

Decha Kumla 2014: Antagonistic and Antimycelial Growth Activities of Marine-Derived Fungi Against Plant Pathogenic Fungi and Secondary Metabolites of *Talaromyces trachyspermus*. Master of Science (Plant Pathology), Major Field: Plant Pathology, Department of Plant Pathology. Thesis Advisor: Assistant Professor Tida Dethoup, Ph.D. 115 pages.

A total of 210 strains of marine-derived fungi were isolated from 36 samples of marine invertebrates (sponges and corals), collected from coral reefs at Similan Islands (Phang Nga Province), Lanta Islands (Krabi Province), and Kram Island (Chonburi Province), Thailand, and 36 species have been identified as *Arthrinium* sp., *Aspergillus candidus*, *Aspergillus niger*, *Aspergillus terreus*, *Aspergillus* spp., *Chaetomium* spp., *Cladosporium* spp., *Emericella nidulans*, *Emericella variecolor*, *Emericella* spp., *Eupenicillium* spp., *Fusarium solani*, *Fusarium* sp., *Hamigera* sp., *Humicola* sp., *Lasiodiplodia* spp., *Mucor hiemalis*, *Mucor* sp., *Neosartorya fischeri*, *Neosartorya pseudofischeri*, *Neosartorya* sp., *Paecilomyces lilacinus*, *Paecilomyces* spp., *Penicillium* spp., *Pestalotiopsis* spp., *Phoma* sp., *Phomopsis* spp., *Pseudoeurotium* sp., *Rhizopus* sp., *Scolecobasidium* sp., *Syncephalastrum* sp., *Talaromyces trachyspermus*, *Trichocladium* sp., *Trichoderma opacum*, *Trichoderma* spp., *Xylaria* spp. and sterile mycelia.

Among these marine-derived fungi, twelve isolates were subjected to preliminary screening for the antagonistic activity against ten plant pathogenic fungi by a dual culture. The results revealed that *E. variecolor* (KUFA 0103) and *N. pseudofischeri* (KUFA 0108) displayed relevant inhibitory activities against the mycelial growth of *Helminthosporium maydis*, while *E. variecolor* (KUFA 0103) exhibited also strong mycelial growth inhibition against *Alternaria brassicicola*. On the other hand, *E. nidulans* (KUFA 0102), *Emericella* spp. (KUFA 0104 and KUFA 0105), *N. pseudofischeri* (KUFA 0108) and *Neosartorya* sp. (KUFA 0109) displayed moderate inhibitory activity (50%) against *Colletotrichum capsici*, but were inactive against *Colletotrichum gloeosporioides* and *Lasiodiplodia theobromae*. Furthermore, *E. nidulans* (KUFA 0102), *Emericella* sp. (KUFA 0104), *N. pseudofischeri* (KUFA 0108) and *Neosartorya* sp. (KUFA 0109) were able to cause 50-60% inhibition of the mycelial growth of *Phytophthora palmivora*. However, all the marine-derived fungi tested were found to be inactive against the mycelial growth of *Pythium aphanidermatum* and the two Agonomycetous plant pathogenic fungi, *Rhizoctonia solani* and *Sclerotium rolfsii*.

*In vitro* antifungal activity evaluation of the EtOAc crude extracts of the culture of six marine-derived fungi against plant pathogenic fungi revealed that *T. trachyspermus* (KUFA 0021) extract was the most effective inhibitor of the mycelial growth in most of the plant pathogenic fungi. Moreover, the EtOAc crude extracts of *N. fischeri* (KUFA 0107), *Hamigera* sp. (KUFA 0106), *Pseudoeurotium* sp. (KUFA 0110), *N. pseudofischeri* (KUFA 0108) and *Emericella* sp. (KUFA 0104), displayed relevant antifungal properties against the selected plant pathogenic fungi. The EtOAc crude extract of *T. trachyspermus* (KUFA 0021) was found to completely inhibit the mycelial growth of *A. brassicicola*, *C. capsici*, *H. maydis*, *P. aphanidermatum*, *R. solani* and *S. rolfsii* at 1,000 ppm, and displayed total inhibition of mycelial growth on all plant pathogenic fungi at the highest concentration tested (10,000 ppm). Interestingly, this extract was still effective on the mycelial growth inhibition of *P. aphanidermatum* even at the concentration as low as 100 ppm. Chemical analysis of the EtOAc crude extract of the culture of *T. trachyspermus* (KUFA 0021) resulted in the isolation of, besides a new spiculisporic acid derivative, spiculisporic acid E and the new natural product 3-acetyl ergosterol 5, 8-endoperoxide, ergosta-4,6,8(14),22-tetraen-3-one, glaucanic acid and glauconic acid. All the compounds were tested for the antibacterial activity, and it was found that none of them was active against Gram-positive and Gram-negative bacteria, including multidrug-resistant strains and *Candida albicans*. Spiculisporic acid E, glaucanic acid and glauconic acid did not also show an *in vitro* growth inhibitory activity against the MCF-7 (breast adenocarcinoma), NCI-H460 (non-small cell lung cancer) and A375-C5 (melanoma) cell lines. Moreover, spiculisporic acid E, glaucanic and glauconic acids were also found to be inactive on the mycelial growth inhibition of plant pathogenic fungi.

---

Student's signature

---

Thesis Advisor's signature