

**EFFECT OF GIVING MIXED INSECTICIDE CARBOFURAN ON COW FECES  
TOWARD CONSUMPTION RATE AND ASSIMILATION EFFICIENCY EARTH  
WORMS *Pheretima javanica* Gates**

Erwin Nofyan<sup>1</sup>, Syafrina Lamin<sup>1</sup>, Innocenthya Tygra Patriot<sup>1</sup>

<sup>1</sup>Department of Biology, Faculty of Mathematics and Natural Sciences

University Sriwijaya, Inderalaya, Ogan Ilir, South Sumatra, 30662

Corresponding author: erw\_biounsri@yahoo.co.id, Phone call : 08127889278

**ABSTRACT**

Research on the effect of giving mixed insecticide carbofuran on cow feces toward consumption rate and assimilation efficiency earth worms *Pheretima javanica* Gates held in June 201 until August 6, at Laboratorium animal Physiology Department of Biology, Faculty of Mathematics and Natural Sciences, University of Sriwijaya, Inderalaya, Ogan Ilir, South Sumatra. This study aims to determine the effect of Insektisidacarbofuran on the rate of consumption and the efficiency of assimilation of earth worms *Pheretima javanica* Gates. The contribution of this study provide information to farmers about the effects of the insecticide carbofuran against non-target animals, particularly land animals are earth worms *Pheretima javanica*. This study uses a completely randomized design with 6 (Six) treatments and five (5) replicates. Treatment given the form of the insecticide carbofuran with the concentration 0% (control); 0.1%; 0.2%; 0.3%; 0.4%; 0.5%. Data were analyzed by analysis of variance, if there is significant continued with Duncan test at 95% confidence level. The results showed that the treatment of various concentrations of the insecticide carbofuran significant effect on the average rate of consumption and the efficiency of assimilation. Average consumption rate earthworm *Pheretima javanica* lowest for the provision of insecticide carbofuran at concentrations of 0.5% which was  $0.23 \pm 0.02$  mg / g of the day and the average consumption rate of earth worms *Pheretima javanica* highest in the provision of insecticide carbofuran at concentrations of 0% (control) is  $2.53 \pm 0.05$  mg / g today. Efficiency mean assimilation earth worms *Pheretima javanica* lowest for the provision of insecticide carbofuran at concentrations of 0% (control) is  $40.78 \pm 2.56\%$  and the average efficiency of assimilation of earth worms *Pheretima javanica* highest in the provision of insecticide carbofuran at concentrations of 0.5%, ie  $70.76 \pm 3.67\%$ .

**Keywords ; Carbofuran, Consumption Rate, Assimilation Efficiency, *Pheretima javanica* Gates**

**INTRODUCTION**

Insecticides are the substance of a chemical compound commonly used to eradicate plant pests such as the use of synthetic insecticides, particularly insecticide carbofuran to eradicate crop pests especially crops, including potato, peppers, tomatoes, carrots, corn, and soybeans, can not be denied, has contribute greatly in increasing the production of staple crops. However, intensifies the use of insecticide carbofuran had real also lead to negative effects

on the aquatic and terrestrial environment as well as the death of non-target organisms (Tarumengkeng, 2012).

Death of soil biota are not targets, including earth worms and colembola a side effect of the insecticide carbofuran, can be a reduction in the number of individuals, constraints on the metabolic activity, behavior, the rate of feed consumption, growth and hatchability cocoon in the soil biota that (Adianto, 2013) , Earth worms, especially *Pheretima javanica* Gates is the soil biota that are often found on farms and have a beneficial role in the soil ecosystem. Earth worms *Pheretima javanica* role in decomposition and mineralization of organic matter. The decomposition process of organic matter cause structural changes in the soil, thus increasing soil aeration and water holding ability of soil (Edward and Lofty, 2011)

Nofyan (2011), argued that the provision of various concentrations of insecticide profenofos mixed cattle feed in the form of feces showed significant effect on the production and viability earthworm cocoons *Pontos colex corethrurus* Fr. Mull. Nofyan (2013), the provision of various concentrations of synthetic insecticides pirethroid form of feed mixed with cow feces showed a marked influence on the growth and cocoon production of earth worms *Pontos colex corethrurus* Fr.Mull.

The use of carbofuran insecticide on agricultural crops by spraying on the stem, leaf or buried in the ground, can be accumulated by earth worms is an animal that is not a target or non-target animals. Accumulated insecticide carbofuran by animals that did not target or non-target animals important to know, because of their role in the chain of transfer of the insecticide to the level of higher organisms. It is necessary to study: "Effect of Insecticide Carbofuran Aspects Of Physiology Earthworm *Pheretima javanica* Gates", by way of various concentrations of the insecticide carbofuran were mixed with cow feces as feed earth worms *Pheretima javanica* Gates.

### **Formulation of the problem**

Based on the background above, the problem can be formulated as follows:

1. How carbofuran insecticide effect on the rate of consumption of earth worms *Pheretima javanica*?
2. How carbofuran insecticide effect on the efficiency of assimilation of earth worms *Pheretima javanica*?

### **Research purposes**

1. Determine the effect of the insecticide carbofuran on the rate of consumption of earth worms *Pheretima javanica* Gates.

2. Determine the effect of the insecticide carbofuran on the efficiency of assimilation of earth worms *Pheretima javanica* Gates

### **Benefits of research**

1. Provide information to farmers carbofuran insecticide effects on organisms, in particular soil organisms, ie earth worms.
2. Provide information on the role of earth worms on soil and plants.
3. Provide knowledge on farmers to not use any insecticides.

## **MATERIALS AND METHODS**

### **Time and place**

This study was conducted from June to August 2016, in the Laboratory of Animal Physiology Department of Biology, Faculty of Science, University of Sriwijaya Inderalaya.

### **Tools and materials**

Tools and materials used include petri dish (d = 15 cm), blender, oven, eksikator, mortar porcelain, soil tester, a filter (size 200 mesh), hoes, shovels, handcounter, tweezers, scissors, loup, cutter, pipette, insecticide carbofuran (= Furadan 3 G), acetone, filter paper, black plastic, plastic trays, black rubber, spray bottle, timber range, litmus paper pH, label paper, tissue, earth worms *Pheretima javanica*, cow feces as feed earth worms, and distilled water.

### **Ways of working**

#### **Earthworm collection *Pheretima javanica* Gates**

Earthworm collection will be done by hand sorting method(Gorny and Grum, 2003), in areas that have been determined in InderalayaOganIlir Palembang, do hoeing up to depths of 10-15 cm. Soil cultivation results are split by hand using earth worms *Pheretima javanica* were found inserted into the plastic bucket that was filled with soil biotope origin. Earth worms *Pheretima javanica* collection results, and then kept in plastic tubs measuring 20 x 30 x 10 cm. The soil in the plastic tub is a biotope land of origin (Bostrom et al., 2008).

Earth worms *Pheretima javanica* kept fed with cow feces is "ad libitum" above the surface of the tub. The condition of the soil water content in the plastic tub is maintained around 30-40% by way of watering, when the soil water content is reduced from that value, then watering every 3 or 4 days.

## **Cattle Feces provision Earthworm For Animal Feed**

### ***Pheretim a javanica* Gates**

Cow feces taken from the cage cattle ranchers in Palembang and OganIlir. Cow feces dried until dry, then crushed and blended. Then in a blender in the sieve with a sieve (200 mesh size) until homogeneous powders that cow feces. After the sifter put in clear plastic and stored in eksikator before use for experiments.

### **Research design**

This study uses a completely randomized design (CRD), treatment with insecticide carbofuran mixed in feed earth worms, insecticide carbofuran with a concentration of 0%; 0.1%; 0.2%; 0, 3%; 0.4% and 0.5%. Each treatment is done four replications. Such treatment, referring to the draft conducted by Nofyan (2010), are:

Ao = 0% insecticide carbofuran + cow feces

A1 = 0.1% insecticide carbofuran + cow feces

A2 = 0.2% insecticide carbofuran + cow feces

A3 = 0.3% insecticide carbofuran + cow feces

A4 = 0.4% insecticide carbofuran + cow feces

A5 = 0.5% insecticide carbofuran + cow feces

### **Rate of Consumption and Efficiency trial Assimilation Earthworm *Pheretima javanica* Gates Once given various concentrations of insecticide Carbofuran**

The method used is based on the method performed by Dickschen and Topp (2008), ie into each petri dish (diameter = d = 15 cm), given a pad of filter paper that has been cut in accordance with the diameter petri dishes were used and moistened with distilled water to taste , then put the feed in the form of cow feces as much as 200 mg that has been stirred with the insecticide carbofuran predetermined concentration. Petri dish that already contains earth worms and feed cow feces mixed with the concentration of the insecticide carbofuran laid on wooden battens in a plastic tray that has been filled with water. Earth worms are used criteria weighs 1,26-1,38g and its body length 12-15 cm and aged 14 -18 weeks. Before the trial the rate of consumption and the efficiency of assimilation of earth worms were fasted for 24 hours, then weighed the weight of his body,

Experiment consumption rate and efficiency of assimilation carried out for 3 days, every day the state of earth worms controlled. On the third day of earth worms, leftover food and feces earth worms were weighed, then obtained a dry weight of stool and dry weight of feed eaten. To determine the value of rate of consumption and the efficiency of assimilation of earth worms to the formula proposed by Dickschen and Topp (2011), as follows:

Rate of Consumption:

$$CI = \frac{C}{(T \times A)}$$

Information :

CI = consumption rate

C = dry weight of feed eaten ..... mg

T = time ..... days

A = weight of earth worms g

Efficiency Assimilation:  $EA = \frac{(C-F)}{C} \times 100 \%$

Information :

EA = Efficiency assimilation ..... %

C = dry weight of feed eaten ..... mg

F = dry weight faeces of earth worms ..... mg

### Parameter Observation

The parameters observed in this study was the rate of consumption and the efficiency of assimilation of earth worms *Pheretima javanica* Gates.

### Presentation Data

Data presented in tables of each parameter of observation.

### Data analysis

Data obtained from observations done Variant Analysis. If there a real difference followed by a further test of Duncan New Multiple Range Test t (DNMRT) at level  $\alpha = 5\%$ .

## RESULTS AND DISCUSSION

### The rate of consumption of earthworm experiment *Pheretima javanica* Gatesvarious concentrations of insecticide Carbofuran.

The rate of consumption of feed earth worms *P.javanica* on feeding cow feces by various concentrations of insecticide carbofuran in the form of mean. The mean rate of feed consumption *P. javanica* worms highest at concentrations of 0% insecticide carbofuran + cow feces is  $2.53 \pm 0.05$  mg / g.hari and average feed consumption rate of earthworm *P. javanica* lowest at a concentration of 0.5 carbofuran % + cow feces which was  $0.23 \pm 0.02$  mg / g.hari, listed onTable 1.

Table 1. Average consumption rate earth worms feed on a variety *P.javanica* the concentration of the insecticide carbofuran in the laboratory

No.	Treatment	The rate of consumptionFeed (mg / g. day)
A <sub>0</sub>	0% nsektisida i + k arbofuran cow feces	2.53 ± 0.05 a
A <sub>1</sub>	0.1% insecticide carbofuran + cow feces	1, 3 0 ± 0.03 b
A <sub>2</sub>	0.2% insecticide carbofuran + cow feces	1.05 ± 0:07 c
A <sub>3</sub>	0.3% insecticide carbofuran + cow feces	0.6 5 ± 0.04 d
A <sub>4</sub>	0.4% insecticide carbofuran + cow feces	0, 4 5 ± 0.06 e
A <sub>5</sub>	0.5% insecticide carbofuran + cow feces	0.23 ± 0.02 f

Description: The numbers are followed by small letters do not show significantly different sam. ( = 0.05)

From Table 1, the above their rate of consumption of feed earth worms Gates *P.javanica* vary depending on the concentration of the insecticide carbofuran given in form of feed cow feces. According to Arief (2007), inNofyan (2011), the insecticide carbofuran belonged insecticide carbamate, inhibiting the enzyme activity asetilcholinestrace in somatic nervous system and autonomic peripheral, lead affects the sense of taste and smell of earth worms, so earth worms do not want to consume the feed in the form of feces veal mixed with the insecticide carbofuran concentration.

Edward and Lofty (2011), states earth worms feed consumption rate is influenced by the quantity and quality of feed given. The feed quality associated with taste, smell, and chemical composition of the feed. Determine the quality of the feed palatability earth worms, especially *Pheretima javanica* Gates. In these experiments the feed cow feces mixed with carbofuran insecticide containing the chemical compound, causing earth worms *P.javanica* less likely to consume, thus affecting the rate of consumption of feed earth worms *P. javanica*.

### Assimilation efficiency Earth worms *P.javanica* Gates on various Concentration of Insecticide Carbofuran

The efficiency value assimilation *P.javanica* earth worms fed with cow feces mixed with different concentrations of the insecticide carbofuran, are listed in Table 2.

Table 2. Average efficiency of assimilation of earth worms *P.javanica* on various the concentration of the insecticide carbofuran in the laboratory

No.	Treatment	Assimilation efficiency (%)
A <sub>0</sub>	0% insecticide carbofuran + cow feces	40.78 ± 2.56 a
A <sub>1</sub>	0.1% insecticide carbofuran + cow feces	50.01 ± 4.59 b
A <sub>2</sub>	0.2% insecticide carbofuran + cow feces	62,36 ± 3.75 c
A <sub>3</sub>	0.3% insecticide carbofuran + cow feces	76,46 ± 6.24 d
A <sub>4</sub>	0.4% insecticide carbofuran + cow feces	86,21 ± 5.15 e
A <sub>5</sub>	0.5% insecticide carbofuran + cow feces	90.76 ± 3.67 f

Description: Score - a number followed by small letters are not the same showed significantly different. ( $\alpha = 0.05$ )

Experiments for determining the efficiency of assimilation of earthworm *P. javanica* is the difference between the weight of the feed is eaten and excreted feces in the form of very large or small values determine the efficiency of assimilation of earth worms *Pheretima javanica*. From the results obtained in Table 2 turns the average efficiency of assimilation of earth worms *P. javanica* significantly different at each of those treatments. Average efficiency of assimilation of earth worms *P. javanica* lowest for the concentration of 0% insecticide carbofuran + cow feces is 40.78 ± 2.56%, and the mean assimilation efficiency is highest at 0.5% concentration of the insecticide carbofuran + cow feces is 90.76 ± 3.67%. The low average efficiency of assimilation of earth worms *P. javanica* in treatment provision of insecticide carbofuran concentration of 0% + cow feces, because the proportion of uneaten feed and comes out in the form of feces is smaller, but the rate of defecation or stool production is also higher, so the percentage of feed digestibility small. Instead of earth worms *P. javanica* assimilation efficiency in treatment provision 0.5% concentration of the insecticide carbofuran + cow feces is relatively high. It shows a relatively large proportion of the feed is eaten and feces than the other treatments.

From the above discussion, it appears that the amount of food eaten and that comes out in the form of feces or replacement feed in the digestive tract affects the efficiency of assimilation of earth worms. Efficiency assimilation of earth worms influenced by the fast or slow change of feed in the gastrointestinal tract as well as the earthworm species. If the change of feed in the digestive tract of earth worms quickly it will lead to lower efficiency of assimilation of earth worms (Dickschen and Topp, 2011). Turnover time of the feed in the digestive tract of earth worms differ based on the type of earth worms and type of feed eaten. Examples earthworm

*Lumbricus rubellus* Allolo bophorarosea and that each require a range between 1-2.5 hours and 36-48 hours.

The research results are listed in Table 2, it turns out the efficiency of assimilation of earth worms *P. javanica* the highest obtained at treatment of feeding cow feces + 0.5% insecticide carbofuran. The high efficiency of the assimilation of earth worms *P. javanica* on the treatment, because the proportion of uneaten feed and exit through the feces is greater due to the insecticide carbofuran chemical compounds with high concentration in the feed cow feces can affect the digestive tract of earth worms, so that expenditure feces *P. javanica* earth worms. Causing the value of earth worms *P. javanica* assimilation efficiency is very high. The higher the concentration of the insecticide carbofuran were mixed with cow feces as feed material earthworm *P. javanica*, then the least faecal issued by earth worms *P. javanica*, so the value of earth worms assimilation efficiency higher.

Value earth worms *P. javanica* assimilation efficiency was lowest for the provision of insecticide carbofuran concentration of 0% + cow feces is  $40.78 \pm 2.56\%$ , this is due to the feeding in the form of cow feces was no carbofuran insecticide. So that the exchange process feed material faster infrequent issued by earth worms *P. javanica* more, causing the value of earth worms *P. javanica* assimilation efficiency is lower.

## CONCLUSIONS

And discussion of the results mentioned above can be summarized as follows:

1. The effects of various concentrations of the insecticide carbofuran to the rate of consumption and the efficiency of assimilation of earth worms *P. javanica* significantly different.
2. The concentration of insecticides can affect non-target animals are earth worms *P. javanica*.
3. The higher the concentration of the insecticide carbofuran administration on earth worms *P. javanica*, causing increasingly low rate of consumption of earth worms *P. javanica* use values as well as the higher the efficiency of assimilation of earth worms *P. javanica*.

## ACKNOWLEDGEMENTS

Researcher and Author wishes to thanks:

1. Chairman of the Department of Biology, Sriwijaya University Inderalaya that has been providing facilities for research.
2. The Institute for Research and Community Service Sriwijaya University which has provided funding for this study.



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**FIGURES**



Figure 1. Photo of weighing feed earth worms *P. javanica*



Figure 2. Photo trial consumption rate of earthworm *P. javanica*



Figure 3. Photo of earthworm *P. javanica*



Figure 4. Photo of earthworm *P. javanica*