NATURAL ANTIBACTERIAL ACTIVITIES EXTRACT FROM THAI POMELO
Siriwan Mungdee,* Suchada Chaisawadi, Juthathip Panapiyasakunchai, Surachai Keawbunrueng
Pilot Plant Development and Training Institute, King Mongkut’s University of Technology
Thonburi (Bangkhunthien), 49 Soi Tientalay 25, Bangkhunthien-Chaitalay Road, Takham,
Bangkhunthien, Bangkok 10150, Thailand
*e-mail: siriwan1980@hotmail.com

Abstract: This study is emphasized specifically on the potential of the pomelo peel, albedo and seed extract as natural antimicrobial agents. For this study, the extractions from pomelo peel, albedo and seed were used to evaluate the result of antibacterial activities against gram-positive (Staphylococcus aureus and Bacillus cereus) and gram-negative (Escherichia coli) bacterial strains. The organic pomelo peels, albedo and seed were extracted by fresh and alcoholic extraction method. Agar diffusion method was employed to determine the antibacterial activity. The results showed only fresh extract of pomelo peel indicated high potential antibacterial activity against S. aureus with 9.50 ± 0.50 mm of inhibition zone produced and showed moderate potential antibacterial activity against B. cereus and E.coli with 8.17 ± 0.29 mm and 7.83 ± 0.29 mm respectively of inhibition zone produced. Others fresh extract showed no inhibition activities. The alcoholic extraction method showed highest potential antibacterial activity from pomelo peel, albedo and seed with 14.67 ± 0.29, 23.33 ± 0.58 and 13.33 ± 0.76 mm against S. aureus; 16.83 ± 0.76, 13.83 ± 0.29 and 13.33 ± 0.29 mm against B. cereus; 16.50 ± 0.50, 11.83 ± 0.76, and 13.00 ± 1.00 mm against E. coli respectively. Identification of active compounds and suitable purification method in this organic pomelo are now in the process studies. The results from this study, we expect that the pomelo extract is utilized as an alternative natural antimicrobial agent in the treatment of infectious disease in the near future.

Introduction: Infectious diseases are crucial cause of death worldwide due to multidrug resistant strains of bacteria. Natural products have focused for new drug because of the unmatched availability of chemical diversity. Pomelo (Citrus maxima Merr.) is the most popular and economical fruit in Thailand. It has a pear like shape but it is far larger which can be close to 12 inches across at its widest point and weigh up to 10 kg. Moreover, It is a fruit for health, it has been used all parts for many years in Southeast Asia as a folk medicine for treatment some diseases. Previous study reported that pomelo peel has valuable compounds especially for flavanoid, monoterpenoid, pectin production and essential oil. Citrus essential oils have been shown the possession of antimicrobial activities and could serve as a source of antimicrobial agents against food pathogen. The novel drugs are produced from many plants. The antimicrobial properties of plants have been investigated worldwide to better understanding on the plant extract that would be the best source of a variety of drugs. The aim of this study is to investigate Thai pomelo as natural antimicrobial agents for treatment the infectious disease and serve as a source of antibacterial activities against food pathogen in the near future.

Methodology: The organic pomelos were collected from local market in Bangkok. The pomelo peels, albedo and seed were screened for antibacterial activities against S. aureus, B. cereus and E. coli. The Fresh extraction method of organic pomelo peels, albedo and seed were prepared by washing, cutting in small pieces, blending using electrical blender and squeezing to get fresh extract. The alcoholic extraction method was prepared by soaking each of the blended pomelo peel, albedo and seed in ethanol overnight followed alcohol evaporation using rotary evaporator (Buchi, Rotavap) to remove ethanol from the samples.
The antibacterial activities of the fresh extract and alcoholic extract method were examined using agar diffusion method. The antibacterial activities were considered by inhibition zones produced. The assays were performed in triplicate for each individual samples and statistical analysis was analyzed.

Results, Discussion and Conclusion: The results of this study showed antibacterial activities of pomelo peel, albedo and seed extracts were determined against *S. aureus*, *B. cereus* and *E.coli*. Only fresh extract of pomelo peel indicated high potential antibacterial activity against *S. aureus* with 9.50 ± 0.50 mm of inhibition zone produced and showed moderate potential antibacterial activity against *B. cereus* and *E.coli* with 8.17 ± 0.29 mm and 7.83 ± 0.29 mm respectively of inhibition zone produced as shown in Table 1 and Figure 1. Others fresh extract showed no inhibition activities. The alcoholic extraction method showed highest potential antibacterial activity from pomelo peel, albedo and seed with 14.67 ± 0.29, 23.33 ± 0.58 and 13.33 ± 0.76 mm against *S. aureus*; 16.83 ± 0.76, 13.83 ± 0.29 and 13.33 ± 0.29 mm against *B. cereus*; 16.50 ± 0.50, 11.83 ± 0.76, and 13.00 ± 1.00 mm against *E. coli* respectively as shown in Table 1 and Figure 1. Moreover, the alcoholic extract from pomelo albedo indicated the most effective against *S. aureus* as shown in Table 1.

Table 1: Antibacterial activities of pomelo peel, albedo and seed extracts with inhibition zone produced against *Bacillus cereus*, *Staphylococcus aureus* and *Echerichia coli* using agar diffusion method.

<table>
<thead>
<tr>
<th>Types of Pomelo</th>
<th>Fresh extracts</th>
<th>Alcoholic extracts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B. cereus</td>
<td>S. aureus</td>
</tr>
<tr>
<td>Peel</td>
<td>8.17 ± 0.29</td>
<td>9.50 ± 0.50</td>
</tr>
<tr>
<td>Albedo</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Seed</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ampicillin 10µg/disc</td>
<td>12.50 ± 0.50</td>
<td>13.67 ± 0.76</td>
</tr>
<tr>
<td>95% Ethanol 20µl/disc</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Values are mean ± SD of triplication analysis. abc Mean value of in triplicate for each individual samples. Different superscripts in the same column mean that the values are significantly different at p < 0.05 confidential levels.

Interpretation:
Clear zone 6 - 7 mm low potential antimicrobial activity
Clear zone >7 - 9 mm moderate potential antimicrobial activity
Clear zone >9 - 12 mm high potential antimicrobial activity
Clear zone > 12 mm highest potential antimicrobial activity

From the results, All alcoholic extracts from all studied (pomelo peel, albedo and seed) were highest potential against selected pathogenic bacteria. The fresh extraction method, only pomelo peel indicated inhibition activities against all investigated pathogenic bacteria whiles pomelo albedo and seed showed no inhibition activities. We have concluded that the pomelo extract by alcoholic extraction method is more effective than fresh extraction method moreover the pomelo extract by alcoholic extraction method exhibited the strong inhibitory effect on selected pathogenic bacteria with inhibitory effect being equivalent or greater than
to that of 10 µg/ml ampicillin. Therefore, pomelo extracts by alcoholic extraction method has been concerned as an alternative natural drug for treatment the infectious disease in the future.

**Figure 1** Antibacterial activities on fresh and alcoholic extracts of pomelo peel (P), pomelo albedo (A) and pomelo seed (S) against *Staphylococcus aureus* (a) *Bacillus cereus* (b) and *Escherichia coli* (c)

**References:**


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Keywords: antibacterial activities, Thai pomelo, citrus, agar diffusion method, waste utilization