CHAPTER IV

CONCLUSION

During the course of this research, the antifungal activity of ninety benzoic acid and related compounds and cinnamic acid derivatives was screen against four phytopathogenic fungi (*Alternaria porri*, *Fusarium oxysporum*, *Pestalotiopsis* sp. and *Phytophthora parasitica*), in order to define a possible structure–activity relationship. The functional group and the position of the functional group in aromatic ring were also shown to play an important role in the antifungal activity of tested compounds. It was found that the addition of a supplementary hydroxyl group in various positions on the benzene ring of benzoic acid suppressed the antifungal activity on all tested fungi. On the contrary, the addition of a chlorine in the 2 or 3 position increased the mycelial growth inhibition on *A. porri* and *Pestalotiopsis* sp. The study of effects of modifications on the aliphatic chain found that conversion of carboxylic acid function group to an aldehyde increased the biological activity of the original structure.

Further evaluation of antifungal activity of cinnamaldehyde found that it completely suppressed *A. porri*, *F. oxysporum* and *P. parasitica* at 2.5 mM and nearly completely suppressed *Pestalotiopsis sp.* at the same concentration. Methyl, ethyl, propyl, butyl, hexyl, octyl and dodecyl 4-hydroxybenzoates were tested against *A. porri*, *Pestalotiopsis* sp. and *P. parasitica*, in order to investigate the structure – activity relationship on the length of alkyl chain. The results showed that among six tested 4-hydroxybenzoates, butyl 4-hydroxybenzoate showed generally good activity against all tested fungi.

In order to determine the most efficient compounds of cinnamic acid derivatives, 2,6-dichlorocinnamic acid showed strong activity and may be suitable compounds for an application to plants. Further evaluation of antifungal activity, phytotoxicity and stabilty of 2,6-dichlorocinnamic acid were determined. It was found that compared to the conventional chemical fungicide captan and iprodione, 2,6-dichlorocinnamic acid is much more efficient and therefore can be a antifungal agent, particularly to control *Pestalotiopsis* sp. and *P. parasitica*.

Proposal for future work

This research disclosed more potent antifungal compounds of cinnamic acid derivatives. Further studies should involve the elucidation for their biological activity, mode of action of active compound to fungi and toxicity to human and environment. Moreover, *in vivo* studies for further application uses are necessarily studied in further investigations. In addition, their effectiveness can be improved by developing application methodology for use in the field.