VIETNAM NATIONAL UNIVERSITY-HCMC

BACH KHOA UNIVERSITY

SOCIALIST REPUBLIC OF VIETNAM

Independence-Freedom-Happiness

THESIS INFORMATION

- Title: Evaluation of methicillin-resistant *Staphylococcus aureus* (MRSA) characteristics of some medicinal herbs collected in Binh Duong province.
- Major: Biotechnology
- Major code: 62420201
- PhD Candidate: MAI THI NGOC LAN THANH
- Scientific advisors:
  1. Prof. Dr. Truong Vu Thanh
  2. Dr. Hoang Anh Hoang
- University: Bach Khoa University-Vietnam National University - Ho Chi Minh City

CONTENT

The objectives of thesis

- This study aims at screening of ethanol plant extracts collected in Binh Duong province against methicillin-resistant *Staphylococcus aureus* (MRSA).
- Isolation of main pure compound from ethanol plant extract which has the most activity against MRSA
- Determine the synergistic formula of the fractions and the mechanism of resistance to MRSA

Contribution of this thesis

- There are four plant species, including *Cratoxylum cochinchinense*, *Carallia brachiata*, *Syzygium glomeratum*, *Grewia asiatica* L have been identified with anti-MRSA activity the first time.
- Dimethyl pinocembrin is the first isolated from the genus *Syzygium.* The amount of pinostrobin was highest with an extraction yield of 12.79±0.21 mg of pinostrobin in 1 g of dried leaf powder.

- Determine the synergistic formula of the fractions and antibiotics. In which, ethyl acetate extract of *Cratoxylum cochinchinense* – cefoxitin combinations exhibited synergism (FICI ≤ 0.5), where MIC value of cefoxitin reduce 512 times.

- Determine the synergistic formula of pinostrobin and vancomycin are 12.8 pinostrobin:0.5 vancomycin (μg/mL).

- Ethyl acetate fractions of *Cratoxylum cochinchinense, Carallia brachiata, Syzygium glomeratum*, and *Grewia asiatica* L have the ability to inhibit biofilm formation on MRSA strains.

- The thesis contributes to finding solutions against MRSA such as: The initial determination of antibacterial activities of extracts/fractions/pure compound from three plant species in Vietnam; The synergistic formula of fractions – antibiotics and compound-antibiotics are determined to be effective and contribute to the control of MRSA in practice.

The most remarkable points

- Ethanol extracts of *Cratoxylum cochinchinense*, *Carallia brachiata*, *Syzygium glomeratum*, *Grewia asiatica* L are collected in Binh Duong province were reported anti-MRSA activity the first time.
- The pure compounds isolated from ethanol *Syzygium glomeratum* extract are pinostrobin, 4-methoxy benzoic acid, dimethyl pinocembrin, betulonic acid. In which, 4-methoxy-benzoic acid and dimethyl pinocembrin are isolated for the first time from *Syzygium* genus.
- The synergistic formula of fractions-antibiotics and pinostrobin – antibiotics are determined. In particular, the ethyl acetate fraction of *Cratoxylum cochinchinense* showed strong synergistic activity with cefoxitin on MRSA strains.
- The study initially identified the target of the fractions/pinostrobin such as the ability to inhibit biofilm formation, hemolysis, and PBP2a expression inhibition. Notably, the ethyl acetate fraction of *Cratoxylum cochinchinense* has been identified as an inhibitor of the PBP2a-related cell wall synthesis pathway of MRSA.

Scientific advisors

Prof. Dr. Truong Vu Thanh

Dr. Hoang Anh Hoang

Scientific advisors

Mai Thi Ngoc Lan Thanh