

Antimicrobial activity of *Piper betle* Linn extract towards foodborne pathogens and food spoilage microorganisms

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Piper betle Linn leaves have long been used in Indonesia as traditional medicine. These leaves have antimicrobial activity towards bacteria in the mouth i.e. *Streptococcus viridans*, *Staphylococcus aureus* and *Streptococcus mutans*. Essential oils of the plant contained phenolic compounds such as cavinol, cavibetol, carvacrol, eugenol and allilpyrocatechol. These compounds are assumed could inhibit foodborne pathogens as well as food spoilage microorganisms.

The objective of this study was to examine the effect of extraction methods on the antimicrobial activity of two varieties of *Piper betle* Linn towards some foodborne and food spoilage microorganisms.

Extraction methods applied on green and yellow variety of *Piper betle* Linn were cold water, hot water, ethanol and combination of distillation and ethanol. The extracts obtained were examined for its antimicrobial activity using the well diffusion method and the pour plate method. Five foodborne pathogens (*Bacillus cereus*, *S. aureus*, *Salmonella typhimurium*, *Escherichia coli* and *Listeria monocytogenes*) and eight food spoilage microorganisms (*Pseudomonas aeruginosa*, *P. fluorescens*, *Lactobacillus plantarum*, *Bacillus stearothermophilus*, *Aspergillus niger*, *Penicillium rubrum*, *Candida utilis* and *Saccharomyces cerevisiae*) were used as test microorganisms. The active fractions of the extract were analyzed by column and thin layer chromatography.

The greatest zone of inhibition among food spoilage microorganisms tested was demonstrated by the yellow variety extract obtained from hot water extraction towards *B. stearothermophilus* (3.8 mm) while bacteriocidal activity was observed only towards *B. stearothermophilus*, *P. fluorescens* and *P. aeruginosa*. The whole extract (mixture of volatile and nonvolatile extract) of the green variety showed the strongest antimicrobial activity (0.025 % v/v MIC) towards all foodborne pathogens tested. Column and thin layer chromatography analysis showed the polar fraction of the extract as the active fraction.

The results suggest that *Piper betle* Linn extract has a potential application as natural food preservative and to improve the microbiological safety of the foods.