The Antifungal Properties Of Selected Medicinal Plant Extracts Against *Colletotrichum capsici*

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Introduction

Medicinal plants have been reported to possess the combination of or either antifungal, antitumor, antimicrobial, and antioxidant properties. Some of the chosen medicinal plants have been reported to have antibacterial and antifungal activities. Prisana Niyomkam *et. al.* (2007) have found that the ethyl acetate extract of *Alpinia galanga* rhizome showed the strongest antibacterial effect against *Propionibacterium acnes*, with MIC and MBC values of 0.156 and 0.312 mg/mL, respectively. In the previous study of Lee *et. al.* (2008), *Centella asiatica* whole plant methanol extract was found inhibited *Streptococcus* sp, *Vibrio alginolyticus* and *Vibrio vulnificus*, while its aqueous extract showed effect against *Citrobacter freundii*, *Vibrio alginolyticus*, *Vibrio cholerae*, *Vibrio harveyi* and *Vibrio parahaemolyticus*. *Piper betle* L. leaves contains hydroxychavicol, as main component and is said to exhibit antibacterial activity (Nalina and Rahim, 2007). Regarding the important role of these valueable medicinal plants, the purpose of this study is to investigate and evaluate the antifungal activities of eight selected medicinal plants against plant pathogenic fungus; *Colletotrichum capsici*. *Colletotrichum* species was chosen for this study as this species is an economically important disease of pepper fruit antrachnose that causes serious yield loss and quality deterioration in many Asian countries (Sang *et al.*, 2007). There are several species of *Colletotrichum* that have been reported to cause antrachnose in chilli but *Colletotrichum capsici* was chosen for this study as it is one of the most frequently cited as causal agents of chilli anthracnose (Ratanacherdchai *et al.*, 2007).

Materials & Methods

Media culture

Isolation of *Colletotrichum capsici* from *Capsicum* sp. were made on the laminar flow using direct isolation and indirect isolation.

Antifungal assay

The antifungal assay was carried out according to Alam (2004) with a slight modification. 19 mL of potato dextrose agar medium was poured in sterilized Petri dishes along with 1 mL of plant extract and plated. 10 mm diameter cups of mycelia discs made by the cork borer were inoculated at the centre of the medium. The antifungal assay was carried out in Potato Dextrose Agar in five different sets. They are negative control, three experiment sets (crude extract of leaves in methanol, chloroform, and acetone), and positive control (Kocide 101). Colony growth was measured on the basis of linear dimensions. Minimum inhibitory concentration (MIC and MIC_{90}) were determined.

Results and Discussion

Antifungal activities of the leaves extract of eight selected medicinal plants were evaluated against plant pathogenic fungus; *Colletotrichum capsici*.

All eight medicinal plants in this study showed antifungal properties with different percentage. Highest percentage of growth inhibition was by *Piper betle* in 10.00 µg/mL in methanol. It showed 85.18% of inhibition, where positive control showed 87.49% of inhibition within the same concentration, with MIC of 0.0001 µg/mL and MIC_{90} of 10.10 µg/mL. *Blumea balsamifera* showed highest inhibition in the 10.00 µg/mL chloroform crude extracts. It

showed 55.88% of inhibition, where positive control showed 87.83% of inhibition within the same concentration, with MIC of 0.0015 µg/mL and MIC_{90} of 25.00 µg/mL. *Alphinia galanga* showed highest inhibition in 10.00 µg/mL methanol crude extract. It showed 74.60% of inhibition, where positive control showed 87.60% of inhibition within the same concentration, with MIC 0.0001 µg/mL and MIC_{90} 22.10 µg/mL. *Centella asiatica* showed highest inhibition in 10.00 µg/mL methanol crude extract. It showed 72.09% of inhibition, where positive control showed 88.26% of inhibition within the same concentration, with MIC of 0.0009 µg/mL and MIC_{90} 20.50 µg/mL. *Momordica charantia* showed highest inhibition in 10.00 µg/mL chloroform crude extract. It showed 60.61% of inhibition, where positive control showed 86.14% of inhibition within the same concentration, with MIC of 0.001 µg/mL and MIC_{90} of 24.50 µg/mL. *Polygonum minus* showed highest inhibition in 10.00 µg/mL acetone crude extract. It showed 57.02% of inhibition, where positive control showed 86.86% of inhibition within the same concentration, with MIC of 0.001 µg/mL and MIC_{90} of 23.00 µg/mL. *Melastoma malabathricum* showed highest inhibition in 10.00 µg/mL methanol crude extract. It showed 48.99% of inhibition, where positive control showed 86.39% of inhibition within the same concentration, with MIC of 0.0015 µg/mL and MIC_{90} of 30.00 µg/mL. *Dillenia suffruticosa* shows highest inhibition in 10.00 µg/mL acetone crude extract. It showed 51.22% of inhibition, where positive control showed 88.66% of inhibition within the same concentration, with MIC 0.001 µg/mL and MIC_{90} of 22.50 µg/mL.

Previous study by Sinha *et. al* (2004) reported that the extracts from medicinal plants *Azadirachta indica, Datura stremonium, Cassia tora, Sida acuta, Parthenium hysterophorus, Ocimum sanctum, Melia* sp., *Cuscuta reflexa, Anona squamosa and Echornia* sp. showed antifungal activities against *Colletotrichum capsici*. The radial growth of *Colletotrichum capsici* was lowest (30.93 mm) with *Ocimum sanctum* and was highest (45.5 mm) with *Azadirachta indica* compared to the control (71.4 mm). This showed that *Ocimum sanctum* and *Azadirachta indica* can inhibit the radial growth of *Colletotrichum capsici* by 56.68% and 36.27% respectively. Result of the present study however have shown that the leaf crude extract of *Piper betle, Alphinia galanga, Centell asiatica, Momordica charantia,* and *Polygonum minus* showed higher percentage of inhibition in radial growth of *Colletotrichum capsici* compare to *Ocimum sanctum* and *Azadirachta indica*. In the other hand, *Blumea balsamifera, Melastoma malabathricum*, and Dillenia suffruticosa showed lower percentage of inhibition in radial growth of *Colletotrichum capsici* compare to *Ocimum sanctum*, but they showed higher percentage of inhibition compare to *Azadirachta indica*. This indicate the good antifungal potential of the eight selected medicinal plants in this study.

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