

# Antifungal Effects of Thai Medicinal Plants Against *Colletotrichum gloeosporioides* Penz.

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**This study was conducted to develop more efficient and environmentally sound methods for the control of anthracnose. Twelve Thai medicinal plants were tested as potential anti-fungal agents against *Colletotrichum gloeosporioides* Penz. Hexane and ethyl acetate extracts from the pericarp of *Areca catechu* and hexane extract from the flower buds of *Etilingera elatior* demonstrated high inhibitory activity of *C. gloeosporioides* mycelial growth with EC<sub>50</sub> values of 796.2, 803.9 and 803.9 µg mL<sup>-1</sup>, respectively. These extracts were fractionated and purified by column chromatography. Consequently, six compounds from the *A. catechu* high active extracts and two compounds from the *E. elatior* high active extract were isolated. Based on the results of structural elucidation, the six compounds obtained from the *A. catechu* high active extracts were fernenol, arundoin, lauric acid, myristic acid, palmitic acid and a mixture of β-sitosterol and stigmasterol. The two compounds obtained from the *E. elatior* high active extract were lauric acid and a mixture of β-sitosterol and stigmasterol. The effects of these compounds on spore germination, germ tube elongation and appressorium formation were investigated; fernenol was found to provide the highest inhibition in all aspects based on EC<sub>50</sub> values of 45.8, 26.7 and 65.6 µg mL<sup>-1</sup>. Lauric acid, myristic acid and palmitic acid with EC<sub>50</sub> > 200 µg mL<sup>-1</sup> had the least inhibitory activity. The results suggest that the compounds isolated from the pericarp of *A. catechu* and the flower buds of *E. elatior* may be applicable for the control of anthracnose diseases.**

Key Words: anthracnose, antifungal, *Areca*, *Colletotrichum*, *Etilingera*, extract

Abbreviations: COSY – correlated spectroscopy, DEPT – distortionless enhancement by polarization transfer, EC<sub>50</sub> – effective concentration 50%, GC-MS – gas chromatography-mass spectroscopy, HMBC – heteronuclear multiple bond correlation, HREIMS – high resolution electron impact mass spectrometry, IR – infrared, NMR – nuclear magnetic resonance, PDB – potato dextrose broth, SPSS – statistical package for social science software, TLC – thin layer chromatography, UV – ultraviolet

## INTRODUCTION

*Colletotrichum gloeosporioides* Penz. is a cause of anthracnose diseases for many plants such as capsicum, banana, mango, grape, papaya, tomato, guava and coffee (Bailey and Jeger 1992; Silva et al. 2008). The development of synthetic chemical resistance to the pathology of *C. gloeosporioides* is a result of the identification of novel anti-fungal agents (Kumar et al. 2007). In a recent assessment of traditionally used agents, Kumpoun et al. (2005) found

that the compounds in mango latex, namely resorcinols, inhibited the mycelial growth of *C. gloeosporioides*. Regnier et al. (2008) reported that limonene, carvone and 1,8-cineole terpenoids found in *Lippia scaberrima* oil had high activity against *C. gloeosporioides*. Many other medicinal plants in Thailand are known to have anti-microbial properties, including the 12 Thai medicinal plants investigated in this study (Ficker et al. 2003; Alade and Irobi 1993). For instance, Chan et al. (2007) reported that leaf extracts of five *Etilingera* species exhibited moderate inhibition of