

Predator Propagation Technique *Sycanus dichotomus* (Hemiptera: Reduviidae) in Laboratory

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ABSTRACT

Pest control for oil palm trees still using the insecticide, the toxic materials could lead the killing of parasitoid and predator. Various types of parasitoid and predator founded on oil palm crops, such us predatory of *Sycanus dichotomus* as pest predatory of fire caterpillar and bagworm. Various way conducted to incline the role of predator to push the development of pest, such as adding the number and releasing the predator into field area. Provision of predator in big number conducted with mass breeding. Many research about propagation of *S. dichotomus* with using the feed of *Tenebrio molitor*, however, never known the propagation of *S. dichotomus* using the *T. molitor* which integrated with natural feed or artificial. This research aiming to propagate *S. dichotomus* using the *T. molitor* and *Oecophylla smaragdina* also honey. Other wise the maintenance using the simple tools such as jar and glass cage. The parameter which used, namely; the percentage of development of *S. dichotomus* in the egg stadia, nymph and the ability of female imago producing the eggs.

The research conducted in Pest Laboratory of Universitas Sumatera Utara with the temperature around 25-30°C and the humidity were 70-80%. The rearing conducted with caring 15 nymphs, 15 couple of imago of *S. dichotomus*, and 15 eggs' group. Nymph stadia of instar 1 of *S. dichotomus* given the honey feed, nymph of instar 2 given the egg of *O.smaragdina* and honey, also the nymph of instar 3 until instar 5 and imago stadia given the fly bow nymph of *T. molitor* and honey. The development of nymph of instar 1 to instar 2 and nymph of instar2 became instar 3 for each amount 93-95%. The development of nymph of instar 3 to instar 4 amount 90-93%, however,

nymph of instar 4 changed into nymph of instar 5 only reaching 70-75%. A couple of *S. dichotomus* producing as much 3-4 groups and as much 60-80 eggs for each group, and the changes of eggs stadia became nymph reacing 95-96%.

Keywords: Rearing, *Sycanus dichotomus*, Predatory

INTRODUCTION

Pest control in oil palm crops not showing the sustainable plantation because it is still using the insceticide. Many ways to do to push the use of insecticide, one of them is biological control. It is the utilizing or empowering the natural enemies to control the pest or regulating the pest development, and its the one part of integrated pest control (Untung, 2006).

Natural enemies classified as parasitoid, predator and pathogen. The utilizing of natural enemies in biological control conducted through introduction, conservation, and augmentation. Augmentation is the way to heighten the usability of natural enemies that present in nature, one of them is by mass breeding and continued to release to nature. Mass breeding of pest based on the technicque of pest propagation to prepare the natural enemies or biological agent with the certain technique or method so that easy to get and apply it (Arifin, 2011 : Sudarjat *et al.*, 2020).

Predators are pest that prey on pest, and in one life cycle prey on more than one individual of pest. Various types of pest

predator founded in oil palm trees, namely *Sycanus dichotomus* as pest of nettle caterpillar or bagworm. *S. dichotomus* have hemimetabolous metamorphosis. This predator could kill various enemies in larva stadia, pupa and imago from different families (Syari *et al.*, 2010; Abdul *et al.*, 2018).

Various research of mass breeding of predator *S. dichotomus* with *Tenebrio molitor* and *Corcyra cephalonica* as feed *S. dichotomus*, however, the use of *T. molitor* and *Oecophylla smaragdina* with additional feed such as honey never known in development of each stadia and reproduction ability *S. dichotomus*. Besides that the research aiming to develop the mass propagation technique *S. dichotomus* cheaply and easy, with the use of plastic jar as the place for lay, and place for copulation and upkeep the predatory insects.

MATERIALS AND METHOD

Location and Time

Research conducted in Pest and Disease Laboratory in Faculty of Agriculture, Universitas Sumatera Utara. The room temperature were 25-30°C and humidity was 70-80%. Research started from July to November 2021.

Materials and tools that use in reared, namely *S. dichotomus*, caterpillar of *T. molitor*, eggs of *O. smaragdina*, water, honey, jar, gauze, cotton, multilevel plastic shelf, scissor, label paper, rubber bracelet, camera, book, and pen.

This research divided into some steps:

1. Preparing stage of materials and tools
Providing the receptacle and materials that used to predator propagation

2. Maintenance stage

Maintenance eggs stadia until imago of *S. dichotomus*

3. Spawing stage

Striving the mating of *S. dichotomus* to produce eggs.

Research Stages

1. Preparation of Material and Tools

a) Maintenance container

The media that used for propagation of *S. dichotomus* was jar with the diametre 13 cm and height 12.5 cm used to spawing grounds and maintenance of egg stadia of *S. dichotomus* instar nymph 1 to 4. Glass confinement sized 30 cm x 30 cm x 30 cm as a maintenance locus of instar nymph 5.

b) Confinement

Gauze confinement sized 50 x 100 cm as the maintenance locus of nymph *S. dichotomus* which obtained from oil palm trees.

c) Provision of *S. dichotomus*

The nymph of *S. dichotomus* obtained from oil palm trees area, and placed into gauze confinement containing oil palm trees and gave the bag caterpillar feed to *Pteroma pendula*. Nymph maintained until imago, and female imago put the eggs.

d) Propagation feed of *S. dichotomus*

Source of feed in propagation of *S. dichotomus* consist of caterpillar of *T. molitor*, eggs of *O. smaragdina*. The caterpillar of *T. molitor* obtained from the seller of birds feed, and eggs of *O. smaragdina* took from oil palm trees area. The propagation activity also using the additional feed such as honey liquid (honey mixed with water with the comparison 1:20) which smeared to cotton and placed into receptacle.



Picture 1 (a) Caterpillar of *T. molitor* (b) Honey, cotton, and water

f) Multilevel Plastic Shelf

Maintenance jar placed into multilevel plastic shelf. Foot dialed with jar cap containing water to avoid ants and other

pests entering into jar, and shelf footwear cleaned every five days so that it can not be the place for mosquitoes to lay eggs.



Picture 3. Propagation Shelf

2. Maintenance

Rearing of *S dichotomus*

The research started with caring the nymph with feed of bag caterpillar into oil palm trees in confinement. Nymph cared until *S. dichotomus* laying eggs. The eggs group from confinement placed in jar that cover with tissue until became nymph.

The implementation of propagation of *S. dichotomus* with the feed which was used in research started with caring the nymph until *S. dichotomus* laying the eggs, and it develop became nymph.

a) Nymph Stadia

Nymph of *S dichotomus* experiencing 5 instar which marked with skin changes. The

maintenance of nymph conducted in jar and jar's cover with gauze.

Instar 1

Nymph instar 1 which just appeared not actively moving to gather around the eggs group and eating the rest of eggs have not hatched yet. Nymph instar 1 aged two days start move and spreading to find foods. The feed source of nymph was honey liquid in cotton.

The maintenance activity of nymph instar started from nymph aged two days which placed amount 15 nymphs aged two days and gave honey liquid into cotton inside the jar. Feed changes every twice a day until nymph instar 2. The development of nymph instar 1 became instar 2 reach 93-95%.



Picture 8. Nymph of instar 1 *S dichotomus*

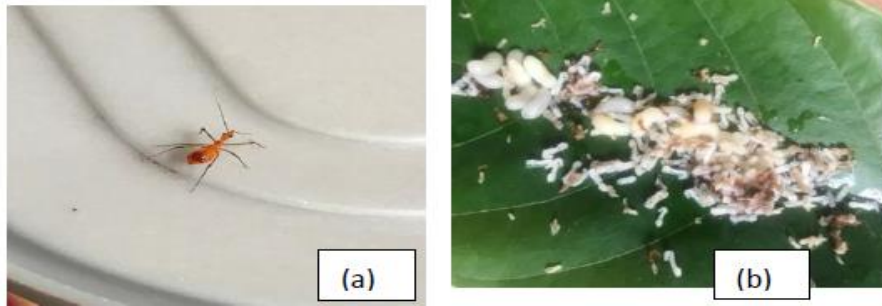
Instar 2

Nymph of instar 2 orange with dark brown abdomen of Nymph of instar 2 maintained with using the eggs of *O. smaragdina* and

honey solvent. The maintenance of Nymph instar 2 as much 5 pcs which placed inside the jar gave feed of one egg of *O. smaragdina* and honey solvent in cotton,

and egg skin waste of *O. smaragdina* with using the paintbrush. Feeding and cleaning the jar conducted every day until became

nymph of instar 3. The development of nymph of instar 2 became instar 3 reach 93-95%.



Gambar 9 (a). Nimfa instar 2 *S dichotomus*
(b). telur *O. smaragdina*

Instar 3 – 4

Nymph of instar 3, and instar 4 orange colour with dark brown colour of abdomen. The changes of instar marked

with the skin changes, and the nymph had just appeared from the skin changes process immediately moved to another jar to avoid the cannibalism.

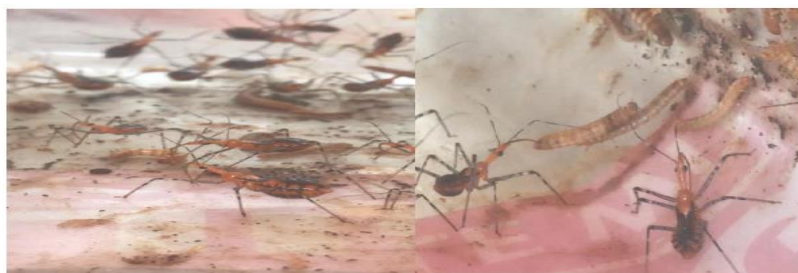


Picture: 11 (a). Nymph of instar 3 *S. dichotomus*
(b). Skin changes process of *S dichotomus* from instar 3 to instar 4
(c). Nymph of instar 4 *S. dichotomus*

The maintenance of nymph of instar 3 and instar 4 with using feed such as fly bow of *T. molitor* and honey solvent also cleaning the jar from the fly bow skin of *T. molitor* which left from the predation. Each of jar placed of instar 3 amount 2-3 inside the jar and feeding one fly bow of *T. molitor* and honey solvent, while 2-3 nymphs of instar 4

feeding with two fly bow *T. molitor* and honey solvent.

Feeding conducted until nymph of instar 3 became instar 4 and nymph of instar 4 became instar 5. The development of instar 3 became instar 3 and 4 were 90-93% and 90-93% nymph of instar 4 became 5.



Picture 10 (a). The maintenance of nymph of instar 4
(b). *S dichotomus* prey on the caterpillar of *T. molitor*

Instar 5

The Nymph of instar 5 which already skin changed into orange colour in torax part and abdomen with the transparent wings and the white limbs. Three hours later, the colour changing into black colour in the part of torax, abdomen, and limbs, while the wings is orange brown colour.

Nymph of instar 5 feeding one fly bow of *T. molitor* for one nymph, and honey

solvent in bowl. The maintenance conducted with placed 15 nymphs and fly bow of *T. molitor* amount 15 also honey solvent in bowl to inside glass cage. Everyday nymph feed and the glass cage cleaned by release the skin of which left from the predation. The nymph cared until become imago, and the development of instar 5 only reaching 70-75%.



Picture 12 (a) *S dichotomus* of instar 5
(b) Propagation of Instar 5 of *S dichotomus*

b) Imago stadia

Imago which just appeared from nymph of instar 5 separated between male imago and female imago. Male imago and female imago differentiated with the sized body and

the shape of the end of abdomen. Female imago has bigger size than male imago, and it has the taper abdomen while male imago has flat-end abdomen.



(a)



(b)



(c)

Picture 13 (a). Imago of *S. dichotomus*; (b) Female Imago; (c) Male Imago

3. Spawing

Spawning conducted with caring 15 couple of imago of *S. dichotomus* aged two days, and each couple of *S. dichotomus* inside jar. Feeding gave to fly bow of *T. molitor* amount 2-3 and honey solvent at cotton. Everyday feed given and jar cleaned with

releasing the skin body of caterpillar of *T. molitor* using tweezers from jar everyday. The cleaning aiming to avoid so as not to smell and the growth of microorganism. *S. dichotomus* predating with inducing suck the body fluids and left the skin body of caterpillar from *T. molitor*



Picture 4 (a) *S. dichotomis* predated the caterpillar of *T. molitor*
(b) Clean up the waste caterpillar skin of *T. molitor* using tweezers



Picture 5. Waste skin of caterpillar of *T. molitor*

S. dichotomis conducted union at aged 6-10 days. The behaviour monitoring of the union *S. dichotomis* namely; the appearing of desire (arousal), approaching, the male position over the female (riding over), copulate, and after-copulate.

The union behaviour of arousal and approach started with male *S. dichotomis* jantan walked and looked the genital of opposite sex. Next the male *S. dichotomis* approaching the female by lengthen the antenna and rostrum. The approaching respon happened when the male reach the female with the antenna and put the forelegs over the female.

The union behaviour of *S. dichotomis* conducted with male imago by touchng the female by using the her feet and push the female anterior thorax with the labial tip. After that the male *S. dichotomis* went to the female body. The copulate happened after the male reach the female body, then male lengthen the genitals until its connected with male's genital. After the copulate the couple of *S. dichotomis* not making a move. The last copulate charaterized by dropping the male and female antenna down, next the male and female insects separated.



Picture 6 . *S. dichotomis* copulate

Egg-Stadia

Female *S.dichotomous* put the eggs in 8-10 days after the copulate. Eggs put as a group that bound for each other as vertical to ground layer and eggs with brown colour. A female imago of *S. dichotomus* put the 3-4 eggs' group and each group consist of 60-80 eggs. The eggs placed by *S dichotomus*

move to another jar. The moving conducted with using the paintbrush.

The maintenance activity of eggs conducted with using 15 of eggs' group and one egg's group placed into one jar that covered by tissue. Eggs separated until become nymph and the growth of eggs stadia become nymph reaching 95-97%.



Picture 7 . *S dichotomus* was put the eggs.

CONCLUSION

Rearing of *S. dichotomus* with in caterpillar of *T. molitor*, eggs of *O. smaragdina*, water, honey The development of nymph of instar 1 to instar 2 and nymph of instar 2 became instar 3 for each amount 93-95%. The development of nymph of instar 3 to instar 4 amount 90-93%, however, nymph of instar 4 changed into nymph of instar 5 only reaching 70-75%. A female imago of *S. dichotomus* put the 3-4 eggs' group and each group consist of 60-80 eggs and then fertilization reaches 95 -97 %.

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