in order to meet the source of the smoke (wood) many people who cut down trees, even be protective coastal mangroves were not spared from logging target. These circumstances make alternative use of firewood has to be considered as well as fogging technique was time to be replaced with modern fumigation.

The use of liquid smoke broader application to replace the traditional way of curing. With the provision of liquid smoke aroma smoke on fish would be more practical because only by spraying or dipping the fish in a solution of liquid smoke, followed by heating. The development of liquid smoke more rapidly in the preservation of foodstuffs, due to the costs required for timber and equipment manufacture more efficient smoke, harmful components can be separated or reduced before being used in food as well as the composition of the liquid smoke is more consistent for repeated use [4].

Modern fogging is fumigation with the gas phase (gas phase smoke) or fumigation with liquid smoke (liquid smoke). Fumigation with the liquid smoke made by soaking the product in liquid smoke that has been disbursed through the process of pyrolysis and distillation [4]. Fumigation this way can improve the quality of products in terms of health because of carcinogenic compounds such as benzo(a)pyren contained in the liquid smoke can be absorbed and reduced in number, while the tar can be separated by using sedimentation and filtration [5].

Some research on the production and use of liquid smoke has been carried out include the determination of the temperature and time of pyrolysis of rubber wood to produce liquid smoke quality [6], the study of raw materials cinnamon at a temperature pyrolysis 400^{o}C produce quality liquid smoke[7], the study wood sweet with a temperature pyrolysis of 400^{o}C at concentrations of 1500 ppm showed antioxidant supreme amounted to 35.091% [8], the determination of antibacterial properties of liquid smoke produced from several kinds of soft wood [9], the preservation of the tongue smoked with liquid smoke produced from teak [10] , result research Budaraga et al, [11] to get the dominant content of liquid smoke coconut husks, coconut shell and cinnamon contains acetic acid and phenol. Further research Budaraga et.al., [12] to get the cytotoxic properties (the ability to kill Artemia salina) liquid smoke cinnamon at 400^{o}C temperature pyrolysis of 19.048%. These studies all utilize hardwood and softwood separately. Whereas softwood with low lignin content will be very effective to extend the lasting power of fish and produce flavor which is not typical [13] when combined with other wood (hardwood).

Based on the above research, the cinnamon is ideal to use as a preservative. The results of further research Budaraga et al, [14] to get the purification of liquid smoke cinnamon on the distillation temperature of 140^{o}C have undetectable levels of benzo (a) pyrene. Further research Budaraga et al, [15] to get the liquid smoke toxicity cinnamon purified by precipitation during the 3-day 83.75%. Results antioxidant liquid smoke cinnamon in a manner different purification produces antioxidants that are strong enough (<50 ppm) Budaraga et al, [16]. Furthermore, the results of research Budaraga et.al., [17] to get the measurement results on the antibacterial properties of E. coli liquid smoke cinnamon purified by precipitation for 3 days resulted in inhibition diameter 34.129 mm / ppb. Their immersion in liquid smoke concentration cinnamon timely manner will affect the protein content during this time there is no information about it.

The next process followed by drying the fillets of tilapia resulting in decreased water levels expected product microbial activity is inhibited, resulting in a longer lasting power products. During this time the nature of the community is still traditional fish processing, fish fillet products in the form of beef jerky is usually not packaged properly so easily contaminated by microorganisms which will result in reduced power durable besides that do not pay attention shelf. Besides the water content of the product is still relatively high. To obtain a lower water content, then fillet products were not made in the form of a thick but in the form of thin slices. It

is intended that the liquid smoke cinnamon can more rapidly penetrate into slices of fillet of tilapia, as well as the drying process faster. With the form of the product in the form of thin slices of fillet, hoped no bones were shipped, all the edible parts and form a thin more attractive for consumers. Contamination with microbes and other damage can be prevented by packing with a plastic bag. It remains no information about the type of packaging and storage right on the protein content of tilapia fillet stuffed with liquid smoke. The results of the study [18] showed the absence of good packaging during storage. The purpose of this study to determine levels of protein smoked fillet of tilapia given combined treatment of liquid smoke concentration, soaking time, types of packaging and storage time are different.

II.Raw And Methods

The materials used for the manufacture of fish is tilapia fillets black bought at the market bottom of the crocodile with an average weight of 250 grams / fish, alcohol 70%, salt, water and liquid smoke cinnamon purified by distillation temperature of 140^{o}C. The tools used in this study are: a. Equipment for the manufacture of preservative solutions flask, glass beaker, beakers, pipettes, propipet and pengaduk.b. Equipment for the manufacture of fish filet was basins, pans, mixers, stainless steel knives, water heating, cutting boards, work desks, spray equipment, pan drainer, freezer, and analytical scales. c. Equipment for drying of tilapia fillets: briquette stove heat resistance [19], a drying oven tool length 240 x width 100 x height 80 cm measurement device 200^{o}C [20]. d. Equipment for packaging and storage: storage shelves, polyethylene, polypropylene plastic, paper labels, paper plates for a fillet. Another tool used in this study such as, refrigerator coolers, freezers, flask, cup petridist, electric stove, filter paper, oven, burette, incubators, ovens, porcelain dish, desiccator, filter, thermometer, erlenmeyer 125 ml and 500 ml, beaker, filter paper, soxhlet, test tubes, micro burette, pipette, pipette volumetric flask of 250 ml.

2.1.Metode Research

The experimental design used in this study using factorial pattern in a completely randomized design (CRD) is a combination of liquid smoke concentration with soaking time, types of packaging and storage in order to obtain 5 x 3 x 3 x 5 x 3 trial replications = 675 experimental units. The first factor consisted of 5 (five) level is the concentration of liquid smoke control, 5% and 10%, 15% and 20%; The second factor of soaking with liquid smoke is composed of three (3) levels ie soaking time 5 minutes, 10 minutes and 15 minutes; The third factor type of packaging consists of three (3) levels ie without packaging, packaging polyethylene (PE) and polypropylene packaging (PP) and the factor of the place of storage time (days) consists of 5 (five) levels ie 0,3,6,9 and 12 days. The observed data in the form of the protein content analyzed by analysis of variance on the real level of 5%, when dilanjutnya significantly different by Tukey's test at 5 percent significance level [21].

2.2.Implementation Research.

2.2.1.Preparation liquid smoke.

Before the pickling process fillet of tilapia with liquid smoke cinnamon purified by distillation temperature of 140oC first prepare liquid smoke subsequent dilution with distilled water. The concentration of preservative liquid smoke used is smokeless liquid (control), 5%, 10%, 15% and 20%.

2.2.2.Preparation fillet of tilapia and preservation with liquid smoke

The process of making fillets of tilapia and preservation with liquid smoke cinnamon well as packaging and storage done in this study are as follows: In the conduct of research activities begins with the preparation of materials and tools such as a desk, knives, cutting boards that have been sterilized with alcohol 70% and cinnamon liquid smoke that has been purified. Prepared aqudest (control), liquid smoke concentration of liquid smoke 5%, 10%, 15% and 20%, Tilapia been in fresh condition refers to the SNI [22] on the specifications of fresh fish and SNI [23] on the requirements of the raw material with the characteristics -ciri raw materials are clean, free of any odor indicating decay, is free of signs of decomposition and forgery, free from other natural properties that can reduce the quality and not harmful to health. Organoleptic characteristics of the raw material has a freshness: a) appearance: intact, convex eyes, bright white cutlet; b) The smell: specific fresh fish; c) texture: Solid, compact and elastic, with a weight of 250 ± 10 grams. As for how to manufacture fillets of tilapia as follows: Cultivated using fresh fish that has passed through the phase freezing (rigor mortis) and cleanliness is always maintained by weeding the scales of a fish, discarding the entrails, feces, and lining the wall of the

stomach is black, then do the washing up clean to remove any remaining dirt, blood, loose scales and slime. Already clean then performed an incision behind the gill fins to the back of the head; front heads toward keekor incision along the dorsal fin using a stainless steel knife and a knife made parallel so separated from the ribs when taking fillet.

Turn the fish, cut off the back fin gills until the head backward; The cut of the tail toward the head. Open the fillet by cutting towards the head with a knife close to the ribs, cutting through the bone of thorns. Furthermore fillet obtained immediately put into the freezer -20 ° C as soon as possible. To prevent a decline in quality, cleanliness fillet is always maintained and in working to make fillets have to really pay attention to sanitary aspects such as using gloves, head, working table knife would have been made sterile by sprayed and rinsed with alcohol before starting the job.

In this study using fish fillets in the form of block ie boneless fillets. Avoid contamination which can easily infiltrate into the meat tissue and muscle meat that has been open to the whole fish. In the process of handling for each stage of work to keep the fish stay fresh is to protect from the sun, wind, other heat source to increase the temperature of the fish and once made fillet put in the freezer. To reduce drip (water from the muscle tissue is lost in the frozen product melted) fillet do immersion in pure saline solution 15% for 20 seconds.

This fillet construction work done quickly but carefully to avoid spoilage, contamination and defects due to carelessness which may adversely affect the product and to anticipate these things put in feezer. Waste obtained from pemfilettan be removed from the processing to avoid contamination of the product.In blocks, fillets transported easily stored and handled SNI [24]. Furthermore, fish blocks are cut in the form of stick (size of ± 5 x 10 cm with a thickness of ± 2 cm) and are given treatment liquid smoke is a concentration of 5%, 10%, 15%, 20% and control (without liquid smoke) and combined with the long immersion different ie 5 minutes, 10 minutes and 15 minutes. After completion of the immersion, the fillet is removed and drained and winds up dry fillet surface. Fillet of tilapia further arranged on the shelves of the oven so evenly, and dried at 70 ° C for 6 (six) hours.

After the fillets of tilapia smoked dry due to heating, fillet cooled at room temperature for ± 20 minutes to cool placed in a clean container styreform and hygienic [25], and then inserted into the packaging polyethylene (PE), polypropylene (PP) and without packaging shall be retained and held at room temperature observations began days 0, 3 days, 6 days, 9 days and 12 days to protein content by the Method Kjedhal [26].

III. Result and Disscution

3.1. Protein Content

In the analysis of variance showed no real interaction on a combination of four treatments of soaking, the difference in concentration, types of packaging and storage of different ($P < 0.01$) in. The average value of the number of tilapia fillets protein in the treatment of different concentrations, dipping time and different types of packaging and different storage time can be presented in Table 1 below.

Table 1. Average protein content (%) fillet of tilapia based on differences in the concentration of liquid smoke, prolonged submersion, types of packaging and storage time is different.

Type of	Soaking (K)	Concentration (L)	Stoage time (S) day					Mean	Interaction
Packaging (B)	Time (minute)	Liquid smoke (%)	0 (S^0)	3 (S^1)	6(S^2)	9(S^3)	12(S^4)	L*S	L*S
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		0 (L^0)	66.667	63.000	63.000	59.000	60.667	62.467	3.533
	5 (K^1)	5 (L^1)	79.000	56.000	57.333	60.000	62.333	62.933	6.333
		10 (L^2)	62.000	61.000	61.667	63.000	65.333	62.600	-1.267
		15 (L^3)	58.333	58.000	62.000	58.000	63.000	59.867	-0.867
		20 (L^4)	66.333	56.000	56.000	58.000	63.000	59.867	2.067
	Mean 5 minute		66.467	58.800	60.000	59.600	62.867	61.547	
	Interaction (B^1*K*L)		-4.267	-2.400	-1.867	-0.800	1.067	-1.653	
		0 (L^0)	48.333	61.000	63.333	61.000	58.333	58.400	-4.533
	10 (K^2)	5 (L^1)	63.667	53.000	59.333	60.000	63.333	59.867	-0.600
Control		10 (L^2)	55.667	62.000	59.000	62.000	64.333	60.600	-3.000
(non		15 (L^3)	59.000	65.000	60.000	53.000	59.333	59.267	3.533
Packaging)		20 (L^4)	62.333	60.000	58.000	53.000	59.000	58.467	3.933
(KK)	Mean 10 minute		57.800	60.200	59.933	57.800	60.866	59.320	-0.293
	Interaction (B^2*K*L)		4.667	2.000	-2.000	-4.600	-0.533	-0.093	
		0 (L^0)	52.667	59.000	62.000	55.000	57.333	57.200	0.600
	15 (K^3)	5 (L^1)	55.333	59.000	60.000	56.000	63.000	58.667	-1.067
		10 (L^2)	66.000	56.000	63.000	56.000	62.333	60.667	2.733
		15 (L^3)	59.667	61.000	44.000	51.000	57.333	54.600	4.200
		20 (L^4)	64.333	60.000	61.333	51.000	57.333	58.800	5.867
	Mean 15 minute		59.600	59.000	58.067	53.800	59.466	57.987	-2.360
	Interaction (B^3*K*L)		5.533	0.800	-3.467	-2.600	-1.133	-0.173	
	Mean	0 (L^0)	55.889	61.000	62.778	58.333	58.778	59.356	-0.533
	konsentration	5 (L^1)	66.000	56.000	58.889	58.667	62.889	60.489	1.556
	liquid smoke	10 (L^2)	61.222	59.667	61.222	60.333	64.000	61.289	-0.511
		15 (L^3)	59.000	61.333	55.333	54.000	59.889	57.911	2.289
		20 (L^4)	64.333	58.667	58.444	54.000	59.778	59.044	3.911
	Interaction (L)		1.978	0.133	-2.444	-2.667	-0.200		
	Mean								
	soaking		61.289	59.333	59.333	57.067	61.066	59.618	
	Time (minute)								
	Interaction (B*K*L*S)		3.430	-0.100	0.967	2.900	1.700		
		0 (L^0)	66.667	64.333	61.333	65.000	65.667	64.600	0.400
	5 (K^1)	5 (L^1)	79.000	65.000	62.000	66.000	66.000	67.600	5.000
		10 (L^2)	62.000	64.000	57.000	69.000	69.000	64.200	-3.800
		15 (L^3)	58.333	65.000	63.000	63.000	62.667	62.400	-1.400
		20 (L^4)	66.333	62.130	64.000	64.333	63.667	64.093	0.493

	Mean 5 minute		66.467	64.093	61.467	65.467	65.400	64.579	4.512
	Interaction (B^1*K*L)		-4.267	-0.881	1.267	-0.867	-1.467	-1.243	
		0 (L^0)	48.333	62.000	62.000	67.000	66.333	61.133	-8.333
	10 (K^2)	5 (L^1)	63.667	58.000	60.667	66.000	66.000	62.867	-2.533
Packaging		10 (L^2)	55.667	58.000	64.000	68.000	68.000	62.733	-6.933
PP		15 (L^3)	59.000	59.333	65.000	66.000	65.667	63.000	-4.067
		20 (L^4)	62.333	52.000	64.000	59.000	58.667	59.200	0.000
	Mean 10 minute		57.800	57.867	63.133	65.200	64.933	61.787	0.605
	Interaction (B^2*K*L)		3.400	-3.433	-1.833	-3.000	-3.000	-1.573	
		0 (L^0)	52.667	58.000	52.000	61.000	61.000	56.933	-3.933
	15 (K^3)	5 (L^1)	55.333	57.000	52.333	62.000	62.000	57.733	-3.667
		10 (L^2)	66.000	65.000	62.000	63.000	62.000	63.600	1.800
		15 (L^3)	59.667	64.000	63.000	64.000	64.000	62.933	-1.733
		20 (L^4)	64.333	68.000	64.000	57.000	56.667	62.000	5.200
	Mean 15 minute		59.600	62.400	58.667	61.400	61.133	60.640	-3.907
	Interaction (B^3*K*L)		5.533	5.400	6.933	-1.200	-1.333	3.067	
	Mean	0 (L^0)	55.889	61.444	58.444	64.333	64.333	60.889	-3.956
	konsentration	5 (L^1)	66.000	60.000	58.333	64.667	64.667	62.733	-0.400
	liquid smoke	10 (L^2)	61.222	62.333	61.000	66.667	66.333	63.511	-2.978
		15 (L^3)	59.000	62.778	63.667	64.333	64.111	62.778	-2.400
		20 (L^4)	64.333	60.710	64.000	60.111	59.667	61.764	1.897
	Interaction (L)		1.978	0.262	3.289	-1.756	-1.978		
	Mean								
	soaking		61.289	61.453	61.089	64.022	63.822	62.335	
	Time (minute)								
	Interaction (B*K*L*S)		3.430	0.846	1.400	2.033	2.134		
		0 (L^0)	66.667	59.333	55.000	65.000	65.667	62.333	-0.600
	5 (K^1)	5 (L^1)	79.000	55.000	56.333	65.667	66.333	64.467	3.067
		10 (L^2)	62.000	45.667	54.000	69.000	68.667	59.867	-7.400
		15 (L^3)	58.333	64.000	60.000	62.667	62.667	61.533	-1.467
		20 (L^4)	66.333	65.000	63.000	63.667	64.000	64.400	1.266
	Mean 5 minute		66.467	57.800	57.667	65.200	65.467	62.520	1.680
	Interaction (B^1*K*L)		-4.267	4.067	3.933	-1.133	-1.400	0.240	
		0 (L^0)	48.333	60.000	52.667	63.000	65.000	57.800	-6.867
Packaging	10 (K^2)	5 (L^1)	63.667	64.000	53.000	66.000	66.000	62.533	-1.333
PE		10 (L^2)	55.667	62.000	60.000	68.000	66.333	62.400	-5.800
		15 (L^3)	59.000	65.000	60.000	65.667	64.000	62.733	-2.467
		20 (L^4)	62.333	66.667	66.000	58.667	59.333	62.600	-2.467
	Mean 10 minute		57.800	63.533	58.333	64.267	64.133	61.613	-0.507
	Interaction (B^2*K*L)		4.667	2.867	6.733	-1.800	-2.667	1.960	
		0 (L^0)	52.667	63.000	55.000	61.000	61.000	58.533	-2.933

	15 (K^3)	5 (L^1)	55.333	60.000	55.000	62.000	62.000	58.867	-3.067
		10 (L^2)	66.000	60.000	59.000	62.000	62.667	61.933	1.067
		15 (L^3)	59.667	62.667	69.000	64.000	62.667	63.600	-1.733
		20 (L^4)	64.333	64.000	66.000	56.667	59.000	62.000	4.066
	Mean 15 minute		59.600	61.933	60.800	61.133	61.467	60.987	-2.187
	Interaction (B^3*K*L)		5.533	0.933	7.200	-1.333	-0.667	2.333	
	Mean	0 (L^0)	55.889	60.778	54.222	63.000	63.889	59.556	-3.467
	konsentration	5 (L^1)	66.000	59.667	54.778	64.556	64.778	61.956	-0.444
	liquid smoke	10 (L^2)	61.222	55.889	57.667	66.333	65.889	61.400	-4.044
		15 (L^3)	59.000	63.889	63.000	64.111	63.111	62.622	-1.889
		20 (L^4)	64.333	65.222	65.000	59.667	60.778	63.000	2.755
	Interaction (L)		1.978	2.622	5.956	-1.422	-1.578		
	Mean								
	Soaking		61.289	61.089	58.933	63.533	63.689	61.707	
	time (minute)								
	Interaction (B*K*L*S)		3.430	-2.067	-1.567	2.034	2.000		

Description: Figures followed by different letters in the same row or column showed significant differences (P <0.05).

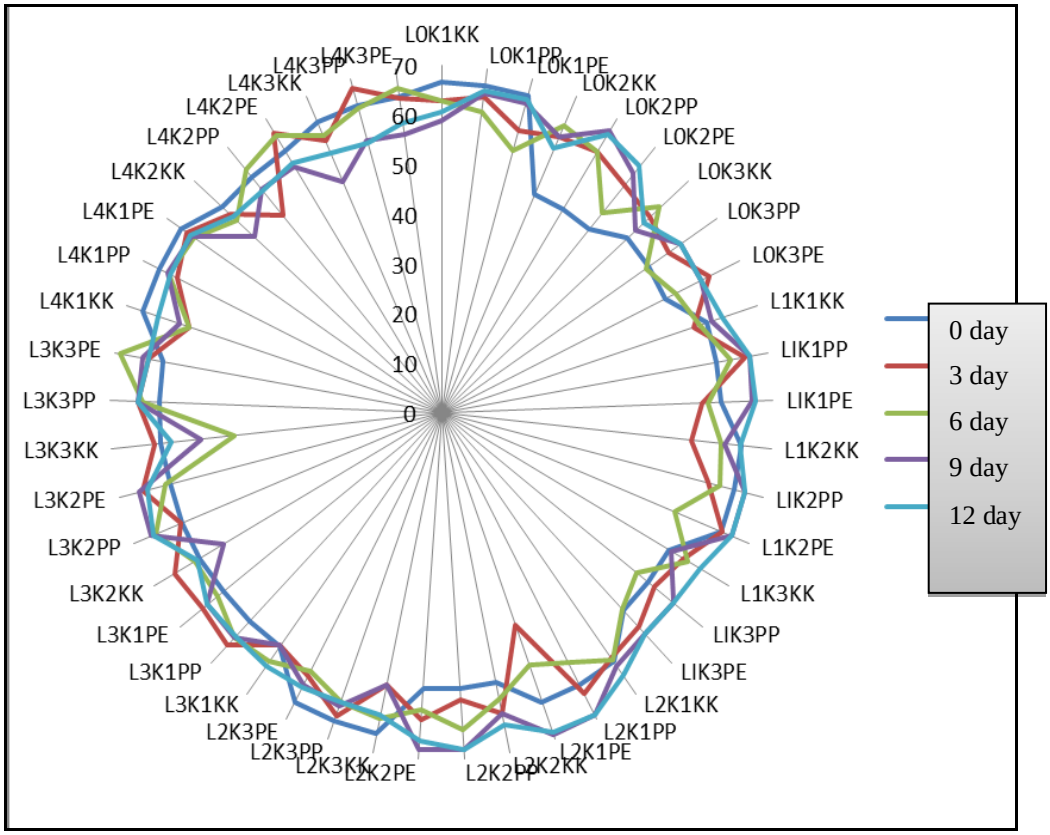

Figure 1. Average protein content (%) fillet of tilapia based on differences in the concentration of liquid smoke, prolonged submersion, types of packaging and storage time is different.

In Table 1 shows no interaction on the combination treatment differences in the concentration of liquid smoke, prolonged submersion, types of packaging, and storage time. This means that all four treatment factors together provide a response to the protein content. Values fourth interactions treatment of an average protein content of tilapia fillet is positive on the treatment concentration, soaking time, type of packaging with storage time 3 and 6 days and negatively storage 0, 9 and 12 days. Values of positive interaction means the four treatments showed the ability to give the same response to the protein content of tilapia fillets, whereas the mean value of negative interactions fourth factor is not the same response. Netx image Average protein content (%) fillet of tilapia based on differences in the concentration of liquid smoke, prolonged submersion, types of packaging and storage time is differentpresented in Figure 1.

The average value of the protein content fillet of tilapia as Table 1 and figure 1 show given treatment concentration liquid smoke 5% in the long immersion 5 minutes on without packaging, packaging polyethylene (PE) and polypropylene at storage time 0 days give the highest protein by 79% and Statistical test the interaction. The amount of protein fillet of tilapia obtained presumably because at the beginning of the storage, the condition of the fillet is still in good shape, so there are no signs of damage by microbes so that the protein becomes high. Conditions tilapia fillet protein levels lowest in 15 minutes soaking time, the concentration of liquid smoke 15 and 20%, without packing on the storage of 9 days by 51%. A decrease in the protein content without packed with storage conditions 9 days old submerged for 15 minutes on the condition of liquid 15 and 20% suspected in dried smoked fillet already given preservative liquid smoke will be affected by external environmental conditions. Storage time will affect water levels, especially in conditions not packed fillet. Their conditions without packaging fillets then be an increase in water content, so it will be easy to attack microbes that make the protein becomes lower. Damayanthi [27] states that the protein is very sensitive to heat and will change the chemical structure (denaturation) due to heating. Besides the higher the temperature and pressure used during the cooking process will make the raw materials used increasingly soft and destroyed, is caused by the increasing number of proteins are denatured protein so that the secondary bonding fragile.

Protein miofibril soluble salt, so to have this effect the elasticity required the addition of salt to 10%. The addition of salt is intended to remove water from the fish meat fillets that have been made [28]. The most important function in the addition of this salt is to release the myosin fibers of fish is very important for the formation of strong jellies. In addition, it is also used as a condiment or flavoring and aroma enhancer, but when used with high enough levels can alter the taste of food. Myofibril proteins can participate dissolved in the wash water along with the frequency of repeated washing due to the degradation of myosin chain. According Rahmawati [29], the value of protein soluble salt to freshwater fish tends to decrease with the increasing number of washes.

According to Winarno [2] protein is the main chemical compounds and the bulk of the fish meat. Fish protein is the largest component in the amount after water and a part that is very useful for humans. Results of research Refilda & Indrawati [30] has conducted fogging bilih fish using liquid smoke made from coconut shell with a pH of 2.75. Soaking bilih fish at concentrations of 5% liquid smoke for 2 hours to produce fish with color, taste, and smell are well-liked and has a protein content of 56.91%. Furthermore Marasabessy [31] research the use of liquid smoke on the cob. Swordfish once prepared and soaked in a salt solution, then soaked in liquid smoke concentration of 2% for 30 minutes. Smoked fish produced has a high protein content and levels of benzo (a) pyren undetectable.

Iv. **Conclusion**

1. There is a real interaction on a combination of four treatments of soaking, the difference in the concentration of liquid smoke, types of packaging and different storage time the protein content.
2. The combination of soaking 5 minutes, 5% concentration of liquid smoke with two types of packaging (polyethylene, polypropylene and without packaging) on the day of the storage 0 tilapia fillet smoked showed the highest protein content of 79 percent.

Acknowledgment

We would like to thank Directorate General of High Education, Ministry of Education, in correspond to Implementation Agreement of Competitive Research Grant, National Priority, Rector of Ekasakti University,

The Head of LPPM Ekasakti University, The Dean of Agriculture Faculty Ekasakti University, Laboratory team and staff that have provided help in this activity.

References

1. Anonim,2013. Kementerian Kelautan dan Perikanan RI.Jakarta
2. Winarno,F.G.1997.Kimia Pangan dan Gizi.PT. Gramedia Pustaka Utama. Jakarta.
3. Hadiwiyoto, S., P. Darmadji dan S.R. Purwasari. 2000. Perbandingan pengasapan panas dan penggunaan liquid smoke pada pengolahan ikan; tinjauan kandungan benzopiren, fenol, dan sifat organoleptik ikan asap. Agritech 20:14-19.
4. Maga, J. 1988. Smoke in Food Processing.Florida:CRCPress-Inc Boca Rotan.
5. Pszczola, D.E., 1995. Tour Highlights Production and Users of Smoke Based Flavors. Food Tech (1)70-74.
6. Darmadji, P., Oramahi, H. A., Haryadi dan Armunanto, R.2000. Optimasi produksi dan sifat fungsional asapcair kayu karet. Fakultas Teknologi Pertanian. UGM.Yogyakarta.Agritech. 20(3): 148.
7. Budaraga IK,Arnim,Yetti Marlida,Usman Bulanin,· 2016.Analysis Of Liquid Smoke Chemical Components With GC MS From Differenft Raw Materials Variation Production And Pyrolysis Temperature Level.International Journal of ChemTech Research Volume 9, Number 6.
8. Budaraga IK,Arnim,Yetti Marlida,Usman Bulanin,·2016. Antioxidant Properties of Liquid Smoke Production Variation of Pyrolysis Temperature Raw and Different Concentration. International Journal of PharmTech Research .Volume 9, Number 6 pp. 366-379.
9. Darmadji.P., 1996.Aktivitas antibakteri liquid smoke yang diproduksi dari berbagai macam limbah pertanian. Agritech.16 : 19-22
10. Sari, R.N., B.S.B. Utomo dan T.N. Widianto. 2006. Engineering equipment manufacturer liquid smoke for smoke fish production. J. Pascapanen dan Bioteknologi Kelautan dan Perikanan. 1 (1):65-73.
11. Budaraga IK,Arnim,Yetti Marlida,Usman Bulanin,·2016. Analysis Of Liquid Smoke Chemical Components With GC MS From Differenft Raw Materials Variation Production And Pyrolysis Temperature Level.International Journal of ChemTech Research Volume 9, Number 6pp 694-708.
12. Budaraga IK,Arnim,Yetti Marlida,Usman Bulanin,·2016. Liquid Smoke Toxicity Properties of Production of Raw Materials With Variation of Temperature and Concentration of Different. International Journal of ChemTech Research .Volume 9, Number 11 pp 171-187.
13. Tranggono, Suhardi, B. Setiadji, Supranto, Darmadji, P. dan Sudarmanto. (1996). Identifikasi liquid smoke dari berbagai jenis kayu dan tempurung kelapa. Jurnal Ilmu dan Teknologi Pangan I (2) : 15-24.
14. Budaraga IK, Arnim, Yetti Marlida,Usman Bulanin,·2016. "Characteristics of Cinnamon Liquid Smoke Produced Using Several Purification Techniques". American Journal of Food Science and Nutrition Research, ISSN: 2381-621X (Print); ISSN: 2381-6228 (Online) 2016; 3(2): 16-21
15. Budaraga IK,Arnim,Yetti Marlida,Usman Bulanin,·2016. Toxicity of Liquid Smoke Cinnamon (Cinnamon burmanni) Production of Ways For Purification and Different Concentration.International Journal of Scientific and Reseacrh Public (IJSRP) volume 6, Issue 7, July 2016.
16. Budaraga IK,Arnim,Yetti Marlida,Usman Bulanin,·2016. Antioxidant Properties of Liquid Smoke Cinnamon Production of Variation Purification and Different Concentration. International Journal of Scientific & Technology Research (IJSTR). ISSN ISSN 2277-8616.Volume 5 - Issue 6, June 2016.
17. Budaraga IK,Arnim,Yetti Marlida,Usman Bulanin,·2016. Antibacterial Properties of Liquid Smoke from the Production of Cinnamon How Purification and Concentration of Different. International Journal of Thesis Projects and Dissertations (IJTPD)Vol. 4, Issue 2, pp: (265-274) Month: April - June 2016.
18. Dewi, Neti H. 2001. Kajian Penggunaan Bilangan Thiobarbituric Acid (TBA) Sebagai Indikataor Penduga Umur Simpan Bumbu Masak Siap Pakai. Fakultas Teknologi Pertanian. IPB. Bogor.
19. Budaraga IK, Rizal Abu,Jamaludin, 2013. Kompor Briket Tahan Panas (Paten no.ID S0001244 tanggal 19 Maret 2013. Kementerian Hukum dan HAM Republik Indonesia.
20. Budaraga IK,Rizal Abu, 2014. Rancang bangun alat pengering hasil perikanan menggunakan kompor briket tempurung kelapa. Laporan Penelitian Lembaga Penelitian dan Pengabdian Kepada Masyarakat Universitas Ekasakti. Tidak dipublikasikan.
21. Steel R.G.D.and James H.Torrie, 1991. Prinsip dan Prosedur Statistik Suatu Pendekatan Biometrik. PT Gramedia Pustaka Utama Jakarta.

22. SNI, 2006. Standar Nasional Indonesia 01.2729.1-2006. Ikan Segar-Bagian 1: Spesifikasi. Badan Standarisasi Nasional. Jakarta.SNI,2006. Standar NAsional Indonesia 01-4103.2-2006.Fillet nila (Tilapia SP)persyaratan bahan baku. Badan Standar Nasional Indonesia.Jakarta.
23. SNI, 2006. Standar Nasional Indonesia 01-4103.2-2006. Fillet nila (Tilapia SP) persyaratan bahan baku. Badan Standar Nasional Indonesia. Jakarta
24. SNI, 2006. Standar Nasional Indonesia 01.2729.3-2006. Ikan segar-Bagian 3: Penanganan dan Pengolahan. Badan Standarisasi Nasional. Jakarta.
25. SNI, 1992. Standar Nasional Indonesia 01-2725-1992. Ikan Asap. Badan Standarisasi Nasional. Jakarta.
26. AOAC. 1994. Official Methods of Analysis of The Association of Analytical Chemists, Washington D.C.
27. Damayanthi E. 1994. Pengaruh Pengolahan terhadap Zat Gizi Bahan Pangan. Diktat Jurusan Gizi Masyarakat dan Kesehatan Keluarga. Bogor: Fakultas Pertanian, IPB.
28. Sedayu, 2004.Pengaruh lama penyimpanan baku daging lumatikan kurisi (Nemipterus nematophorus) terhadap mutu fisiko kimia surimi [skripsi]. Bogor: Program Studi Teknologi Hasil Perikanan, FPIK, IPB.
29. Rachmawati, I., Suranto.,dan Setyaningsih, R. 2005. Uji Anti bakteri Asam Laktat Asal Asinan Sawi Terhadap Bakteri Patogen. J. Bioteknologi 2 (2): 43-48.
30. Refilda, Indrawati. 2008.Penyuluhan PenggunaanGaram dan Liquid smokeUntuk Menambah CitaRasa dan Kualitas Ikan Bilih (Mystacoleuseus padangensis) Dari Danau Singkarak Dalam Meningkatkan Perekonomian Rakyat.DP2M Dikti Depdiknas Program IPTEKS. Fakultas MIPA Universitas Andalas
31. Marasabessy, I. 2007. Produksi Liquid smoke dari Limbah Pertanian dan Penggunaannya dalam Pembuatan Ikan Tongkol (Euthynnus affinis) Asap [tesis]. Bogor: Program Pascasarjana, Institut Pertanian Bogor.

*****