PROCEEDING

Food Globalization:
New Technology in An Era of Change

The 10th National Student Conference on food science & technology

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Unika SOEGIJAPRANATA

Proceedings

The 10th National Student Conference

Food Globalization : New Technology in An Era of Change

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PLENARY SESSION

FOOD PRODUCT DEVELOPMENT

FOOD QUALITY AND SAFETY

FOOD MARKETING AND BUSINESS

FOOD ENGINEERING

Preface 10th NSC – "Food Globalization: New Technology in An Era of Change"

This is a proceeding of the 10th National Student Conference on Food Science and Technology done by Food Technology Department, Soegijapranata Catholic University. Seeing that this conference is organized by only the students of the faculty, ten consecutive years of performance deserves quite praise. Thanks to their powerful motivation and energy, this event can be held in routine without skipping a single year.

In this year conference we focused on the development of food in globalization era. As we know it, since globalization has begun there has been lots of changes in many sectors of life including food. On the bright side, it can be seen that globalization has made food become highly varied, more "functional", and somewhat safer by using new material, more sophisticated technology, or even change the food source's genetic structure. Although there are a lot of advantages in the era of food globalization, there will be many risks that make people have to be aware in consuming the foods.

The conference was specifically designed to discuss all of these matters, where students of food technology department can share their research and opinion. This proceeding covers two sections of paper that are papers of the keynote speakers and also from the presenters. There are six platform themes that were used: *Food Product Development*, *Food Quality and Safety, Food Management and Business, Food Engineering. Food Microbiology & Biotechnology* and *Functional Food.* With the ongoing changes in food related to the current globalization, I am quite sure there will be more topics that can be discussed in other student's conferences or academic communities.

Semarang, January 7, 2010

Alberta Rika Pratiwi
Chairman of the Steering Committee

THE EFFECTIVENESS BETWEEN APUS-28 AND ALCOHOL DISINFECTANTS TO INHIBIT BACTERIAL AND FUNGAL GROWTH IN MINERAL WATER PRODUCTION SYSTEMS

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ABSTRACT

Geographically, Semarang is a town that located between $6^0$50' - $7^0$10' south latitude and $109^0$35'-$110^0$50' east longitude. The town is therefore humid with almost stable yearly temperature range of approximately 20-30^0 C. These prevalence climatic conditions were the favor conditions for the growing of bacteria and fungi. In the industry of mineral water, as well as in beverage industries, bacterial and fungal attack was serious problem in providing safe product to consumers. To overcome this problem, some beverage industries use Apus-28 and alcohol in their production systems. This research was aimed to compare the effectiveness of Apus-28 and alcohol in inhibiting bacterial and fungal growth. The methods that used in this research were agar medium (count agar) and air isolation principles. PCA (Plate Count Agar) was used for bacterial investigation and SDA (Sabourd Dextrose Agar) was used for fungal investigation. The results showed that there was no bacterial and fungi on laboratorial research because Apus-28 was known as an effective and efficient disinfectant rather than alcohol. On the other hand, especially in mineral water production room, air isolation indicates that Apus-28 was still an effective and efficient disinfectant to inhibit bacterial and fungal growth. This study awaits further investigation to find out more detailed information about the strains of bacterial and fungi can be controlled by the two disinfectants at safety dose.

Keywords: *disinfectant, Apus-28, alcohol, bacteria, fungi, mineral water*

INTRODUCTION

Semarang is a town that located in Center Java between $6^0$50' - $7^0$10' south latitude and $109^0$35'-$110^0$50' east longitude. The town is therefore humid with almost stable yearly temperature, range of approximately 20-30^0 C. These prevalence climatic conditions were the favor conditions for the growing of bacteria and fungi. Bacteria and fungi are kinds of microorganisms that could live and breed in humid area with their supported environment. This can also affect to the all parts of human life especially for food and beverage industry. Mineral water is a basic need of human life because without water no one can survive. Bacteria and fungi can affect mineral water production and systems because they easily grow in humid condition with rather high

water activity. Due to this reason, the important thing to do is to keep mineral water production and systems well in beverage industry.

In order to overcome the growth of bacteria and fungi, many beverage industries use some disinfectants to keep the sterility of their own mineral water products. For example, some beverage industries use Apus-28 and alcohol in their production systems to inhibit several microorganisms. Alcohol is an effective antimicrobials. There are many kinds of alcohol that used in beverage industries, they are ethyl alcohol (ethanol, alcohol), isopropyl alcohol (isopropanol, propan-2-ol) and *n*-propanol (in Europe) are the most widely used. Alcohol exhibits rapid broad-spectrum antimicrobial activity against vegetative bacteria (including mycobacteria), viruses, and fungi. However, alcohol is known to inhibit sporulation and spore germination but this effect is reversible and widely used for both hard-surface disinfection and skin antisepsis.

The effectiveness of alcohols depends on the concentrations of both the active agent and the test microorganism. Generally, the antimicrobial activity of alcohols is significantly lower at concentrations below 50% and is optimal in the 60 to 90% range. Alcohol is used as a disinfectant because it can cause membrane damage and rapid denaturation of proteins, with subsequent interference with metabolism and cell lysis. On the other hand, Apus 28 is a concentrated cleaning substance that can also be used as a disinfectant. Its biodegradable characteristic can kill germ (microbe). Besides, Apus 28 is made from sodium met silicate, which can easily be dissolved in water and not cause irritation both on skin or eyes. Maintain the sterility of food and beverage product especially mineral water products is very important to do, because its sterility can improve not only consumer's health but also trust and other factory's benefits. The objective of this research was to compare the effectiveness of Apus-28 and alcohol in inhibiting bacterial and fungal growth especially in mineral water production systems.

MATERIAL AND METHODS

This research was divided into two big scale, laboratory scale and field scale. In laboratory scale, we used two media, PCA (*Plate Count Agar*), made from 500 ml aquades, 2.5 g peptone, 0.5 g glucose, 1.25 g yeast, 1 piece of agar and SDA (Sabourd Dextrose Agar) made from 19.5 g SDA and 300 ml aquades. PCA is used for bacterial investigation rather SDA is for fungal investigation. After that, we sterilize all Medias and tools in autoclave for 1-2 hours. Then, we diluted 3 ml of Apus 28 in 30, 45 and 60 ml aquades to make three comparison, they were 1:10, 1:15 and 1:20.

On the other hand, alcohol had no comparison in this scale. Later, we started to inoculate bacterial and fungal and add Medias that we have prepared before then incubate them. While two days for bacterial investigation rather three days for fungal. After the whole incubation period finished, we calculated the total colony of both bacterial and fungal.

Different from laboratory scale, in field scale, in this case, rather focus about the air sirculation in mineral water production room. This mineral water production room was usually treated with fogging treatment especially at 2 pm. The whole method concept in this field scale is almost same with laboratory scale. The two Medias, both PCA and SDA had been prepared and sterilize before with all tools and equipments. After that, at 11 am, we went to mineral water production room when there was no fogging treatment added to that area. We also laid the opened petridish on the air sirculation inside the room for 30 minutes and we went back to laboratory. Then, at 2 pm, we went back again to mineral water production room when there was fogging treatment added to that area and we laid the opened petridish on the air sirculation inside the room for 30 minutes and we went back to laboratory. Later, we add Medias that have been prepared before then incubate them. While two days for bacterial investigation rather three days for fungal. After the whole incubation period finished, we calculated the total colony of both bacterial and fungal.

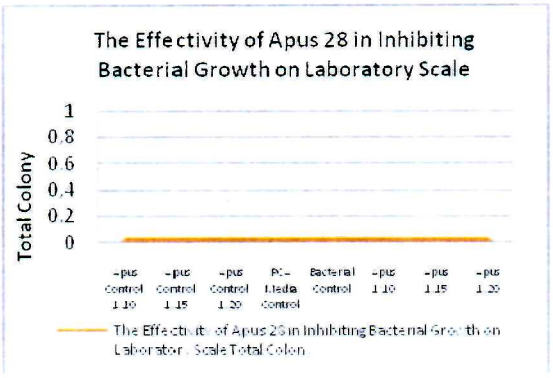
RESULT AND DISCUSSIONS

1. Laboratory Scale

1.1. The Effectivity of Apus 28 in Inhibiting Bacterial Growth on Laboratory Scale

Table 1.1.1. The Effectivity of Apus 28 in Inhibiting Bacterial Growth on Laboratory Scale

Treatment	Total colony
Apus Control 1:10	0
Apus Control 1:15	0
Apus Control 1:20	0
PCA Media Control	0
Bacterial Control	0
Apus 1:10	0
Apus 1:15	0
Apus 1:20	0

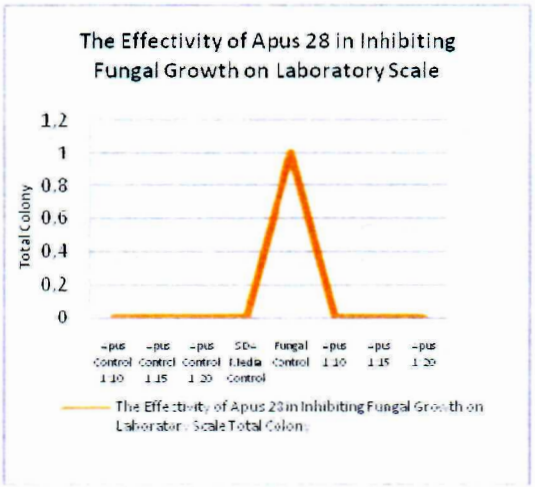


Graph 1.1.1. The Effectivity of Apus 28 in Inhibiting Bacterial Growth on Laboratory Scale

1.2. The Effectivity of Apus 28 in Inhibiting Fungal Growth on Laboratory Scale

Table 1.2.1. The Effectivity of Apus 28 in Inhibiting Fungal Growth on Laboratory Scale

Treatment	Total colony
Apus Control 1:10	0
Apus Control 1:15	0
Apus Control 1:20	0
SDA Media Control	0
Fungal Control	1
Apus 1:10	0
Apus 1:15	0
Apus 1:20	0



Graph 1.2.1. The Effectivity of Apus 28 in Inhibiting Fungal Growth on Laboratory Scale

1.3. The Effectivity of Alcohol in Inhibiting Bacterial Growth on Laboratory Scale

Table 1.3.1. The Effectivity of Alcohol in Inhibiting Bacterial Growth on Laboratory Scale

Treatment	Total colony
Alcohol Control	1
PCA Media Control	0
Bacterial Control	Spreader
Alcohol	1,67

1.4. The Effectivity of Alcohol in Inhibiting Fungal Growth on Laboratory Scale

Table 1.4.1. The Effectivity of Alcohol in Inhibiting Fungal Growth on Laboratory Scale

Treatment	Total colony
Alcohol Control	0
SDA Media Control	0
Fungal Control	Spreader
Alcohol	0

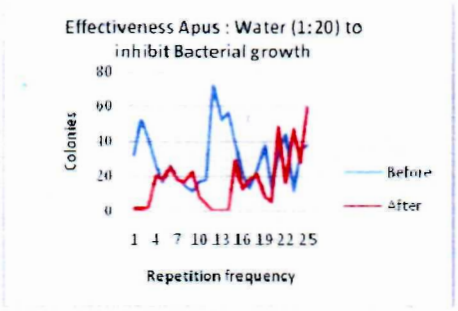
As we can see above, while we used Apus-28 with three comparison (1:10, 1:15, 1:20), there were no bacterial and fungal could grow. It means that Apus-28 with the three comparisons is an effective disinfectant.

Different from Apus-28, alcohol, indicated that there were still bacterial and fungal could grow. It was proved with the result from table 3 that there was 1 colony in alcohol control without any inoculated bacterial, in bacterial control there were so many colonies called spreader and total colony in alcohol with inoculated bacterial is 1.67 colonies. On table 4, we can see that there were no colony in alcohol control, media control and alcohol with inoculated fungal.

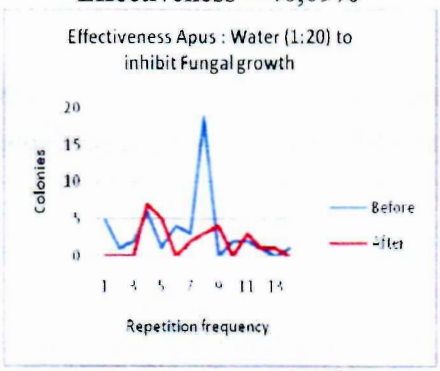
2. FIELD SCALE

2.1. Apus-28

From two graphics below, we could see the best comparison of Apus 28 to inhibit bacterial and fungal growth.

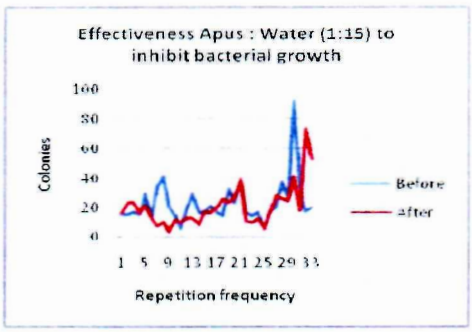


Effectiveness = 46,09%

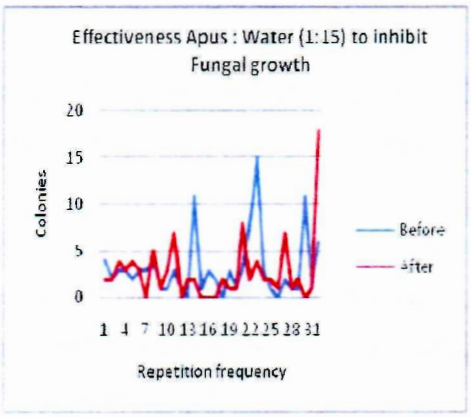


Effectiveness = 44,68%

Graph 2.1.1. The Effectiveness of Apus 1:20 to inhibit Bacterial and Fungal Growth

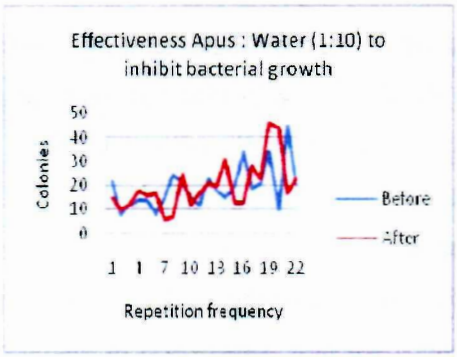


Effectiveness=13,31%

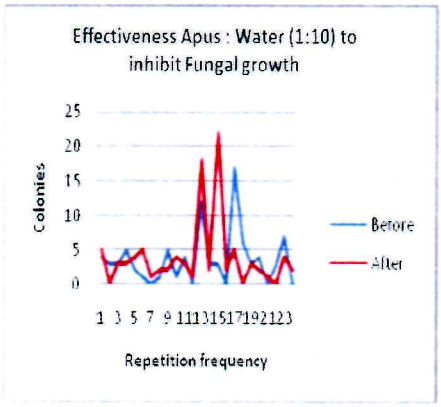


Effectiveness = 12,62%

Graph 2.1.2. The Effectiveness of Apus 1:15 to inhibit Bacterial and Fungal Growth



Effectiveness=-1,87%



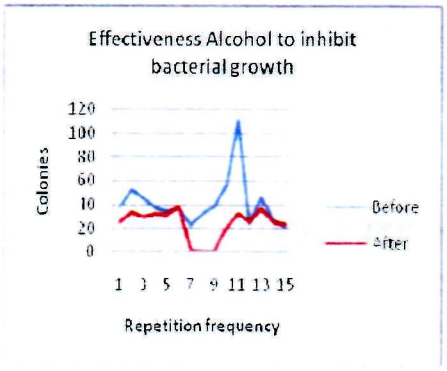
Effectiveness = -8,05%

Graph 2.1.3. The Effectiveness Apus 1:10 to inhibit Bacterial and Fungal Growth

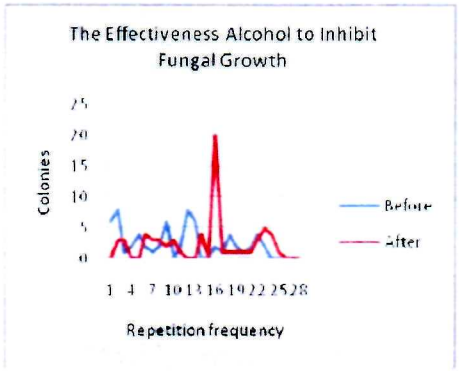
From the three graphs above, the best comparison of Apus-28 that have been applied in mineral water's filling room system is 1:20. The degradation value of Apus-28's effectiveness from comparison 1:20, 1:15, to 1:10 can be caused by the discard on implementation standard operation system and lack of good sanitation (Good Manufacturing Practice). In the filling and production room, several workers don't really obey the rules. For example, disinfectants spraying programs is not applied continually in mineral water filling room, and the workers don't usually control the best comparison of disinfectant that they have to apply inside the room. This is because, the more concentrated Apus 28 can cause slippery floor that can harm the workers. Lack on GMP application is also the main cause that can affect the effectiveness of disinfectant because the floor inside filling room is always full with water that can cause humid area so that bacteria and fungal can easily grow.

2.2. Alcohol

From the graphs below, we could see the effectiveness of alcohol to inhibit bacterial growth.



Effectiveness = 44,38%



Effectiveness = 3,03%

Graph 2.2.1. The Effectiveness of Alcohol to inhibit Bacterial and Fungal Growth

As we an see that Apus 1:20 (which is the effectiveness value were 46,09% and 44,68%) is still better than alcohol (which is the effectiveness value were 44,38% and 3,03%). These results showed the

effectiveness in inhibiting bacterial growth. It also appropriated with Donnel *et al.* (1999) that alcohols exhibit rapid broad-spectrum antimicrobial activity against vegetative bacteria (including mycobacterium), viruses, and fungi but are not sporicidal. Alcohol, however, known to inhibit sporulation and spore germination, but this effect is reversible. Because of the lack of sporicidal activity, alcohols are not recommended for sterilization but are widely used for both hard-surface disinfection and skin antisepsis. Another reference from industry said that Apus have three time power more than usual antiseptic to kill microorganism. The most composition at Apus is sodium metabisulfite.

CONCLUSIONS

Apus 28 is better when it used as a disinfectant than alcohol while Apus 1:20 is the best comparasion to inhibit both bacterial and fungal growth. This study awaits further investigation to find out more detailed information about the strains of bacterial and fungi can be controlled by the two disinfectants at safety dose.

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