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Antifungal Studies of Acetone Crude Extract from the Tree Barks of *Vatica odorata*

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ABSTRACT

Bioactivities of the acetone crude extracts from the tree barks of Vatica odorata was investigated on antifungal activity. Four genus of fungal were tested for anti-fungal activity i.e Rhizoctonia solani, Fusarium sp, Pythium sp. and Phytophthora sp., the pathogens of vegetables. The in–vitro bioassay of this acetone extract against fungal revealed that there were inhibition zone occurred for four genus of fungal tested. This revealed that there were anti-fungal activities of crude extract against plant pathogens.

Keywords: *Anti-fungal activities, plant pathogens, resveratrol oligomers, Vatica odorata,*

Introduction

Dipterocarpaceae is large family of tropical plants, consists of 16 genera and approximately 600 species. This group of plants is widely distributed in Indonesia, locally known as Meranti, Keruing or Tengkawang and widely used in building constructions and plywood industry (Hakim, 2002). Vatica belongs to the largests subfamily Dipterocarpoideae of the Dipterocarpaceae. This genus commonly known as *resak* (Symington, 1974) consists of over 60 species, which are small to medium sized trees and distributed primarily in Kalimantan and the Malay Peninsula. Species in this genus grow in the drier areas of tropical evergreen forests and are found up to 1600m in altitude (Seo et al., 1999). This family of plant produces a wide variety of natural products, including terpenoids, flavonoids, arylpropanoids and resveratrol oligomers. Many of the latter class of compounds which form a major polyphenoic constituents show useful biological activities, such as chemopreventive, hepatoprotective, antiflammation, antibacterial, fungicide, cytotoxic, inhibition of topoisomerase II, gastric ATPase and 5α-reductase (Hakim, 2002). The present investigation is a part of our ongoing studies on the resveratrol oligomers of Dipterocarpaceae in which no phytochemical data was recorded on *Vatica odorata*. This paper reported on the antifungal potential of acetone crude extract from the tree barks of *V. odorata* to be a new discovery of pesticides from plant.

Plant Material

Samples of the tree bark of *Vatica odorata* were collected from the Pulau Mata Kail, Belum Forest Reserve, Perak, Malaysia. The plant was identified by a Botanist from University Putra Malaysia and a voucher specimen was deposited in the herbarium.

Extraction

The dried powdered tree bark (0.45 kg) of *V. odorata* was macerated with acetone (3 x 4L) followed by methanol (3 x 4L), and each extract was evaporated under reduced pressure to give dark brown residues. The dried acetone and methanol extract gave 27.3g, 6.07% and 75g, 2.4% each.

Assays for Antifungal Activity

Tested Extracts

The crude extract of acetone was tested for antifungal activity. They were filtered sterile through 0.45 mm membrane filter before testing. The acetone solvent was used as a test control.

Microorganisms

Four genus of fungi were tested for anti-fungal activity i.e *Rhizoctonia solani*, *Fusarium* sp, *Pythium sp.* and *Phytophthora sp.*, the pathogens of vegetables. The fungi was isolated from diseased vegetables. The fungi was isolated on Potato Dextrose agar (PDA) and was identified based on their morphological characteristics. They were maintained on PDA plates for further experiment.

Preparation of Inoculate

The 5 mm mycelia plug of each fungi was taken from the leading edge of 4 old day culture and placed at the centre of the Potato Dextrose Agar (PDA) plate. The 5mm paper disc was then soaked with crude extracts and placed at 2 sides of the plates. The plates was then incubated at 28°C and observed for inhibition zone everyday for 5 days incubation. The mycelial growth of the fungi was measured.

Results and Discussion

The fungi growth graph (Figure 1) showed the inhibition of this crude extract against fungal pathogens. The graph showed that the crude extracts of *V. odorata* gives a good inhibiton against four genuses of fungi pathogens. This can be proved with the decreases of radius fungi growth with treated in acetone extract. Meanwhile, radius of a control which not treated with acetone extract showed the increases of radius fungi growth. The positive effects of antifungal activities of acetone crude extracts against tested fungi may be due to a few factors such as:

i. the existence of antifungal substances in extracts (phytoalexins)
ii. the synergistic effects of the chemical compounds.

Phytochemically, Dipteropcarpaceae plants are well known to be a rich source of various resveratrol oligomers (Ito et al., 2003). In general, most of the resveratrol oligomers are classified as semi polar or polar compounds. Therefore, through acetone extract as a polar solvent gives more resveratrol oligomers compounds (Oshima et al., 1993). Sotheswaran & Pasupathy (1993) reported that some resveratrol oligomers are considered phytoalexins. Phytoalexins is an antimicrobial compounds produced by a plant in response to infection or certain other types of physiological stimuli. A-viniferin classified as resveratrol oligomers trimer compound was first phytoalexins isolated from grapevine, *Vitis vinifera* (Pryce & Langcake, 1977).

However, the synergistic effects of chemical compounds may also give the positive result of this antifungal activity. Schulz et al. (1990) suggested that resveratrol oligomers can act synergistically with other natural compounds present in wood. Futhermore it is also possible that resveratrol oligomers which are first formed have only moderate fungicidal activity but are then modified in vivo to give derivatives which have greater and /or broaderbioactivities. For example, recent studied of grapevine phytoalexins have shown that stilbene resveratrol ([E- 3,4'5-trihydroxystilbene]) formed dehydrogenation oligomers in vivo. These polymerized derivatives was reported by Schultz et al. (1990) to have significantly more antifungal activity than the monomeric precursor.

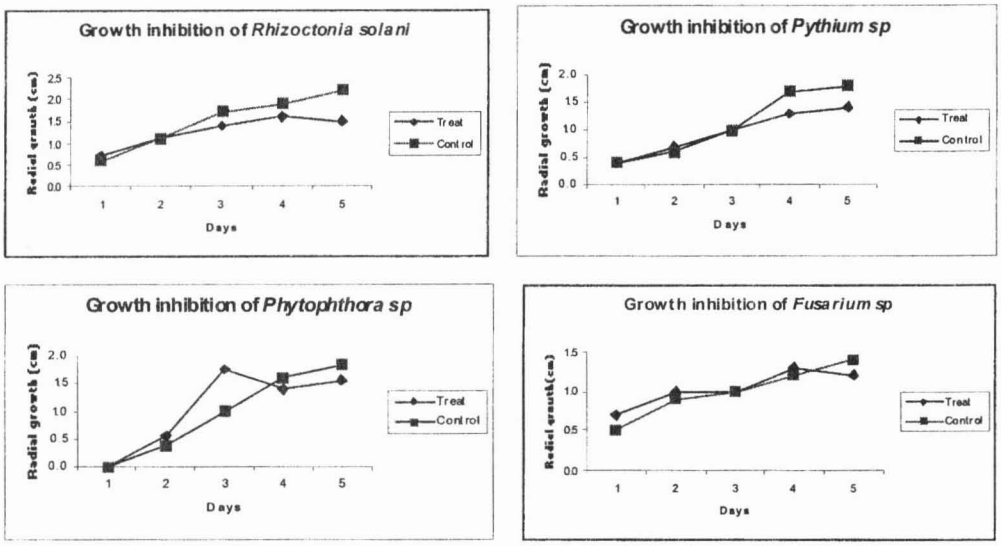

Figure 1: Grow Inhibition of each Fungi

Conclusion

The *in-vitro* antifungal activities of acetone extract from tree barks of *V. odorata* against four genuses of fungi pathogens revealed that there were inhibition zones occurred for all the tested fungi ie. *Rhizoctonia solani, Fusarium* sp., *Pythium* sp. and *Phytophthora* sp. This showed that the acetone extract of *V. odorata* was an antifungal substances. For further study on antifungal from *V. odorata* plant, purification and isolation of organic compound should be done to predict either individual resveratrol oligomers, their derivatives or other compounds in the plant signifinantly give the positive activity on the antifungal.

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