EXECUTIVE SUMMARY

In developing countries where antibiotics can be unrestrictly used, the emergence of antibiotic-resistant pathogenic bacteria has caused considerable public health concern. Treatment failure due to MRSA with reduced susceptibility to vancomycin was reported. More recently, resistance to new antimicrobial agents such as linezolid, quinupristin, and daffopristin has already occurred. Therefore, we aimed to search for a novel drug to solve problems encountered with drug-resistant organisms. Over 100 plant species tested, *Quercus infectoria* was the only plant species which possess a broad spectrum of activity against all pathogenic bacteria. Detailed studies on anti-*Escherichia coli* O157:H7 mechanisms of this plant were performed. *Rhodomyrtus tomentosa* and *Eleuterine americana* exhibit extremely good activities against Gram-positive. In addition to studies on antibacterial mechanisms, as *Eleuterine americana* is generally recognized as safe (GRAS), it has been applied in a number of food systems. *Rhodomyrtus tomentosa* is of interest as rhodomyrtone, its principle bioactive component demonstrated extremely good anti-Gram-positive bacteria. This compound is an chanllenging candidate natural drug for Gram-positive bacteria. The detailed biological evaluation of the pure compound will make it possible to assess the potential applications for targeted infectious organisms. *Staphylococcus aureus*, a major hospital-acquired organisms with global concern on its resistance to most antibiotics, was selected for further studies. The main focus were to:

1. Investigate changes in bacterial proteins following treatment with the most active compound in order to find their direct and/or indirect targets.
2. Study antibacterial mechanisms at molecular level in relation to phenotypic express.