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Characteristic of *Pangium Edule Reinw* as food preservative from different geographical sites

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***Abstract*—** The objective of this study is to evaluate effectiveness of Picung (*Pangium Edule Reinw*) from two geographical sites (P1: Picung from Batusangkar; P2: Picung from Bogor) in preserving Mackerel (*Rastrellinger sp*) which is bought fresh from fishermen. Analysis conducted on fish includes: moisture content, pH, crude protein and anti-microbial properties in traditional fish recipe. The traditional recipe is *Pado fish* which consists of dried picung pulp, coconut and other spices. Mean were compared using student t-test and the level of significant different was determined at $p < 0.05$. The t-test uses 2-sample assuming equal variance analysis. The result shows that there is no significant different in moisture content, pH and crude protein between P1 and P2 ($p>0.05$). Cyanide level of both picung after submerged in water for 1 day is 17.5 mg/kg and 30.1 mg/kg. Further, according to SNI: 01-7152-2006 the level of cyanide acid after applies in traditional recipe is 1 mg/kg. *Salmonella sp* were detected negative during 72h storage. Cyanide acid was not significantly different between two samples ($p>0.05$). There is no significant different in effectiveness in preserving the food between (P1) and (P2). Total microbes ranged between 2.2 x104 - 7.0 $x10^4$ for 24h storage it is confirmed with SNI 01-2729.1-2006 total maximum microbe is 5.5 x 10^5 colony/gr. It may be some influence of traditional recipe prolong the preservation time.

***Keywords*— *Pangium Edule Reinw*, food preservative, geographical sites.**

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INTRODUCTION

The exploration of indigenous preservative agent for fish has been long discussion (Mangunwardoyo et al, 2008) (Yusra, et al, 2008) (Sukarti, 2011) (Chye, 2009) (Husni, 2007). Many of study were conducted to explore Pangium Edule Reinw where in Indonesia is called Picung. Meat of Picung seed contains flavonoids and tannins in the form of hydrogen cyanide which acts as an antibacterial. According to Hangesti (2006), 2 % meat of Picung seeds mixed with salt from total weight of fish could preserve fresh mackerel for 6 days without changing the quality.

Traditionally, Picung seed is used for antimicrobial product such as ketchup. The seeds of Picung consist of solid shell. The seed nucleus is white and solid containing seeds (endosperm), where the core of the seed shell bounded by a brown thin membrane. The seeds that have been clean from the flesh of the fruit and seed membrane (brown) however still have webbed seeds. Picung contains cyanide acid which is poisonous. However, local people know how to reduce cyanide acid; they are used to do a preparation before it consumed. Picung peeled and then boiled. Then Picung seed is immersed in flowing water and boiled again. After second boiling process, Picung seed are placed in tray and let fermentation begin. Further, after a week picung seed are wrapped with ash and there again let 40 days for fermentation. The fermentation process gives specific flavor and taste.

Antimicrobial in picung is cyabide acid and tannin (Burkill, 1935). Additionally, a group of chemical compound which has antimicrobial are fenol and fenolic, alcohol, halogen, metal components, colour agent, detergent, aluminium quartier compound, acid and bases, and gas Khemosterialan. Furthermore, according to Hildicth and William (1964), a plant which contains unsaturated fatty acid: Hydnocarpate, Khaulmagrat, Gorlat acid will have ati microbial properties. Likewise, picung have those properties because contains several unsaturated fatty acid and Cyanide acid.

Traditional recipe of West Sumatera cuisine use picung as preservative agent and flavors. According to preliminary survey, local people from Batusangkar, West Sumatera has thought that picung from their places are more effective in preserving the fish compare to other place. Consequently, local people are depending on local resources and furthermore the price of picung depending on the availability on local resources. This study is aiming to answer the doubt of local people whether picung has significantly differs in preserving the fish or maybe their recipe is differs and lead to better preserving the fish.

MATERIALS AND METHODS

A. Materials

Picung were collected from Batusangkar, West Sumatra (P1) and Bogor, West Java (P2) dried and submerges in water for a day, and then Picung were dried once again. Each sample from different sites was separately stored in plastic and kept until required analysis. The research was categorized in two steps, first characterized the Picung, second step, to assay the antimicrobial activity.

Mackerel (*Rastrellinger sp)* brought fresh form the fishermen. The traditional *Pado* fish are prepared by using dried Picung pulp. Tuna fish are more preferable by the people. The preparation begins with mixing picung pulp and coconut pulp and left brooded for 3-5 days and covered by banana leaves. After 3-5 days the mixture becomes brownie. Picung preparation start from withering of picung meat fruit, then shell and meat separation of grains, later meat beans dried under the sun until dry. At the same time coconut pulp are prepared and start with grated coconut pulp, pulp dried under the sunshine until dry. Fish are prepared and washed.0.5 kg seeds of Picung, 0.25 kg grated coconut pulp and 0.5 kg fresh fish, mixed into a tray and then covered with banana leaves, leave it for 3-5 days, and then the fish was become *Pado*.

B. Moisture content and Crude Protein

The samples were analysed for composition (Moisture content (AOAC, 1999)) and crude protein (CP). The micro *Kjeldhal* procedure was used for the determination of protein while the *Schweider* and flat procedure was used for determination of carbohydrate. Crude fat was estimated by method describe by Orborn and Voogt (1978).

C. Cyanide acid Analysis

Cyanide content was analysed using the method developed by Ikediobi (Ikediobi et al, 1980) cyanide Solution was extracted from 2g or ground sample with 15 ml of 0.1 M Sodium Phosphate buffer (pH 6.8) with thorough shaking using a mechanical shaker for 3 minutes. The mixture was then centrifuged and resulting supernatant removed by filtration. To 0.4 ml of the extract was added 1.6 ml of 0.1 M sodium phosphate buffer to give a total volume of 2 ml and 4 ml of alkaline solution. The tube was stopped and incubated in a water bath at 95°C for 5 minutes. The solution was read in the spectrophotometer at 490.

D. Anti-microbial analysis

Salmonella contamination analysis is using medium Salmonella Shigella Gel (SS). Calculations based on the calculation of SPC. Calculation of total plate count 5g of fish introduced into Erlenmeyer sample containing 45 ml physiological saline solution and then shaken, to obtain 10-1 dilution 1 ml was taken and added to 9 ml physiological saline solution and shaken, to obtain 10-2 dilution. Pipette 1 ml of each dilution into a petri dish, 12 ml of media in order. Driven petri dish on the table in a circular motion and let it solidify at room temperature, and then incubated at 30°C - 35°C for 18-24 hours in a reverse situation. Salmonella test is performed in several stages: phase propagation; A total of 1g (1 ml) of liquid or solid samples 10g put in 9 ml or 10 ml enrichment medium (Galantine F or Galantine Cysteine SC) Broth Tetrahionate to obtain the dilution of approximately 1:10. Incubation temperature of 35ºC while the long incubation period of 12-16 hours. Phase selection and isolation: the tubes showing positive growth enrichment directly streaked on selective media, namely Salmonella-Sigella Gel. Etching done in quadrants so that it will grow colonies separate, incubation carried out for 18-24 hours at 35ºC. The incubation Growing colonies can be seen from the appearance of a turbid medium or clear.

E. Statistical analysis

Mean were compared using student t-test and the level of significant different was determined at $p < 0.05$. The t-test uses 2-sample assuming equal variance analysis.

RESULTS AND DISCUSSIONS

A. Characteristics

Based on analysis of protein content, moisture content, pH and antimicrobial activity, the result can be shown as table 1 below:

Table1
Characteristic of fish after mixed with Picung from Batusarsangkar (P1) and Bogor (P2)

Characteristic	P1	P2
Moisture content	60.12 %	58.14 %
pH	6.36	6.43
Crude Protein	23.33%	27.85%
*Salmonella sp.**	Negative	Negative

* SNI: 01-2332. 2-2006.

From this data we can see that moisture content, pH, Crude Protein and antimicrobial activity is effectively similar giving by both samples. Moisture content is dominant feature in fish with almost 70-80 % from (w/w). During processing, Moisture content gradually decreased due to evaporation and absorption of coconut pulp and picung pulp. During the storage, metabolic reaction will lead the decreased of moisture content as well.

Degradation of protein starts with breakdown of dipeptide, amino acid, tri methyl amino oxide and other nitrogen compound. This degradation occurred because of fish has less tendon and this tendon is easily degraded.

According to Muchtadi (2010), pH of fish ranged between 6.4 -6.6. This result of this study indicate that pH of fish are not changing during application of both sample. Adawiyah (2008) argued, fish become spoiled if pH higher than 7. During addled time chemical compound is formed such as ammonia, tri methyl ammine, and other volatile compound.

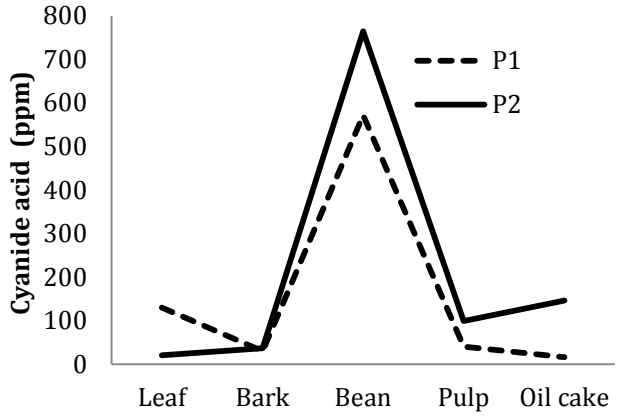

Fig.1 Comparison Cyanide acid (ppm)

Cyanide acid from leaf, bark, bean pulp and oil cake are very differs. The highest content of cyanide acid was in bean of picung whereas meat of picung lied. According to t-test with 2-sample assuming equal variances the result show that p value two tail is 0.75 which is higher than 0.05. This mean the cyanide levels do not differ and has large enough to be significant under the condition of the test.

Cyanide acid is a fatty acid with no colour and soluble in water, ethanol and ether. This chemical compound normally found in fruits and normally bounded with glycoside, cyanide acid were produced by enzyme ginokhardase during metabolism (Wong, 1989). Cyanide acid is highly toxic but this compound can be easily removed since it has soluble in water feature and other advantages this compound can be easily evaporates at temperature 26° C. Simple heating or washing cyanide acid is leached. The maximum cyanide acid in the product that contains nuts and tuber according to SNI 01-7152-2006 is 50 mg/kg. Cyanide level of both picung after submerges in water for 1 day is 17.5 mg/kg and 30.1mg/kg. Then, the level of cyanide acid in food product according to standard is 1 mg/kg which is applies in traditional recipe is 1 mg/kg.

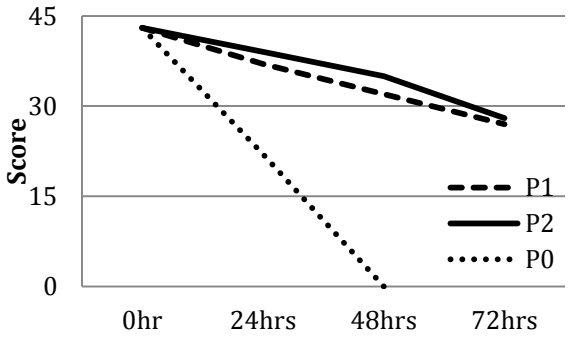

Fig.2. Scoring of fish freshness
P0 : Control P1: Fish with Picung from Batusangkar P2: Fish with Picung from Bogor
(0-15: spoiled; 16-30: moderate; 31-45: Fresh)

Observation to fish freshness according to SNI 01-2729.1-1996 includes mucus, odour, and texture. This observation categorized into three different groups which is 0-15 is spoiled, 16-30 is moderate and 31-45 is fresh. Fish is observed from 0hr to 72hrs. There is declining freshness compare to control.

Furthermore, t-test with 2 sample assuming equal variance the result of freshness scoring of fish after applied with picung show that the p value is 0.85 which is higher than 0.05. This means there is no significant difference between picung from Batusangkar (P1) and Picung from Bogor (P2) preserving the fish.

B. Anti-microbial

Total microbes ranged between 2.2 $x10^4$ - 7.0 $x10^4$ for 24h storage it is confirmed with SNI 01-2729.1-2006 total maximum microbe is 5.5 x 10^5 colony/gr.

According to analysis there is no *salmonella sp*. Until 48h, however approaching 72 h *salmonella sp* is not detected. *Salmonella sp* can grow at temperature ranged from 5-47 °C and optimum grows at temperature ranged from 35-37 °C. Some cells can also survive in chilling temperature. Salmonella preferably live in pH 4.1 – 9.0 and the optimum pH ranged from 6.5 – 7.5. In pH below than 4.0 and higher than 9.0 *Salmonella sp* will be lifeless.

Antimicrobial in Picung are cyanide acid and tannin (Burkill, 1935). The other features of those components are the ability in curing leprosy, scabies and other skins problem. Hildicth and Williams (1964) and also has role in preserving. Furthermore, Indriyati (1987) reported that Pangium edule Reinw prevents bacterial activities in Fish which are Bassilus sp. Micrococcus sp. Psedomonas sp. and coliform. Micrococus sp is very sensitive bacteria and coliform is very resistance. Extract of picung is 3 % (b/v) can prevents four of those bacteria whereas in 5% can be effective as bactericidal.

Picung are expected contents tannin, beside tanat acid. Picung can prevent of microbial growth as well, beside that the 1,2 benzendikarboksilat, dietyl ester and 9-octadekanoat acid (Mangunwardoyo, 2008). Tannin and other fatty acid can act as antimicrobial agent. Based on Chye & Sim (2009), there are relationship between phenolic content and its biology activity especially anti-oxidative and antimicrobial activities Murniyati & Sunarman (2000) reported that the stage of bacterial decompositions bacterial action begins at about the same time with autolysis. The bacteria damage the fish more severe than the damage caused by enzymes. In phase autolysis will usually be followed by the increase in the number of bacteria. Since the decomposition enzymes during autolysis process are a very suitable medium for the growth of bacteria and other microorganisms (Afriyanto & Evi, 2005).

Furthermore, Andarwulan (2000) argue that natural microbial fermentation of Pangium edule Reinw. seeds following postharvest heat treatment was suspected based on enhanced activity of selected enzymes linked phenolic mobilization. During fermentation processing metabolites including lipids, protein,and carbohydrates were mobilized. Among the fatty acids present in lipids, oleic and linoleic acids did not change but theconcentration of the antioxidant,ɣ-to-cotrienol increased. Glutamic acid was the

major amino acid that was hydrolyzed from protein, which may contribute to flavour. Among other metabolites, carbo hydrates were partially hydrolysed and may have contributed to the fermentation process and microbial growth. Total phenolics substantially increased without concurrent increase in antioxidant activity. Phenolics may contribute partially to oxidation stability, flavor and to some extent antimicrobial activity.

CONCLUSIONS

Based on statistical comparison the characteristic of Picung from Batusangkar (P1) and Bogor (P2), this paper has given an account of:

1. There is no significant different in cyanide acid compound between Picung from Batusangkar (P1) and Bogor (P2).
2. There is no significant different the effectiveness in preserving the food between picung from Batusangkar (P1) and Picung from Bogor (P2)
3. It may be some influence of traditional recipe prolong the preservation time.

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