**Antifeedant activity of Morinda citrifolia L. (Noni) against Helicoverpa armigera (Hubner)**

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**ABSTRACT**

During the investigation on antifeedant activity of *Morinda citrifolia* against third instar larvae of *Helicoverpa armigera*. The methanolic extract of leaves and root showed the extremely significant antifeedant activity at highest concentration 10,000 ppm with the C-value of 0.16 & 0.074. Whereas the extract of root bark showed the extremely significant antifeedant activity at 10,000, 7,000 ppm concentration with C-values of 0.035 & 0.043 and extract of stem bark showed the extremely significant antifeedant activity at 10,000 & 7,000, 5,000 & 3,000 ppm with C-value of 0.05, 0.118, 0.218 & 0.226. Stem bark extract was least preferred by the larvae because it showed the extremely significant antifeedant activity even at lower concentration. On the basis of non-preference by the larvae of *H. armigera*, the methanolic extract of stem bark can be used as an alternate to synthetic pesticide.

**Key words:** *Morinda citrifolia*, Helicoverpa armigera, antifeedant.

**INTRODUCTION**

*Helicoverpa armigera* (Hubber) is one of the important polyphagous pest which causes severe losses to almost all the economical crops like cotton, tomato, pigeonpea, oilseeds etc. (Chavan et al., 2003). A large number of synthetic, non selective toxic chemicals have been introduced during past several years to control this pest. However, their extensive and indiscriminate use has led to number of environmental, economic and human problems including the persistence of residues, development of pest resistance (McCaffery et al., 1989). It has become imperative to search other alternative measures for management of this pest. Amongst, many alternate approaches, the use of natural antifeedant of plant origin can be considered as potential alternative for insect pest management (Saxena, 1996) because they are rich source of natural chemical viz., flavanoids, anthraquinones, glycosides etc. Keeping the above fact in mind, the methanolic extract of leaves, stem bark, root and root bark of indigenous plant *M. citrifolia* have been evaluated for antifeedant activity against grampod borer (*H. armigera*). *Morinda citrifolia* L. (Noni) belonging to family Rubiaceae is one of the traditional folk medicinal plant hat has been used over 2000 years in Polynesia (Whistler, 1985). It has been reported to have a broad range of therapeutic and nutritional value (Singh et al., 1984) and have a broad range of health benefits for cancer, arthritis, diabetes, asthma, hypetension and pain (Whistler, 1992).

**MATERIALS AND METHODS**

The larvae of *H. armigera* were collected from crop research center of G.B. Pant University, Pantnagar during the month of April. To maintain the fresh culture, insect were reared on semisynthetic diet prepared as per the method of Singh (et al., 2001) freshly moulted 3rd instar larvae were used as a test insect. The text material i.e. *M. citrifolia* leaves, stem bark, root and root bark
were procured from Lucknow and Chennai. The plant material were dried under shade and pulverized. The powdered material was extracted with methanol in soxhlet apparatus. The known volume of the alcoholic extract was concentrated under vacuum using the rotaevaporator to find the percentage extractive. The stock solution of known concentration were prepared and further diluted with methanol as per requirement. To test the antifeedant activity, fresh undamaged disc of cabbage leaves (3cm² area) were treated with different concentration of the plant extract. The treated leaves were dried and placed in individual petridishes. A single 3rd instar larvae was placed in each disc and allowed to feed for 24 hrs. All the treatment were replicated three times along with matter left methanol only. The observations were recorded for leaf area consumed by larvae. The preference index (C-value) for each treatment was calculated by using following

\[
C = \frac{2A}{M + A}
\]

where:
- \(A\) = eaten area of test leaf
- \(M\) = eaten area of the standard leaf

C value of 1 = feeding on test plant extract equals to standard.
C value > 1 = preference of test plant extract
C value < 1 = lesser acceptance to test plant extract.

### Table -1: Antifeedant activity of methanol extracts of *M. citrifolia* L. (Noni). against *H. armigera* (Hub.)

<table>
<thead>
<tr>
<th>Different Concentration of <em>M. citrifolia</em> in Methanol (in ppm)</th>
<th>Preference Index (C-value)</th>
<th>Stem</th>
<th>Root</th>
<th>Root Bark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaves</td>
<td>Stem Bark</td>
<td>Root</td>
<td>Root Bark</td>
<td></td>
</tr>
<tr>
<td>10,000</td>
<td>0.16</td>
<td>0.05</td>
<td>0.074</td>
<td>0.35</td>
</tr>
<tr>
<td>7,000</td>
<td>0.35</td>
<td>0.118</td>
<td>0.329</td>
<td>0.43</td>
</tr>
<tr>
<td>5,000</td>
<td>0.55</td>
<td>0.215</td>
<td>0.418</td>
<td>0.273</td>
</tr>
<tr>
<td>3,000</td>
<td>0.66</td>
<td>0.226</td>
<td>0.660</td>
<td>0.57</td>
</tr>
<tr>
<td>2,000</td>
<td>0.67</td>
<td>0.640</td>
<td>0.750</td>
<td>0.57</td>
</tr>
<tr>
<td>1,000</td>
<td>0.72</td>
<td>0.746</td>
<td>0.97</td>
<td>0.83</td>
</tr>
<tr>
<td>Control</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>SEM±</td>
<td>0.0054</td>
<td>0.00316</td>
<td>0.0057</td>
<td>0.0073</td>
</tr>
<tr>
<td>CD at 5%</td>
<td>0.0165</td>
<td>0.00959</td>
<td>0.0174</td>
<td>0.0223</td>
</tr>
</tbody>
</table>

**C- Value**
1. Extremely significant antifeedant 0.01-0.25
2. Significant antifeedant 0.25-0.50
3. Moderately antifeedant 0.51-0.75
4. Slight antifeedant 0.76-0.99
5. Preferred plant >1.00
RESULTS AND DISCUSSION

The antifeedant activity of methanolic extract of leaves, stem bark, root and root bark of *M. citrifolia* were evaluated against third instar larvae of *H. armigera*. The preference index (C-value) were recorded. From Table -1, it is evident that extremely significant antifeedant activity was observed for root bark followed by stem bark, root and leaves at 10000 ppm with C-value of 0.035, 0.05, 0.074 & 0.16. At 7000 ppm the root bark also showed extremely significant antifeedant activities with C-value of 0.043. However, at lower concentration i.e. 7000, 5000 & 3000 ppm stem bark showed better antifeedant activity as compared to root bark, root & leaves with C-value of 0.118, 0.218 & 0.226 respectively while at 2000, 1000 ppm stem bark showed moderate antifeedant activity. Thus, the methanolic extract of stem bark of *M. citrifolia* can be recommended as nontoxic, less expensive, eco-friendly antifeedant for control of *H. armigera*. The antifeedant activity of *M. citrifolia* extract have not been reported. Although, the different extract of the *M. citrifolia* is thoroughly evaluated for various biological activity and number of bioactive molecule have been isolated.

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REFERENCES