

Thesis Title	Utilization of bioactive compounds from cyanobacteria for the control of insect pest
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### Abstract

The insecticidal property of samples extracted from 11 genera 318 strains of cyanobacteria was tested by brine shrimp (*Artemia salina*) bioassay. The toxicities of cyanobacteria extracts on brine shrimp was shown in 7 genera 34 strains. Insecticidal activity of cyanobacteria extracted was subsequently tested via bioassay using insect pests, beet armyworm (*Spodoptera exigua* Hubner) and cotton bollworm (*Helicoverpa armigera* Hubner). Cyanobacteria-methanol extract showed better lethal effect on insect larva than cyanobacteria-water extracted. However, only one strains, *Hapalosiphon* sp. TISTR 8252 could inhibit of 1<sup>st</sup> instar of cotton bollworm

Modified BGA medium with addition of NaNO<sub>3</sub> 1.5 g/l was optimal medium which gave the cyanobacteria dried weight of 0.23 g/l and bioactive compound production (as standard gentamicin equivalent) of 0.47 mg/l or 2.03 mg/g (dry weight) during the 20–21 days of cultivation. Bioactive compound produced on day 21 showed the highest inhibition on the growth of 1<sup>st</sup> instar larvae of cotton bollworm with the average larval weight being 6.5 times lower than the control.

Extract from *Hapalosiphon* sp. TISTR 8252 showed feeding inhibition, growth inhibition and insecticide activity on cotton bollworm. The efficacy of cyanobacteria extract depended on the concentration of extract. The feeding of 3<sup>rd</sup> instar larvae was decreased 90% when the host plants were treated with 1,400 µg/cm<sup>2</sup> of crude extract. For short-term test, the average larval weight of 1<sup>st</sup> instar larvae fed with young chinese kale leaves applied with extract at the concentration 1.0-5.0 % (w/v) was 11.81-79.11

times lower than control, and produced 30-62 % mortality. For long-term test, the crude extract at the concentration 1.0 % (w/v) showed growth and development inhibition, conspicuous delay of metamorphosis, undergoing ecdysis to malformed pupae and reduced adult emergency.

The partial purification of the bioactive compounds by TLC in the band at  $R_{f_6}$  and  $R_{f_4}$  showed the inhibition on the growth of 1<sup>st</sup> instar larvae and average larval weight loss was 6 and 4 times lower than control and on its death of 53 and 30 % respectively. The result was negative for chemical test of partial purification of bioactive compound (ninhydrin reaction, biuret reaction, Molisch's test, anthron test and unsaturation test)

The crude extract was stable at a wide range of pH and temperature but its stability decreased under sunlight and UV irradiation.