Development of a Biofilm from Pleurotus sajor-caju Mycelium Using the Cast Film Technique to Enhance Mineral Nutrient Uptake and Growth of Brassica spp.

Phitthayarat Boon-aiem[1], Nichaphat Sirasuphanimit[1]

[1]*Princess Chulabhorn Science High School Phitsanulok, Makham Sung, Mueang Phitsanulok, Phitsanulok 65000, Thailand*

**E-mail: nichaphat.sir@pccpl.ac.th*

Abstract

Brassica crops are economically important plants but are unable to form arbuscular mycorrhizal associations with arbuscular mycorrhizal fungi (AMF) because isothiocyanates (ITCs) inhibit fungal growth. Therefore, this study developed a *Pleurotus* mycelium biofilm to promote fungal colonization inside plant roots as a fungal endophyte. The results showed that the most suitable biofilm preparation method was scraping the surface of the mycelium with an inoculating loop and wrapping it with aluminum foil, which promoted hyphal aggregation and extracellular matrix formation. The biofilm exhibited the greatest tolerance in the presence of ITCs from cabbage, with a survival rate of 46.08 ± 6.17%, and extracellular matrix production increased as ITC concentration increased. In addition, the *Pleurotus* mycelium biofilm enhanced the uptake of nitrogen, phosphorus, and potassium (NPK) to 56.40 ± 0.44, 2.64 ± 0.02, and 31.90 ± 0.25 mg g^{-1} dry weight, respectively — approximately 1.57 ± 0.02, 1.47 ± 0.03, and 1.48 ± 0.02 times higher than the control group — and promoted plant growth at an average rate of 0.76 ± 0.05 cm day^{-1}, compared to 0.22 ± 0.02 cm day^{-1} in untreated plants. These findings suggest that the developed biofilm has potential for application as a biological product to improve nutrient uptake efficiency and promote plant growth.

Keywords: Brassica crops, Pleurotus, fungal endophyte, biofilm