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### THE USR INTERNATIONAL SEMINAR ON FOOD SECURITY

“Improving Food Security : The Challenges for  
Enhancing Resilience to Climate Change”

**Volume II**

The University of Lampung

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# **USR INTERNATIONAL SEMINAR ON FOOD SECURITY**

*Improving Food Security : The Challenges for Enhancing Resilience to  
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**EXPLORATION OF THE PREDATORS OF SUGARCANE SCALE INSECT  
(*Aulacaspis tegalensis* Zehntn) AND TESTING THE DURABILITY OF THE  
PREDATOR WITH ALTERNATIVE FEEDS \*)**

SUDI PRAMONO\*\*), FX. WAGIMAN, Y. ANDI TRISYONO AND WITJAKSONO\*\*\*)

\*) Part of dissertation S3 Ilmu Pertanian UGM, Yogyakarta.

\*\*\*) Departmen of Plant Protection, Faculty of Agriculture, Lampung University

\*\*\*) Departmen of Plan Pest and Disease, Faculty of Agriculture, Gadjah Mada University

**ABSTRACT**

One of the important factors that could potentially lower the production of sugarcane plantations in Indonesia is the pest infestation. The mayor pest of sugarcane are sugarcane top borer (*Scirpophaga nivella*), sugarcane stem borer (*Chilo aurichilius*), rats and sugarcane scale insect (*Aulacaspis tegalensis*). Scale pests of sugarcane in the last decade increased in areas of Sumatra. The attack of sugarcane scale insect on the sugarcane plantations of PT Gunung Madu Plantations, Central Lampung is almost evenly in estate area with a strike rate of over 18 percent. This research aimed to get potential predators for biological control of sugarcane scale insect. The experiment was carried out in the sugarcane field and Entomology Laboratory of PT Gunung Madu Plantations (PT GMP), Gunung Batin, Lampung Tengah, in April 2015 until May 2016.

As many as 10 individuals of adult predators were placed in plastic jars, 9 cm in diameter. This experiment was arranged in a randomized Complete Design with six treatments and 3 replicates. Treatments were feeding in the form of P1 (100 individuals of sugarcane scale insect); P2 (200 individuals of sugarcane scale insect); P3 (300 individuals of sugarcane scale insect); P4 (100 individuals of aphids); P5 (200 individuals of aphids), and P6 (300 individuals of aphids). The observation was done every day, when the remaining 50% of feed was replaced with the new feed.

One character of the predator was desired in that it had the ability to survive with both the original and alternative feeds. Predators that were found in sugarcane plantations, PT Gunung Madu Plantations were, among others, *Chilocorus* sp., *Telsimias* sp. and *Scymnus* spp. The experiment showed that when fed with sugarcane scale insect, *Chilocorus* sp. survived for 27.2 days, *Telsemia* sp. 4.1 days and *Schymnus* sp. 27.8 days. When fed with





alternative feeds (white sugarcaneaphids) *Chilocorus* sp was able survive for 7.1 days, *Telsemia* sp. survive 4.1 days and *Schymnus* sp. 8.1 days.

## INTRODUCTION

Sugarcane scale(*Aulacaspis tegalensis*) had not previously been reported as an important pest of sugarcane plants but from 2002 to 2007 the population is very high in sugarcane plantation of Sugar Group Companies (SGC). The insect has been found to be more damaging than the stem borer and shoot-tip borer. The intensity of the attacks in sugarcane aged 4 months amounted to 58.34% and in sugarcane aged 6 months amounted to 63.34%, Couhault (2008) cit. Utomo (2010).

Observations on sugarcane plantations PT Gunung Madu Plantations, Central Lampung from April to October 2015 show the phenomenon that is not much different from the sugarcane plantation of Sugar Group. Attacts of sugarcane scale insect occurred in sugarcane aged 6 months to harvest. Sugarcane varieties are susceptible to attack lice shield include GMP 1 GMP 2, GM 23 and GM 25 population is very high even reached thousands of heads per stem.Sugarcane scale population continued to increase until the harvest resulting in a decrease yield and cause losses are relatively large (Research and Development PT. Gunung Madu Plantations, 2014).

To reduce the rate of loss used control is required, among others by means of biological control using predators. This was chosen because of a sugarcane scale is in the stem of sugar cane so that the necessary natural enemies that can get into the midrib and prey on fleas. Hopefully, sugarcane scale insect population could be controlled by the predator so that their population could be be reduced to the level that are not harmful

The problems arise how to provide a predator ready at any time given the presence of sugarcane scale on cane aged 6 months or more (Sunaryo and Hasibuan. 2003). Maintenance required for alternative feed predator shield is a type of mite aphids (*Ceratovacuna lanigera*) almost throughout the year. Characters potential predator is more like the main prey but can survive with alternative feed. Therefore in this study to test the durability of some types of predators using the main feed and alternative feed (Wagiman, 1996) .





## MATERIALS AND METHODS

Tools and materials used jar of diameter 9 cm high 7 cm, gauze, tissue, brush, needle, handcounter, binocular microscope, petri dish, sugar cane attacked by sugarcane scale, predatory insects and mites sugarcane scale.

The experiment was conducted in the sugar plantations and in the Laboratory of Entomology of PT Gunung Madu Plantations (PT GMP), Gunung Batin, Central Lampung, from April 2015 to May 2016. All types of predators encountered at any point of the collection is taken and immediately put in a jar lice sugarcane scale. Imago form *Chilocorus* sp., *Telsimia* sp. and *Scymnus* sp. and used as feed sugarcane scale (*Aulacaspis tegalensis*) and aphids (*Ceratovacuna lanigera*).

Imago predator placed in plastic jars diameter 9 cm by 10 tails. The treatments were feeding in the form of P1 (100 sugarcane scale); P2 (200 sugarcane scale); P3 (300 sugarcane scale); P4 (100 aphids tail); P5 (200 aphids tail) and P6 (300 aphids tail). This experiment was arranged in a completely randomized design with 6 replications. Observations were made every day, when the remaining 50% of feed is replaced with a new feed, until all the imago predators who used to experiment die.

## RESULTS AND DISCUSSION

Predatory sugarcane scale is found in many sugar cane plantations PT Gunung Madu Plantations Central Lampung there are 3 types of *Chilocorus* sp., *Telsemia* sp. and *Schymnus* sp. All three predators are found in groups. not all places are found predators, predators found in plants that are 6 months old or older and sugar cane crops attacked by sugarcane scale (*Aulacaspis tegalensis*). Predator *Chilocorus* sp. most often found in sugar cane plantations followed *Schymnus* sp. and *Telsemia* sp. The existence *Telsemia* sp. only brief, namely when old plants 6-7 months after that age is hard to find. The phenomenon is interesting to study further whether the shield predator mite infestation would prey on other types namely sugarcane aphids (*Ceratovacuna lanigera*). The results show very interesting results among the three predators and showed a different response when given prey mites and aphids shield cane sugar.

*Chilocorus* sp. very like sugarcane scale, is so fed only takes a few moments to locate and direct lice prey on the shield. In contrast with aphids seem less like even tend to shy away. Likewise for predators *Schymnus* sp., Imago insect infestation is favored prey

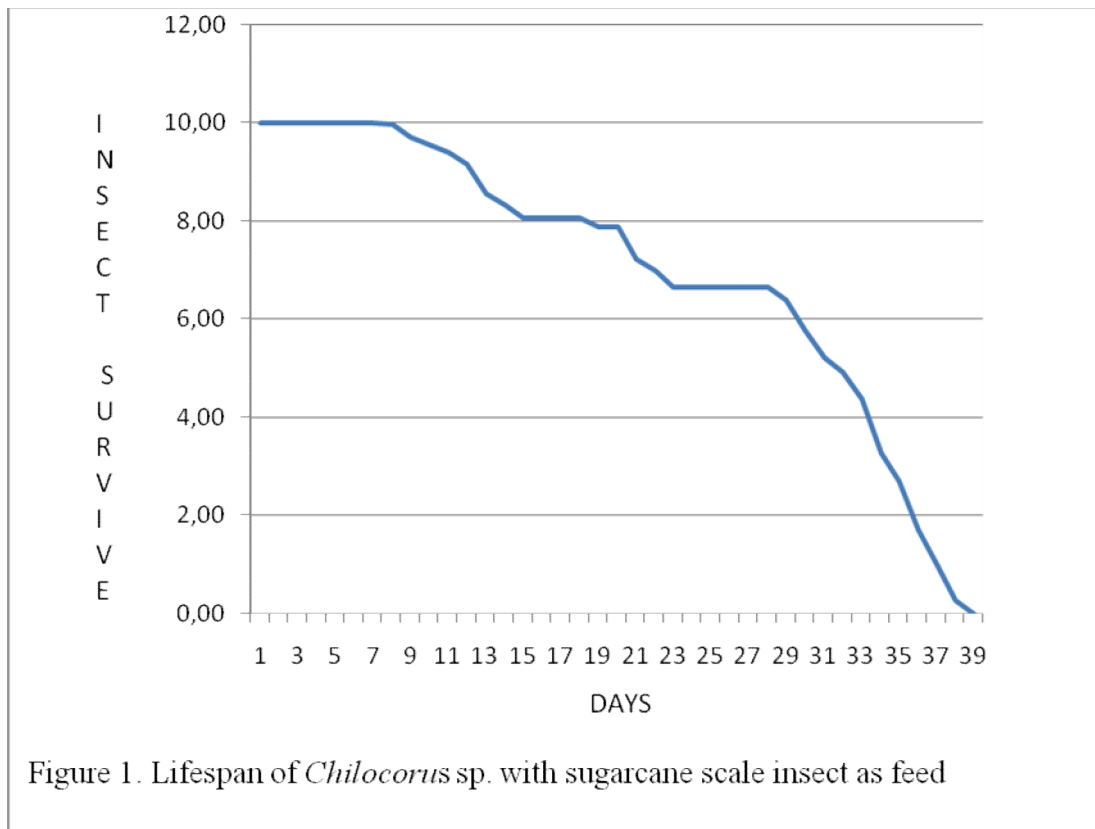


sugarcane scale compared with sugarcane aphids. For predator *Telsemia* sp. fed sugarcane scale and aphids are less aggressive in prey.

**Table 1.** The average age of the predator to prey sugarcane scale and aphids

Prey	<i>Chilocorus</i> sp	<i>Telsemia</i> sp.	<i>Schymnus</i> sp.
Sugarcane scale	27,2 a	4,1 a	27,8 a
Sugarcane aphid	7,1 b	4,1 a	8,1 b

**The average age of *Chilocorus* sp.** *Chilocorus* sp. fed sugarcane scale age much longer with an average of 27.2 days, while those fed aphids on average only 7.1 days. This suggests that the beetle *Chilocorus* sp. more like sugarcane scale compared with aphids. In addition to longer life may also produce offspring that can be maintained as biological agents. Another advantage that is approaching prey monofag means other than cane shield lice only as an alternative if the original is not available prey. Characters like this is very good because if the field is expected to always find their prey, namely the original sugarcane scale.



In Figure 1 looks *Chilocorus* sp. survive long enough and the mortality rate is relatively slow. The first day until the seventh day there is no death, even do copulation. On the 8th day begin to occur death although not too much and the almost simultaneous deaths occurred on the 27th day. The results showed that predators *Chilocorus* sp. fed sugarcane scale can produce offspring although not much.

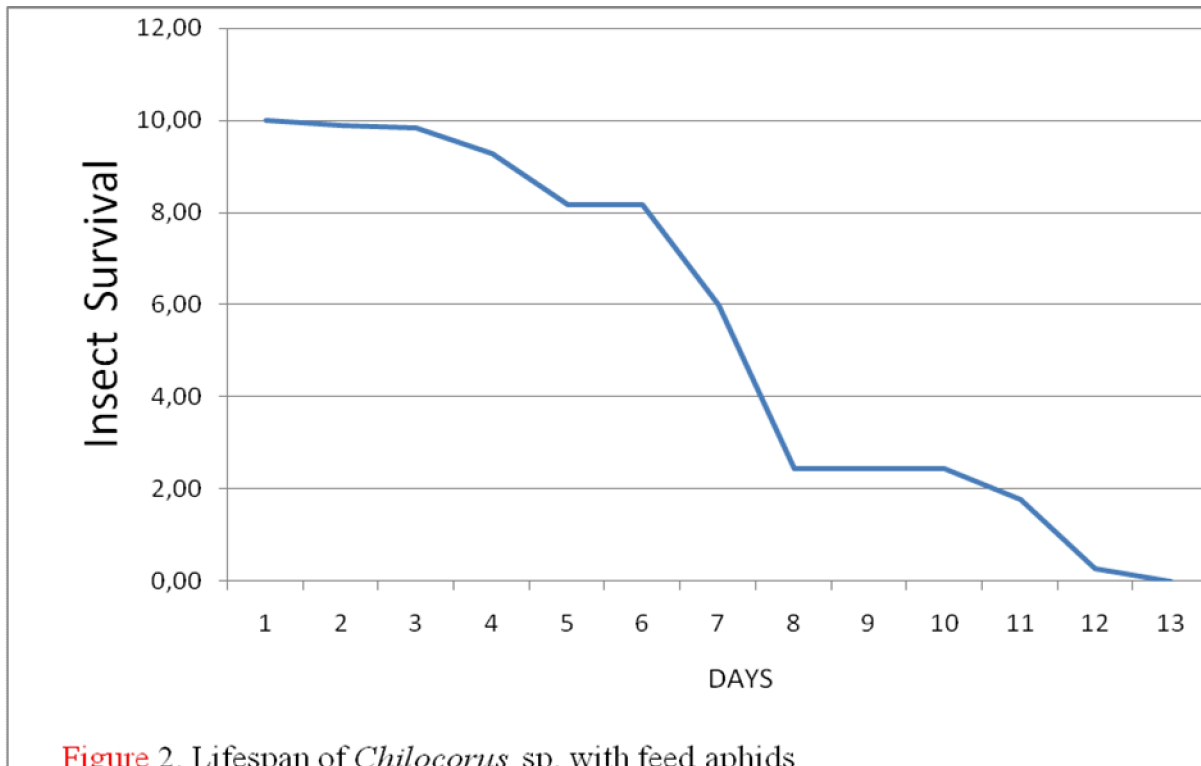
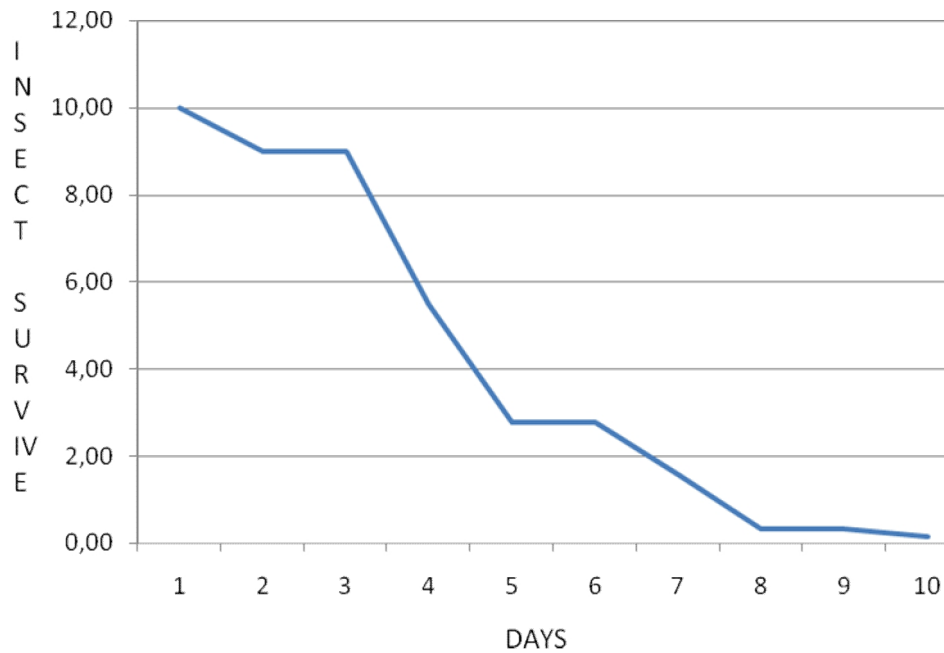
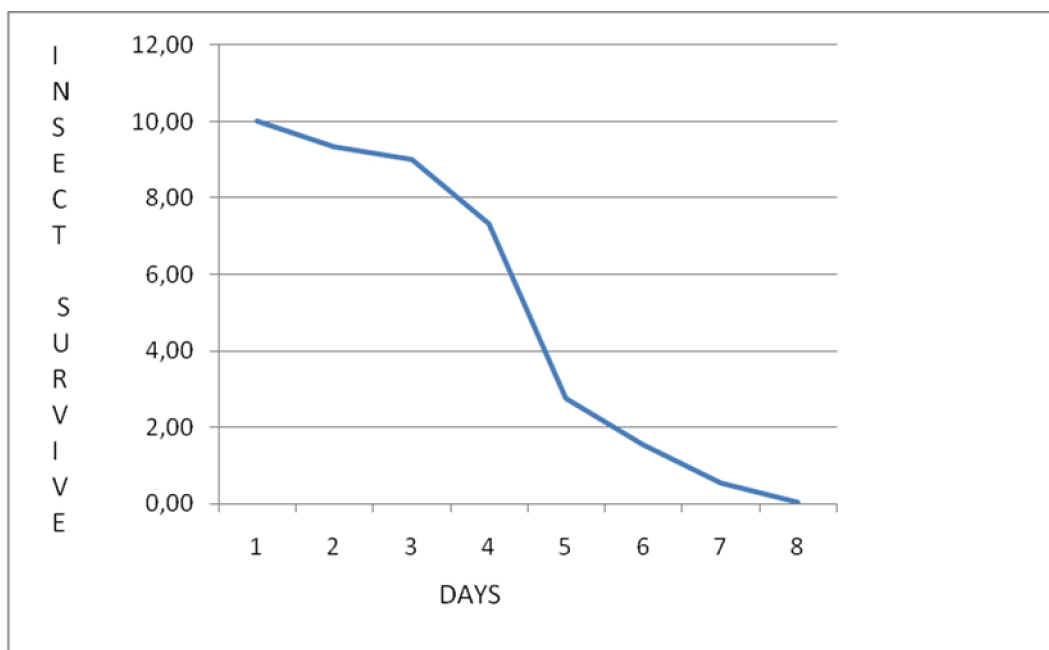


Figure 2 shows starting on day 3 already happened death and death take place very quickly. On the 8th day only about 20% of the test insects, on day 13 all *Chilocorus* sp. all dead. The observations further indicate that no imago that produce offspring, so that it can be said that the aphids feed not suitable for breeding predators *Chilocorus* sp.

**The average age of *Telsemia* sp.** Age *Telsemia* sp. average of only 4.1 days better preserved using the shield fleas feed sugarcane scale and aphids, the feed showed no difference. Imago that was fed with sugarcane scale insect and aphids produce no offsprings. This means that *Telsemia* sp. could not adapt to an artificial environment, so it is difficult to breed. The death rate was relatively fast, as shown in Figures 3 and 4.



**Figure 3.** Lifespan of *Telsemia* sp. that was fed with sugarcane scale insect as feed

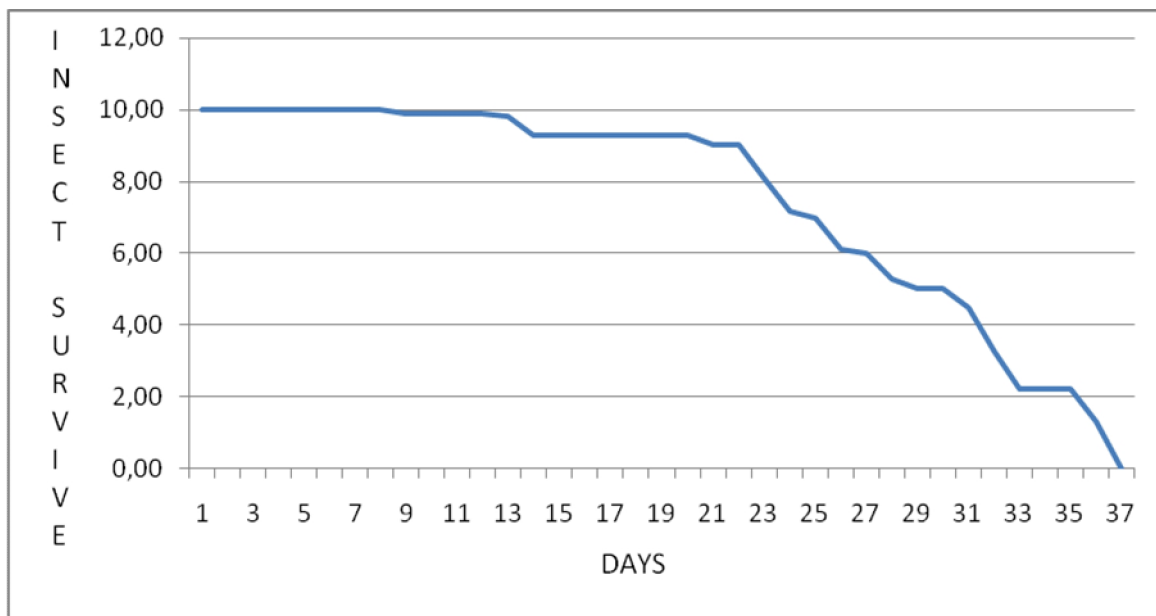


**Figure 4.** Lifespan of *Telsemia* sp. with aphids as feeds.

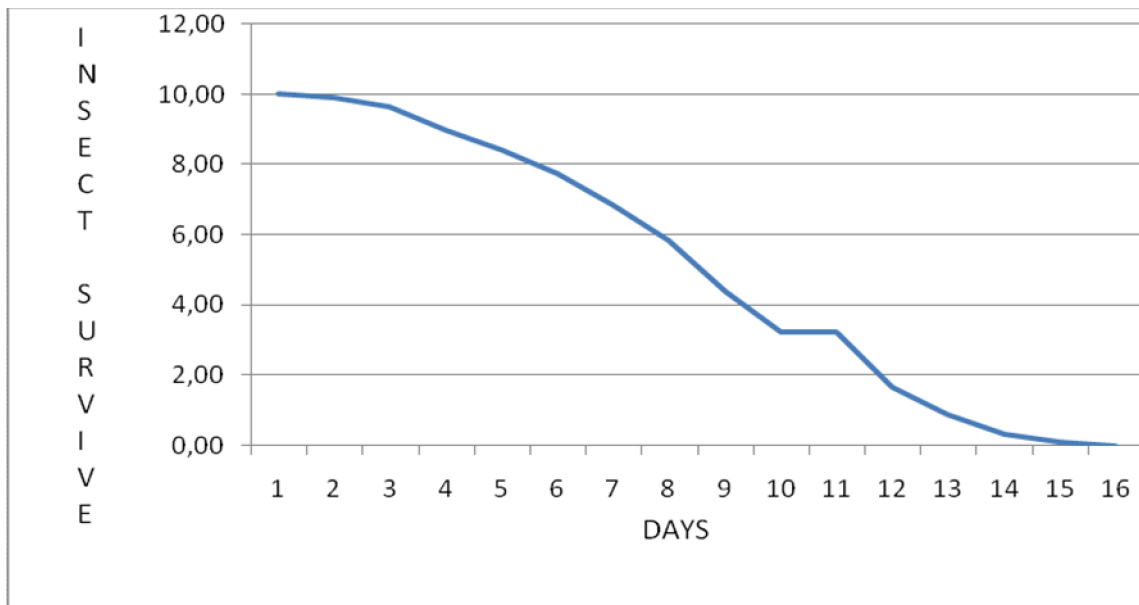
**The average age of *Schymnus* sp.** The average age of imago *Schymnus* sp. that was maintained with sugarcane scale insect as feed was 27.8 days, even some individuals could reach 35 days. Those maintained with aphids as feeds had an average age of

only 8.1 days. Based on observations at the end of maintenance with sugarcane scale insect as feed, only a few larvae of *Schymnus* sp. were found. The larvae were found to be less agile than those found in the field.

As a biological control agents such phenomena indicate that the predator *Schymnus* sp. could not adapt to the artificial environment. The observations further indicate that the resulting larvae molt failed and eventually died. As for the lifespan of *Schymnus* sp with sugarcane scale insect as feed was long enough, suggesting that they have the potential to become a biological agent. Lifespan of the predatory insect can be seen in Figure 5 and 6.



**Figure 5.** Long Lifespan of *Schymnus* sp. with sugarcane scale insect as feeds.



**Figure 6.** Lifespan of *Schymnus* sp. with aphids as feeds.

The third character of the predators showed that they responded differently to the original feed (sugarcane scale insect) and alternative feed (aphids). *Chilocorus* sp. and *Schymnus* sp. showed against alternative feed's favorite. *Telsemia* sp. was short-lived and do not produce offsprings. *Chilocorus* sp. with a cane scale insect as feed showed a relatively long lifespan and produce offsprings, while the imago *Schymnus* although had a relatively long lifespan but the offsprings are not agile and the larvae failed to change its skin (dead).

*Chilocorus* sp with sugarcane scale insects as feeds survived for an average of 27.2 days, *Telsemia* sp. 4.1 days and *Schymnus* sp. 27.8 days. While fed with alternative feed (aphids) *Chilocorus* sp survived 7.1 days, *Telsemia* sp 4.1 days and *Schymnus* sp 8.1 days. *Chilocorus* sp. is a predator that has the best and most potential characters bred as biological control agents.

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