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## Efficiency of Indigenous Fungi for Controlling Pathogenic Bacteria in a Swine Natural Farming System

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### Abstract

Indigenous microorganisms such as fungi are often used in natural farming systems to reduce the rate of both air and water pollution. Different kinds of fungi are therefore added to the bedding to support the production of organic fertilizer. Fungi synthesize enzymes, lactic acid and antibiotics that might inhibit the growth of pathogenic bacteria. Indigenous fungi were collected under bamboos at several places located in five provinces in Northern Thailand (Chiang Mai, Lamphun, Lampang, Chiangrai and Phrae) to investigate the genus or species of the microorganisms. A total of 13 fungi were purified and identified by slide culture. These results indicated that the majority of fungi belonged to *Geomyces* sp. and *Rhizopus* sp. The origin of the further fungi remained unknown. Antibacterial performance studies using *Salmonella* spp., *E. coli* and *Staphylococcus aureus* revealed that three of the 13 fungi affect bacterial growth (23.1%). The fungi collected at Lamphun (Maung isolate) and at Chiangmai (Mae-Sarp and Khun-Sarp isolate) hold the power to inhibit bacterial growth at 61.5%, 38.5% and 38.5% of all bacteria tested, respectively. Co-culture experiments revealed that all fungi strains were capable to inhibit *Salmonella typhimurium* at bacterial concentrations of less than 106 CFU/ml. Growth rates of *Salmonella* spp. taken from pig faeces were inhibited at a concentration of 10 CFU/ml ( $p < 0.01$ ). The results clearly demonstrate the inhibition of bacterial growth by the fungi at a low bacterial concentration. A high efficiency to degrade cellulose has been found in isolates collected in Phrae (Rong-Kwang isolate), Chiangrai (Mae-Fah-Luang isolate), Chiangmai (Saraphi isolate), Lampang (Maung isolate), and Lamphun (Ban-Hong isolate) ( $p > 0.05$ ). The fungus extracted from the Ban-Hong isolate showed the highest cellulase activity ( $0.344 \times 10^{-5}$  U/ml). The lowest activity was found in the Viang-Pa-Pao isolate (Chiangrai) ( $0.065 \times 10^{-5}$  U/ml). The Mae-Rim (Chiangmai), the Rong-Kwang (Phrae) and the Saraphi isolate (Chiangmai) ( $0.326 \times 10^{-5}$  U/ml,  $0.319 \times 10^{-5}$  U/ml and  $0.279 \times 10^{-5}$  U/ml) demonstrated moderate activities ( $p < 0.05$ ). In addition to the gained basic knowledge about indigenous fungi, we will start to characterize these species on the molecular level. The final goal will be to assess their potentials to be used in the swine natural farming system.

**Keywords:** Indigenous fungi, Natural farming, Pathogenic bacteria, swine