

Thesis Title	Utilization of bioactive compounds from blue-green algae to control phytopathogenic fungi
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Abstract

Each 20 µl of 1,000 µg/disc of extracts from 11 genera 165 isolates of nitrogen fixing blue-green algae (BGA) was applied on paper disc to screen for the antifungal activities against 6 isolates of plant pathogenic fungi. The activities were shown in 8 isolates. *Calothrix* sp. TISTR 8906 was chosen for further study due to its highest inhibition activity against *Macrophomina phaseolina*, the mung bean pathogen causing mung bean charcoal rot disease, *Colletotrichum truncatum*, *Bipolaris maydis* and *Fusarium oxysporum*. *Calothrix* sp. TISTR 8906 incubated at 29±1°C for 18 days in a 10-L carboy containing modified BGA medium by the addition of NaNO₃ 1.5 g/l, an increase of K₂HPO₄ to 1.5 g/l. The reduction of NaCl concentration to 0.03 g/l, with the initial pH of 7.0. The cultures were sparged with 5% CO₂ in air at flow rate of ca. 1,000 ml/min under the light intensity of 60 µmol photon/m²/s. The biomass obtained was 3 g/l, and 1 g of fresh cells/l (medium) gave 28.67 mg/l (medium) of the extract. The specific activity of crude extract 100 mg was equivalent to 1.8 mg-cycloheximide. The bioactive compounds was stable when treated at 50°C for 2 h, stable at pH 6-7 at 4°C for 24 h and unstable at 70 and 100°C for 90 min. Purification of bioactive compounds by silica gel thin layer chromatography showed the bioactive compounds by two spot with R_f value of 0.55 and 0.65 with chloroform : methanol : H₂O (7:3:1)

as the solvent system. The negative result from ninhydrin reaction, biuret reaction, Molisch's test, anthrone test, unsaturation test and protease inhibition indicated that these bioactive compounds should be a big molecule with a complicate chemical structure. The effect of algal extract on the infection of *M. phaseolina* on mung bean seeds (in petridish) by crude algal extract from *Calothrix* sp. TISTR 8906, formulated with surfactant at the concentration of 250 µg/seed and over, could inhibit the growth of *M. phaseolina*. Moreover, at the concentration of 500 µg/seed, the algal extract showed the same efficiency on inhibition of *M. phaseolina* as that of the fungicide, mancozeb dose of 200 µg/seed. It was also shown that, at the concentration of 250 µg/seed, the crude algal extract could inhibit the fungal infection with no significant from the application method, mixing or dipping method.