

# D2 POSTER BICFH ANTIBACTERIAL

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# ANTIBACTERIAL POTENTIAL OF COFFEE PULP FRACTIONS AGAINST SOME FOODBORNE PATHOGENS

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## Abstract

The objective of this study was to determine the antibacterial activity of Arabica coffee berry pulp fraction against some foodborne pathogens. Experimental method was conducted through fractionation of phenolic content to water soluble, ethyl acetate and chloroform fraction and pH adjustment to 6.5 and followed by antibacterial test against Gram negative bacteria (*Escherichia coli* O157:H7 ATCC (35150, 43890, 43894 and 933), *Pseudomonas Fluorescences*, *P. aerogenosa*, *Salmonella thypimurium*, *S. thypimurium* ATCC 29631) and Gram positive bacteria (*Listeria monocytogenes scott A*, *L. monocytogenes* ATCC 39-2, *Staphylococcus aureus* ATCC 13565 and *Bacillus cereus*). The result showed that all fractions have inhibition activity against bacteria tested. Increasing acidity of water-soluble fraction is able to decrease its inhibition activity. On the other hand, inhibition activity of ethyl acetate and chloroform fraction tends to be more stable.

Key Words: antibacterial, coffee pulp, foodborne, pathogenic bacteria

## Introduction

Foodborne disease infections and intoxications are much more of a concern to government, the food industries and consumer today than a few decades ago. The infections and intoxication lead to the large number of outbreaks that were not only related to vegetable products but also to the meat products from fresh to frozen food. The outbreaks were caused by some common pathogenic and spoilage microorganism such as *Escherichia coli* O157:H7, *Salmonella typhimurium*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* (Yosai and others, 1985; Davies and others, 1996 and Tood, 1997). Consumer also concerned about the safety of food containing synthetic preservative. Therefore, there has been increasing interest in the development of natural antimicrobial as an alternative for food preservative. Specific study by Toda, Okubo, Hiyoshi, and Shimamura, (1989) found that extracts of coffee inhibited the growth of various bacteria known to cause diarrhoeal such as *Staphylococcus aureus* and *Vibrio parahaemolyticus*. Shetty and others (1994) reported that coffee (Coffea arabica) showed bactericidal activity against *Vibrio cholerae*, *Salmonella typhimurium* and *Salmonella typhi*. Michels (2000) also studied that coffee has antibacterial activity against a range of pathogens including *S. aureus*, *Vibrio parahaemolyticus*, *V. cholerae* and *Salmonella* due to the attributing of tannins and caffeine. Furthermore, Daglia and others (2007) reported that roasted coffee has antibacterial activity against wide range of microorganisms including *S. aureus* and *Streptococcus mutans*.

## Objective

The objective of this study was to determine the antibacterial activity of Arabica coffee berry pulp fraction against some foodborne pathogens.

## Materials and Methods

### Materials

Materials used were coffee pulp fraction from Kona Coffee plantation Hawaii, 80% methanol, chloroform, ethyl acetate and water

### Methods

#### Fractionation

Fractionation is illustrated in Figure 1, and was done by modify procedure of Zhang and others (2008). Fraction was collected and a half portion was adjusted to pH 6.5. The water solution from the EtOAc fractionation was further absorbed on an XAD-2 (Amberlite Resin, Supelco Bellefonte, PA) column and rinsed with sterile water to get water soluble fraction. The fraction was collected and a half portion was adjusted to pH 6.5. Water soluble fractions were evaporated to dryness using Labconco Freeze drier system for 72 hours. Whereas, CHCl<sub>3</sub> and EtOAc fractions were evaporated using rotary evaporator at 40 °C, speed 40 and pressure about 560-585 mmHg for CHCl<sub>3</sub> and 615-620 mmHg for EtOAc. The dried fractions were resuspended with their solvent (Water soluble fraction with water; CHCl<sub>3</sub> fraction with CHCl<sub>3</sub> and EtOAc fraction with EtOAc).

#### Antibacterial Test

All pathogenic bacteria were subcultured at least three (3) times prior to the test. Bacteria used were *L. monocytogenes* ATCC 39-2, *Pseudomonas Fluorescences*, *P. aerogenosa*, *Salmonella thypimurium*, *Escherichia coli* O157:H7 ATCC (35150, 43890, 43894 and 933), *Listeria monocytogenes* Scott A, *S. thypimurium* ATCC 29631, *Staphylococcus aureus* ATCC 13565 and *Bacillus cereus*. Antimicrobial activity was determine by measuring diameter inhibition zone.

## Results and Discussions

Table 1. Fractionation of methanolic coffee pulp extracts

Fraction	pH	Yield (g)	% (Yield/fresh pulp)
CHCl <sub>3</sub>	6.53	0.0855	0.11
	4.28	0.0762	0.09
EtOAc	6.50	0.0637	0.08
	3.88	0.0471	0.06
Water soluble fraction	6.50	2.5455	3.18
	3.97	2.2771	2.85
Methanolic acidic fraction	6.59	0.2522	0.32
	5.06	0.2688	0.34

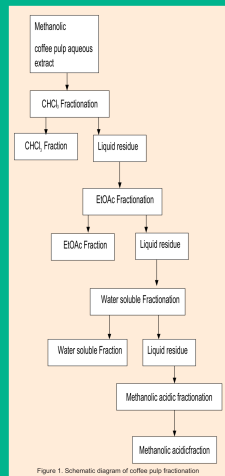
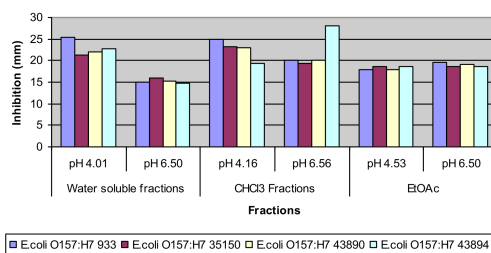


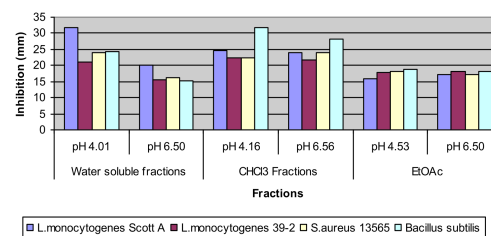
Figure 1. Schematic diagram of coffee pulp fractionation



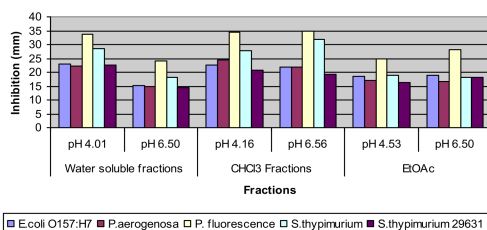
### Antibacterial activity of coffee pulp fractions against *E. coli* O157:H7



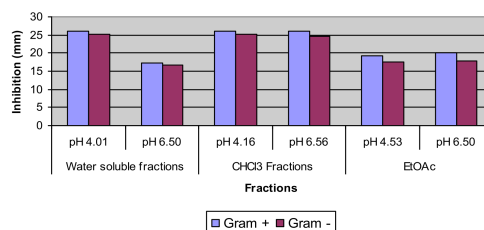
### Antibacterial activity of coffee pulp fractions against Gram positive bacteria



### Antibacterial activity of coffee pulp fractions against Gram negative bacteria



### Antibacterial activity of coffee pulp fractions against Gram positive and Gram negative bacteria



## Conclusions

All fractions have inhibition activity against bacteria tested. Increasing acidity of water-soluble fraction is able to decrease its inhibition activity. On the other hand, inhibition activity of ethyl acetate and chloroform fraction tends to be more stable.

Coffee pulp has potential as antibacterial against some food borne pathogens, therefore it can be used as food preservative and has potential as medicine.

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