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# PROCEEDING

## THE INTERNATIONAL CONFERENCE ON MATHEMATICS, SCIENCE, EDUCATION AND TECHNOLOGY

ICOMSET 2015

*Education, Mathematics, Science and Technology for  
Human and Natural Resources*

**October 22, 2015**

Inna Muara Hotel and Convention Center  
Padang, Indonesia

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Faculty of Mathematics and Science  
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FACULTY OF MATHEMATICS AND SCIENCE  
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# *Certificate*

Is Hereby Given To

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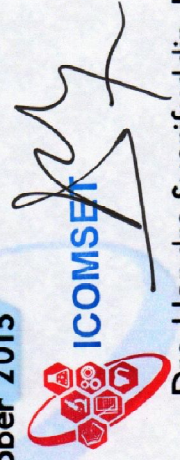
**As Presenter**

at "The International Conference on Mathematics, Science, Education and Technology"  
in Padang, West Sumatera, Indonesia

22<sup>nd</sup> October 2015



**Prof. Dr. Lufri, M.S.**  
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# The International Conference on Mathematics, Science, Education and Technology

(ICOMSET 2015)

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Technology for Human and Natural  
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## BACTERIOLOGICAL TEST OF SOME COOKED GRINDING SEASONINGS IN THE PASAR RAYA PADANG

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### ABSTRACT

The modern life makes the habit patterns changing for using natural products from direct processing by self to fast processing product in the market, but it also can be served quickly, safety, and healthy. The busyhousewife who works as a career woman caused lack of time to grind seasoning by themselves. In the Pasar Raya, a market in Padang city, was found the quality of some natural products that processing to be grinding seasonings that could not be cleaning and hygienic for public consumption category. This study aimed to test bacteriological some cooked grinding seasonings that sell in Pasar Raya Padang. This research was observed from June to July 2014 in the Laboratory of Microbiology Department of Biology, Faculty of Mathematics and Natural Sciences, State University of Padang. This study was observed on four samples of cooked grinding seasonings (onion, galangal, garlic and ginger) from different points of market, with using the descriptive methods to observed there is or not the bacteria *Escherichia coli* and Coliform. Most Probable Number (MPN) method was used for sample processing in laboratory with combine 5:1:1. The results counting of bacterial colonies in the total sample of some cooked grinding seasonings that sell in Pasar Raya Padang was found variation of total bacteria in each sample. The grinding onions contain bacteria  $59 \times 10^5$  cfu/ml (sample A),  $63 \times 10^6$  cfu/ml (sample B) and  $47 \times 10^5$  cfu / ml (sample C). The grinding galangals contain bacteria  $38 \times 10^5$  cfu/ml (sample A),  $87 \times 10^5$  cfu/ml (sample B) and  $45 \times 10^5$  cfu/ml (sample C). The grinding garlics contain bacteria  $123 \times 10^7$  cfu/ml (sample A),  $83 \times 10^7$  cfu/ml (sample B) and  $113 \times 10^7$  cfu/ml (sample B) and the grinding gingers contain bacteria  $67 \times 10^5$  cfu/ml (sample A),  $103 \times 10^5$  cfu/ml (sample B) and  $74 \times 10^5$  cfu/ml (sample C). The MPN value of *Escherichia coli* and Coliform from all food grinding seasonings in Pasar Raya Padang was poor in cleaning and hygienic quality. The cooked grinding seasoning that sell in Pasar Raya Padang was not fulfill the eligibility requirements for consumption. All samples of food grinding seasoning that tested was contaminated by *Escherichia coli* and Coliform bacteria and with poor quality based on MPN values.

**Index Terms-** Bacteriological test, cooked grinding seasonings, MPN value

### 1. INTRODUCTION

The modern life makes the habit patterns changing for using natural products from direct processing by self to fast processing product in the market, but it also can be served quickly, safety, and healthy. As the development of technology, the seasoning instant products are delighted by people because simple, quickly, and inexpensive. One is the raw material that is processed into material that has been grinded. Based on the results of market surveys that have been conducted on traders of the cooked grinded seasonings in Pasar Raya Padang, they often have not sold out in one day. The traders generally keep the rest in their stalls only in a closed container without any ice, generally the containers are plastic buckets and sacks. Although the placement of ground seasonings in a sealed container that could reduce dust and microbes contamination during storage, but the room temperature conditions without ice could not inhibit decomposed microbial growth during storage, but it was ineffective to inhibit damage of seasonings.

In the Pasar Raya was found in quality management of cooked grinded seasonings could not be categorized cleaning and hygienic seasonings for public consumption. In fact such as peeling, washing is not perfect, use the same water over and over again

for the next wash seasoning, there were also traders who do not wash it first seasoning and spice merchant stalls adjacent to the merchant broilers.

Foodstuffs could be contaminated by microorganisms before harvesting or cutting (primary contamination) or after harvesting or cutting (secondary contamination). Secondary contamination could be occurred during the processing, selling and preparation. The procedural food storage during treatments processing and selling was the main thing in determining the safety and quality of microbiological aspects [1]. Sanitizing indicator bacteria are bacteria that the presence in the food that indicated the water or food was contaminated by human feces [2]. Waterborne bacteria that commonly live in duct digestion and excreted through feces [3]. Sanitizing indicator bacteria is bacteria that are generally prevalent and live in the human gut. Thus, the presence of these bacteria in water or food never had contact with the feces derived from human intestine and therefore may contain other harmful pathogenic bacteria.

*E. coli* is one of a group of bacteria that is avoided in the presence of an object that is associated with human interference, even though it came from precisely these bacteria from human feces. Other

species of this group, among others, are included *Aerobacter* and *Klebsiella*. Based on the source and characteristic bacteria, the group of *E. coli* are divided into two groups, namely *E. coli* fecal such as *Escherichia* truly derived from human feces, and *E. coli* non-fecal likes *Klebsiella* and *Aerobacter* that does not come from human feces, but may from other sources [4]. The *Escherichia coli* as an indicator of biological contaminants in the presence of objects (water, foodstuffs, etc.) that associated with human interference, and it is not expected. Because of the presence of this bacteria group on an object indicates that the object has been contaminated/subjected by fecal matter (stool, stool or feces) [4].

Some specific microorganism, especially bacteria and microalgae, its presence can be used as a parameter to the presence of organic pollutants. The presence of faecal matter (from faeces) in the water can be seen in the presence of coliform bacteria group [4]. Coliform bacteria belonging to the family *Enterobacteriaceae* are Gram-negative, rod-shaped, ferment lactose, facultative anaerobic and optimum temperature of  $37^\circ\text{C}$ . These bacteria is used until now as an indicator of the level of sanitizing food products and a drink that consumed by animals and humans [5]. Suriawiria [4], explains that the presence of Coliform as a natural indicator in determining the level of pollution caused by these bacteria-borne bacterial pathogens simultaneously along with fecal matter. Its presence is not so dangerous, but when it is found in a large population, estimated to be potentially pathogenic bacteria.

The tests to detect Coliform bacteria, using selective and differential media greatly help efforts to detect water proofing Coliform organisms. In this research consisted of three steps, namely test estimators (Presumptive Test), test the amplifier (Confirmed Test), and the complementary test (Test Completed) [3]. In the increased activity of life, the Indonesian people generally required the practice everything, including the fulfillment of the needs of the processed material. The cooked grinded seasonings were one of the chosen alternatives to need in the kitchen. With respect to the maximum limit microbial contamination in food, the authors conducted a study to determine how the feasibility and quality of the cooked grinded seasonings. It was closely related to hygiene and the source of water that was used in the processing of ground seasonings. This study aimed to test bacteriological of some cooked grinded seasonings that sale in Pasar Raya Padang.

### 2. METHODS

This research was observed from June to July 2014 in the Laboratory of Microbiology Department of Biology, Faculty of Mathematics and Natural Sciences, State University of Padang. This research was conducted with descriptive method was to see whether or not *E. coli* and Coliform bacteria in

samples of ground seasoning Onion (*Allium cepa*), Galangal (*Alpinia galanga*), Garlic (*Allium sativum*) and Ginger (*Zingiber officinale*). For sample processing in the laboratory used a method MPN (Most Probable Number) with combination 5: 1: 1. The tools were used the incubator, water bath, autoclave, hot plate, spritus lights, pumpkin erlenmeyer, measuring cup 100 ml, test tubes, petri dish, pipette measure, the Durham tube, *sengkelit* (OSE) and the digital camera as a documentation tool. The materials were used media Lactose Broth (LB 1 and 2), Brilliant Green Lactose Broth (BGLB), Nutrient Agar (NA), Endo Agar (EA), Alcohol 70%, minced ginger and distilled water.

Sample some herbs grinding randomly purchased by 3 samples at different points of sale for each market Raya Padang. Each sample was purchased as much as 100 g, and then taken to the laboratory for analysis. 1 ml samples were taken, and then inserted into a test tube containing 9 ml of sterile distilled water. The dilution was using a vortex until 8-10 times dilution. 1 ml dilution pour plate implanted with medium NA into petridish, which instilled a result of the dilution of 5-10 to 8-10 times dilution and incubate for 24 hours at room temperature. Then count the number of colonies that exist by using a colony counter. After incubation, the total count of bacteria (BO) which grow on the medium Nutrient Agar, which ranges between 30-300 colonies on the last dilution series. The total of bacteria was calculated using colony counter. The numbers of bacteria carried by observing the numbers of tubes of positive test results, estimation, affirmation and complementary. Furthermore, the numbers of bacteria from each tube were positive in the match with MPN.

The data were analyzed descriptively by the presence of coliform bacteria bacteriological test some cooked grinding seasonings from market Raya Padang. Data obtained by looking at the Test Estimation (presumptive test) and compared with the MPN table 5: 1: 1. If you have obtained the index MPN per ml per 100 ml of the sample that followed by determining the quality of the sample.

### 3. RESULT AND DISCUSSION

The results of bacteriological tests have been done on several samples of cooked grinding seasoning that sold in Pasar Raya Padang, was showed total counting bacterial colonies on a few samples of cooked grinding seasoning with varying amounts (Table 1).

Table 1. Total Bacteria in the cooked grinding seasoning sold in Pasar Raya Padang

No.	Seasoning	Sample	Total Bacteria (cfu/g)
1	<i>Allium cepa</i>	A	$59 \times 10^5$
		B	$63 \times 10^6$

2	<i>Alpinia galanga</i>	C	47 x 10 <sup>5</sup>
		A	38 x 10 <sup>5</sup>
		B	87 x 10 <sup>5</sup>
3	<i>Allium sativum</i>	C	45 x 10 <sup>5</sup>
		A	123 x 10 <sup>7</sup>
		B	83 x 10 <sup>7</sup>
4	<i>Zingiber officinale</i>	C	113 x 10 <sup>7</sup>
		A	67 x 10 <sup>5</sup>
		B	103 x 10 <sup>5</sup>
		C	74 x 10 <sup>5</sup>

In the table 1 it can be seen samples of grinding onion contained bacteria with number 59 x 10<sup>5</sup> cfu / ml (sample A), 63 x 10<sup>6</sup> cfu / ml (sample B) and 47 x 10<sup>5</sup> cfu / ml (sample C). The grinding galangal contained bacteria with the number 38 x 10<sup>5</sup> cfu / ml (sample A), 87 x 10<sup>5</sup> cfu / ml (sample B) and 45 x 10<sup>5</sup> cfu / ml (sample C). The grinding garlic contained bacteria with the number 123 x 10<sup>7</sup> cfu / ml (sample A), 83 x 10<sup>7</sup> cfu / ml (sample B) and 113 x 10<sup>7</sup> cfu / ml (sample C) and on the grinding Lengkuas contained bacteria with the number 67 x 10<sup>5</sup> cfu / ml (sample A), 103 x 10<sup>5</sup> cfu / ml (sample B) and 74 x 10<sup>5</sup> cfu / ml (sample C).

This can be caused by the processing of seasoning ingredients not washed with running water, in a spice mill that added water, the equipment is not clean, which is less hygienic storage and merchant stalls adjacent to the cooked grinding seasoning stall chicken traders. Kartina[6], most traders do not wash the equipment with clean water, do not drain the appliance clean cloth and did not wash his hands before the process.

Broadly speaking, the total bacterial colonies that was obtained can be caused by various sources, among others, can be derived from the raw materials, storage management and unhygienic as well as the water used for washing the same water over and over, and grinding tools used are not clean. Rosaria[7], merchants selling cooked grinding seasonings in new containers and placed in a plastic bag when the consumer buys. The cooked grinding seasoning container was usually made of plastic such as the basin without the lid, it could provide a great chance of contamination. Buckle [1], the way the food storage during various treatment processes and the level of sales is the main thing in determining the safety and quality aspects of bacteriology. Value MPN Coliform and *Escherichia coli* on some cooked grinding seasonings sold in Pasar Raya Padang can be seen in Table 2.

In the estimation test of this research, all samples cooked grinding seasonings have positive results that marked by characteristic Lactose Brouth medium becomes turbid and contained gas bubbles in the Durham tube. The Durham tube serves captured gases that occurred as a result of fermentation of lactose to acid and gas, CO<sub>2</sub> gas as a result of the expenditure of carbohydrates and amino acids [8]. Coliform bacteria are bacteria that are able to ferment carbohydrates, whereas in this medium carbohydrates only in lactose.

This means murky medium and the presence of gas bubbles indicates the growth of bacteria that are able to ferment lactose.

Estimation of the test, the tubes that produced gas bubbles followed by a confirmation test. Confirmation test performed if the results of the estimation test that used a tube containing Lactose Broth media was found any gas bubbles. At the confirmation test showed that the difference between the temperature of incubation at 37o to 44oC. The tube produced gas bubbles that indicated the existence of coliform bacteria in all samples taken. Suspected of air or gas bubbles was the resulting of the activity of coliform bacteria that fermented lactose. Widiyanti and Ristiati [2], coliform bacteria were used as indicators of pollution, waste and the conditions were not good for water, food, dairy and other products. The presences of coliform bacteria in foods/drink were showed the possibility of microbes that are enteropathogenetic or toxigenic that were harmful to health. Nisa [9] stated in her work on the analysis of steeping tea drink that coliform MPN value based on the test resulted proving the assertion of CO<sub>2</sub> gas bubbles the fermentation of lactose in Durham tubes.

Table 2. Value MPN Coliform and *Escherichia coli* on Some Food SeasoningsMilled sold in Pasar Raya Padang.

No.	Seaso ning	Sample	NPM/100 ml			
			Kolifo rm	Result	<i>E. coli</i>	Result
1	<i>Allium cepa</i>	A	240	Ugly	38	Ugly
		B	240	Ugly	240	Ugly
		C	240	Ugly	240	Ugly
2	<i>Alpini a galan ga</i>	A	27	Ugly	96	Ugly
		B	21	Ugly	38	Ugly
		C	240	Ugly	96	Ugly
3	<i>Allium sativu m</i>	A	240	Ugly	27	Ugly
		B	29	Ugly	96	Ugly
		C	96	Ugly	4	Ugly
4	<i>Zingib er officin ale</i>	A	27	Poor	38	Poor
		B	96	Ugly	96	Ugly
		C	16	Ugly	12	Ugly

*E. coli* could ferment lactose, the presence of acid and gas in the tube were inoculated after 48 hours of incubation at 37° C was an approximate evidence for the presence of *E. coli* and thus, contamination of dirt. If the lactose was not fermented, it assumed that *E. coli* of the sample was free from fecal contamination [10]. Based on the test results and the estimation of the assertion, it was evident that there could have taken samples of grinding seasonings was contaminated by coliform bacteria species and *E. coli*. The assertion of the test, the tubes was detected to contain coliform and *E. coli* bacteria in all samples grinding seasonings reinforced by macroscopic observation at Completion Test that used the medium

Endo Agar (EA). In this research showed that quite clear, that colonies of *E. coli* on Endo medium order for colored metals and coliform lightning pink. The results of research that has been done [11], about the qualitative isolates of *E. coli* that were visible colonies that growth on the medium Endo order lightning red metal.

Pink colony was suspected to be a group of coliforms. Because of this colony were still able to grow in media Endo order while not producing colonies such as *E. coli*. Megahati [11] said Endo order for a medium that was selective against gram-positive bacteria but was very good for the growth of gram-negative bacteria. Each of these bacterial colonies could be identified from the color inflicted on Endo medium order such as *E. coli* will produce pink or shiny metal.

Food hygiene and safety is the most important requirement is shared by all the food that will be consumed by all of people. The guarantee food security is a consumer right, because food is a basic need of consumers. The importance of maintaining the quality and hygiene of a food, that consumers avoid foods that can be harmful to health, because the consumer must be keen in purchasing. So that people avoid foods and drink that can be harmful to health, the government has set the standards and requirements for food and drink feasible and safe for consumption by the NII in the community. In this case was expressed in Law Number 23 Year 1992 on Health Article 21 paragraph 1 "Observation of food and beverages held to protect the public from food and drinks that do not meet health requirements" [12].

In order to avoid diseases that could endanger the health, should be the food we eat should be protected from bacterial pathogen which at times can harm us. Total plate count is still high is also not in accordance with the terms that have been determined. Where the number of germs or bacteria limits for food that is processed according to the Food and Drug Monitoring Agency (BPOM) of the Republic of Indonesia on the maximum limit microbial contamination in food HK.00.06.1.52.4001 numbers in 2009, concerning the food mentioned that food standards for the number of colonies bacteria / gram sample is 1 x 10<sup>4</sup>.

#### 4. CONCLUSION

1. The cooked grinding seasonings that were sold in Pasar Raya Padang did not have the eligibility requirements for consumption. In accordance with the decision of the Minister of Health No. 1098/Menkes/SK/VII/89 on the limit microbial contamination in food, and BPOM Republic of Indonesia on the type and maximum limit microbial contamination in food HK.00.06.1.52. 40011 No. 2009.

2. All samples of cooked grinding seasonings that tested was contaminated by Coliform bacteria and

*Escherichia coli* were considered ugly by MPN values obtained results.

#### 5. SUGGESTION

It is hoped that the government can conduct surveillance and further review of the processing of cooked grinding seasoning up to the society.

#### 6. LITERATURE

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FIGURES



Figure 1. Resulting test of coliform (a) and *E. coli* (b) in the grinding onion (*Allium cepa*).

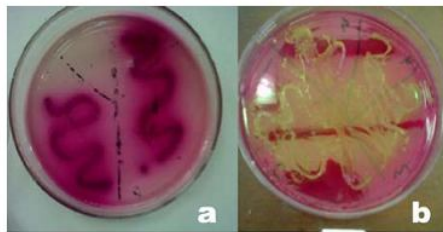


Figure 3. Resulting test of coliform (a) and *E. coli* (b) in the grinding *Allium sativum*



Figure 2. Resulting test of coliform (a) and *E. coli* (b) in the grinding Galanga (*Alpinia galanga*)

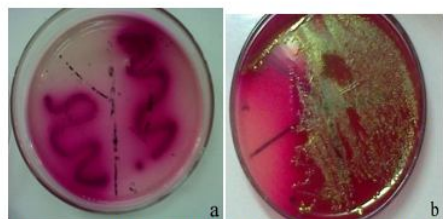


Figure 4. Resulting test of coliform (a) and *E. coli* (b) in the grinding *Zingiber officinale*