Evaluation of green lacewing (*Crysoperla carnea*) eggs hatching in field and laboratory conditions

Tariq Sharif, Asad Bashir, Irum Waheed, Muhammad Safder, Ayesha Saleem, Muhammad Zeeshan and Hasnain Yaseen

**Abstract**

To evaluate the hatchability of *Crysoperla cornea* on sugarcane variety HSF-242. Eggs of *C. cornea* were released in the form of rings containing 25 eggs twice in a month. Similarly 25 eggs per ring were kept in laboratory at optimum temperature 28 ± 2 °C and relative humidity 60-65%). In field conditions maximum hatching was observed during the month of March which was 70% and followed by April (67%), September (66%). August (65%), May (58%). July (40%) 2nd June (30%). Similarly damaging percentage was observed maximum during the month of June (70%) followed by July (60%), May (42%). August (35%), September (34%). April (33%) and March (30%). In laboratory conditions no significant difference in hatching which was observed and ranged from (72-76%).

**Keywords:** *Crysoperla carnea*, hatchings, field conditions, laboratory conditions, eggs laying

**Introduction**

Agriculture is the mainstay of Pakistan economy. Nearly one fourth of total output and 45% of total employment is engaged in agriculture sector (Anonymous. 2002) [2]. Sugarcane is an important cash crop of Pakistan. It is the main sources of sugar production and also produces numerous valuable by - product like alcohol, ethanol, bagasse and press mud which is the rich source of organic matter and nutrient for crop production (Shafi, 2000) [17]. In Pakistan sugarcane cultivated area is 1.7 million hectares and the national average cane yield is 47.5 ton/ ha and average sugar recovery is 8.97% which is less than worldwide yields which is more than 100 ton/ ha and recovery more than 14%, but the potential in Pakistan is also to obtain yield more than 100 ton/ ha. (Ehsan et al. 2000) [5]. Like considerable increase in sugarcane cultivated area, hut unfortunately per acre yield was stagnant during the past few years. There are many reasons of stagnation in per acre yield. Such us poor selection of soil, sowing of non-quality seed, poor tillage practices, use of unbalanced fertilizers and other agronomic practices. However, major factor which is usually overlooked has always been the attack of various insect pests and diseases on this crop. Sugarcane is attacked by a number of chewing pests including top, root, stem and gurdaspur borers (Rajiejulran et al. 2003) and sucking pests i.e. sugarcane pyrilla, whitefly and black bug are major pests (Patil et al. 2003) [14]. Unfortunately, plant protection in sugarcane is considered as a secondary importance in Pakistan. There have been several examples in past when there was a drastic decline in sugar production per unit area because of severe attack of insect pests. Sugarcane is a perennial crop, control of insect pests through direct methods such as cultural, mechanical and chemical control methods are not feasible because sugarcane attain maximum height in early days of their growth. It is most feasible to use biological control because low disturbance against natural fauna (Shenhmar et al. 2003) [18]. *Chrysoperla cornea* is bio-control agent and can easily be reared on commercial scale (Charles et al. 1998) [4]. It is a predator of the larval stage of lepidopteron pests (Hydorn, 1971) [6] and found in wide variety of cropping systems (Aynew et al. 1981) [3]. It is a voracious feeder having sickle-like mouth part to cut the body of host larvae, eggs and to suck the body fluid.
It can be successfully used in Integrated Pest Management because it has resistance against many insecticides (Paraveen and Dhundidapani, 2001) [12]. They used *C. carnea* with neem seed extract for control of whitefly and Jassid on tomato. Acetamiprid and spinosad are safe for *C. carnea* and used in Integrated Pest Management. Acetamiprid exhibited little Ovicidal effect permitting 62.5 – 82.5% egg hatching and also spinosad which permitting 62-85.5% egg hatching (Uthamasamy et al. 2003) [13].

1. The main objectives of these studies were.
2. To observe hatching percentage in field and laboratory conditions.
3. To gauge the survival rate of this bio-control agent under prevailing environment conditions.
4. To observe feasibility of this bio agent on sugarcane crop.

**Materials and Methods**

**Study site**

Experiments were conducted during the season 2017-18 at experimental area and biological Control Research Laboratory, Layyah Sugar Mills, Layyah. Sugarcane only HSP-242 was sown in field where *C. carnea* eggs were released. But in laboratory trial was conducted under laboratory condition at optimum temperature 28 ± 2 °C and relative humidity 60-05%. The eggs of *C. carnea* was taken from Biological Control Research Laboratory Layyah Sugar Mills, Layyah.

**Mass rearing of Adults**

To rear the adults’ two different kinds of cages were used for good eggs laying. To maintain the healthy culture different designs were used.

**Transparent glass cages**

This cage was made with transparent glass and black muslin cloth was used and pinned tightly with common paper pins which make them easy to rear and adults did not escape. The front side consist of hole which size 7.4 cm use for handling of insects and it is covered with muslin white cloth. To maintain the moisture placing white cotton wig in glass vials.

Data Analysis

Grey eggs of *C. carnea* were released in the form of staked eggs on paper ring @25 eggs per ring. Each ring was tagged on single plant randomly. Released schedule of *C. carnea* and mean temperature are given in Table 1. After three days of releases these rings was collected from the field to observe hatching percentage under microscope. In case of laboratory condition after three days hatchimg percentage was also observed under microscope. In both laboratory and field condition hatching percentage and damaging percentage were also observed. The data collected was subjected to be analysis by suitable computer software.

Results and Discussion

Study in Field Conditions Month wise evaluation of *C. carnea* eggs hatching and damaging percentage in field conditions are given in Table No.1 Maximum eggs hatching (70%) was observed during the month of March followed by April (67%), September (66%), August (65%), May (58%), July (40%) and June (0%). Maximum damaging percentage was observed during the month of June which was 70% and followed by July, May, August, September, April and March which were OUY%, 42%, 45% 34%, 33% and 30% respectively. Our research has indicated that some biotic and abiotic factor influenced the hatching of *C. carnea* eggs. In...
humidity was 60-65%, so the temperature remained constant where optimum temperature was 28±2°C and relative humidity 24-28%. Our results showed that in laboratory conditions, Second instars larvae consumed their eggs and newly emerged larvae in its successive stages. (Rosenheim, 2001) [16] Assessed that higher woolly aphid population on sugarcane enhanced the survival of *C. carnea* in field condition. (Adane, et al. 2002) [1] Assessed that *C. carnea* female laid maximum eggs i.e. 1079 and oviposition period were affected significantly due to the variation in prey species, while hatchability and sex ratio were unaffected. In study in laboratory conditions, month wise evaluation of *C. carnea* eggs hatching and damaging percentage in laboratory condition are given in Table No.2. In laboratory condition no significant difference among month wise eggs hatchability i.e. 72 — 76% and also damaging percentage was observed i.e., 24 - 28%. Our results showed that in laboratory condition where optimum temperature was 28 ± 2°C and relative humidity was 60±5%, So the temperature remained constant and variation of hatching percentage were also minimum. (Osman et al. 1993) [11] Confirmed our results they studied the egg hatching and adult emergence i.e. 75% and 74.8% respectively at temperature 28 °C and relative humidity 65 - 70%. (Mustafa et al. 2003) [10] observed maximum eggs viability (82.89%) in laboratory condition when eggs was harvested by razor.

### Table 2: Evaluation of *C. Carnea* eggs Hatching and Damaging in Field Conditions

<table>
<thead>
<tr>
<th>Month</th>
<th>Mean No. of observed eggs</th>
<th>Mean hatched eggs</th>
<th>Hatching Percentage</th>
<th>Mean damaged eggs</th>
<th>Damage percentage</th>
<th>Mean Temperature °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>March</td>
<td>50</td>
<td>35</td>
<td>70</td>
<td>15</td>
<td>30</td>
<td>35.5</td>
</tr>
<tr>
<td>April</td>
<td>50</td>
<td>33.5</td>
<td>67</td>
<td>16.5</td>
<td>33</td>
<td>36.5</td>
</tr>
<tr>
<td>May</td>
<td>50</td>
<td>29</td>
<td>58</td>
<td>21</td>
<td>42</td>
<td>40</td>
</tr>
<tr>
<td>June</td>
<td>50</td>
<td>15</td>
<td>30</td>
<td>35</td>
<td>70</td>
<td>43</td>
</tr>
<tr>
<td>July</td>
<td>50</td>
<td>20</td>
<td>40</td>
<td>30</td>
<td>60</td>
<td>41.5</td>
</tr>
<tr>
<td>August</td>
<td>50</td>
<td>32.5</td>
<td>65</td>
<td>17.5</td>
<td>35</td>
<td>40</td>
</tr>
<tr>
<td>Sept</td>
<td>50</td>
<td>33</td>
<td>66</td>
<td>17</td>
<td>34</td>
<td>34.5</td>
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</tbody>
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### Table 3: Evaluation of *C. Carnea* Eggs Hatching and Damaging in Laboratory Conditions

<table>
<thead>
<tr>
<th>Month</th>
<th>Mean No. of observed eggs</th>
<th>Mean hatched eggs</th>
<th>Hatching percentage</th>
<th>Mean damaged eggs</th>
<th>Damaging percentage</th>
<th>Mean Temperature °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>March</td>
<td>50</td>
<td>37</td>
<td>74</td>
<td>13</td>
<td>26</td>
<td>30</td>
</tr>
<tr>
<td>April</td>
<td>50</td>
<td>38</td>
<td>76</td>
<td>12</td>
<td>24</td>
<td>28</td>
</tr>
<tr>
<td>May</td>
<td>50</td>
<td>36</td>
<td>72</td>
<td>14</td>
<td>28</td>
<td>26</td>
</tr>
<tr>
<td>June</td>
<td>50</td>
<td>36</td>
<td>72</td>
<td>14</td>
<td>28</td>
<td>27</td>
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<tr>
<td>July</td>
<td>50</td>
<td>37</td>
<td>74</td>
<td>13</td>
<td>26</td>
<td>27</td>
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<tr>
<td>August</td>
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<td>38</td>
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<td>Sept</td>
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<td>76</td>
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### Conclusions

In conclusions, *Chrysoperla carnea* is bio-control agent which can adopt this climatic conditions and may successively control insect pests of sugarcane i.e. Borer complex, sugarcane bug and sugarcane pyrilla. The population of *Chrysoperla carnea* so an important tool for integrated whitefly, sugarcane black synchronized with pest’s emergence on sugarcane crop. It is al pest management.

### Recommendations

- Handling of these rings should be proper during the releases in the field.
- Grey eggs should be released.
- Rings of grey eggs should be tagged on 4th. Top portion of plant.
- Release should be equivalent in field.
- Releases should be repeated after 15 days interval.
- Protect the eggs from direct sunlight during tagging on plant.

### Acknowledgement

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![Fig 1: Months wise eggs hatching *C. carnea* in field conditions](image-url)
Fig 2: Month wise eggs hatching of *C. carnea* in Laboratory conditions

References


