Infectivity of *Beauveria bassiana* on *Herotia vitessoides*, a major pest of *Aquilaria malaccensis* Lamk.

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The use of chemical insecticides in plantations of forestry tree species to control the insect pests causes severe environmental hazard. Therefore, the suitable alternative method to manage the insect pests is biological control. Taking into consideration, the effective utilization of entomopathogenic fungi in control of number of insect pests of agricultural and horticultural importance were attempted by many researchers (Ferron. 1981). In this aspect, an attempt was made to evaluate the native entomopathogenic fungus *Beauveria bassiana* to control the major defoliating pest of *Aquilaria malaccensis* in laboratory condition. Soil is the main reservoir of entomopathic fungi which have an essential influence on the occurrence and expansion of insect mycoses (Ignoffo, et.al., 1978). Soil samples were collected from different land use systems in the state of Assam to trap entomopathogenic fungi during 2013 - 2014. We came across a native strain of *Beauveria bassiana* isolated from the forest soil through insect bait method (Zimmermann, 1986). The top soil down to 10-15 cm depth were collected and transferred to small containers. The larvae of the insect *Galleria mellonella* were released for trapping the entomopathogenic fungi through bait method. The fungi isolated from the insect cadavers were subcultured on artificial media Sabouraud Dextrose Agar medium (SDA). A pure culture was obtained and identified as *B. bassiana* on the basis of taxonomic and morphological characters.

The effect of the fungus was tested on *Herotia vitessoides* in laboratory condition through bioassay method. *B. bassiana* was grown on SDA at room temperature 25-28°C for 8 – 10 days, harvested and crude extract was prepared (stock solution) with distilled water. The concentration of spores in the final suspension was determined by haemocytometry (Tamuli and Gurusubramaniam, 2011). The spore suspensions of known concentration were prepared from the stock solution by suitable dilution with distilled water.

**Dilution:** One ml of the purified stock fungus suspension was made up to 10 or 100 ml with water containing 0.1% wetting agent (Tween-80). This solution ensured thorough mixing and uniform distribution of fungal spores. There were two dilution factors: 1 ml made up to 10 ml = 10 times; 1 ml made up to 100 ml = 100 times.

Four concentrations viz. $2.4 \times 10^{10}$, $2.4 \times 10^8$, $2.4 \times 10^6$ and $2.4 \times 10^4$ spores/ml were prepared and pathogenicity test was conducted on *H. vitessoides*. Healthy third instar larvae were surface sterilized with 1-5% sodium hypochlorite and sprayed with the fungal inoculum. The inoculum sprayed *H. vitessoides* larvae were air dried on a filter paper and were released in the plastic containers with *Aquilaria malaccensis* leaves. Control sprayed with distilled water was also maintained. Five replications were maintained for each concentration. Twenty
Larvae were used per replication. Larval mortality was recorded at every 48 h interval and recording of data was concluded on the seventh day of the experiment. Pathogenicity of *B. bassiana* tested on the targeted insect *H. vitessoides* at four different concentrations exhibited that the isolates at the concentrations 2.4 × 10^{10}, 2.4 × 10^{8} and 2.4 × 10^{6} Spores/ml were pathogenic to the larvae and resulting 100% mortality over a period of 7 days and the concentration 2.4 × 10^{4} spores/ml resulted in 98% larval mortality in laboratory condition (Table 1). The data were analyzed through one way ANOVA and the treatments i.e. 2.4 × 10^{10}, 2.4 × 10^{8}, 2.4 × 10^{6} and 2.4 × 10^{4} were found significant at *P* = 0.05. The experiment shows that the soil borne native entomopathogenic fungus *B. bassiana* was very much effective in causing cent percent mortality of the *H. vitessoides* larvae in laboratory condition.

### CONCLUSION

The concentrations of *B. bassiana* viz. 2.4 × 10^{10}, 2.4 × 10^{8} and 2.4 × 10^{6} spores/ml were found effective on *H. vitessoides* and resulting 100% larval mortality over a period of 7 days. *Beauveria bassiana* can be used for effective management of the *Aquilaria malaccensis* defoliator *H. vitessoides* and a number of other forest insect pests. Future research will concentrate on formulation development and the targeting of pests which live in different environments.

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### Table 1: Evaluation of *B. bassiana* (natural strain) against the defoliator *H. vitessoides* in laboratory condition

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Conc. (spores/ml)</th>
<th>(R) Replication 5 of 20 larvae in each replication</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>All Treatment Total Larval Mortality</td>
</tr>
<tr>
<td>1</td>
<td>T1 2.4 × 10^{10}</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>T2 2.4 × 10^{8}</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>T3 2.4 × 10^{6}</td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td>T4 2.4 × 10^{4}</td>
<td>98</td>
</tr>
<tr>
<td>5</td>
<td>T5 Control</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>398</td>
</tr>
</tbody>
</table>

CV 2.51 SED 0.80 CD 1.4
Fig.1.  A. *Herotia vitessoides* larvae  
B. *H. vitessoides* larvae infected with *B. bassiana*

REFERENCES

Ferron P. 1981. Pest control by the fungi *Beauveria* and *Metarhizium*, In: Microbial control of pest plant diseases, H.D Burges (eds) : 465-482.


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