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*by* Eva L. Baideng 7

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## PLUTELLA XYLOSTELLA PARASITOID PARASITATION TYPE AND PERCENTAGE ON CABBAGE VEGETABLE FARM, IN RURUKAN AREA, TOMOHON, INDONESIA

Eva Lienneke BAIDENG

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Sam Ratulangi University, Faculty of Mathematic and Natural Sciences, Biology Department, Jl. Kampus Unsrat Bahu, Kleak, Malalayang, Manado 95115, Indonesia, Email: eva.baideng@yahoo.co.id

Corresponding author: eva.baideng@yahoo.co.id

### Abstract

Parasitoid organism was act as biological pest control, in pest attacked on a farm, and *Plutella xylostella* is one of the pest in cabbage at Rurukan vegetable farm, Tomohon, Indonesia. The observation on the type and percentage on parasitiation of *Plutella xylostella* on cabbage was done at IPM (integrated pest management) area and Non-IPM area. Results indicated that there This parasitoid is solitary and endoparasit, because there is only one parasitoid for one pupa host. The parasitoid rate of *D. semiclausum* on *P. xylostella* pupa at IPM area is 83.15% and at Non-IPM area is 70.82%. This results means that *D. semiclausum* parasitoid was settled at vegetable farm at Rurukan, Tomohon, Indonesia, so there is no need special treatment on *P. xylostella* pest control.

**Key words:** cabbage farm, parasitoid, pest control, *Plutella xylostella*, *Diadegma semiclausum*

### INTRODUCTION

The development of cabbage vegetable farming in Indonesia was common, but the national average product still low. In North Sulawesi, the cabbage production is not memuaskan, because the farming system still in conventional system, and the pest especially *Plutella xylostella* and *Crociodolomia binotalis* still dominated [10].

Until now the pest control in Indonesia, especially in North Sulawesi, is one species of parasitoid on *P. xylostella*, the *Diadegma semiclausum* (Ordo Hymenoptera, Ichneumonidae Family and Genus *Diadegma*) was acted as pest control. focused on chemically pest control system. Even the pest was attacked, but in was only temporary. Insecticide pest control in vegetables especially to pears and cabbage, was over dosage in North Sulawesi area [11]. Because of this treatments, there is poisoning the vegetable production, and on the other side, there are pollution. So we must search another system, that is safe and also cheap and good for the environments. We must produce organic vegetables that is pesticide free, develop a

healthy agriculture system using biological parasitoid predator.

### MATERIALS AND METHODS

Sampling was done at Rurukan area, Tomohon, Indonesia, and the identification at Pest and Entomology Laboratory, Agriculture Faculty, Sam Ratulangi University. The research was conducted between May to June, 2016.

The research used 70% alcohol, plastic bag, rubber band, tissue, aquadestilata, hand counter, scissor, collecting bottle, collecting case, dissecting set, microscope, label.

The research was conducted at farm area, comparing the parasitoid at IPM (Integrated Pest Management) area and non-IPM area/Conventional system. At IPM area, the cabbage was planted using plastic bag, without synthetic insectised and at non-IPM area, they used no plastic bag, but used synthetic insectised.

The parameter of this research are : (a) the type and percentage of parasitoid. Parasitoid stadia, was collected and keep and daily inspection until there are some parasitoid. The imago

parasitoid was identified. To calculate the parasitisation percentage, using [1]:

$$P = \frac{A}{B} \times 100 \%$$

Notes : P = Parasitisation Percentase  
 a = Sum of parasitisation host  
 b = Sum of observed parasitisation host

## RESULTS AND DISCUSSIONS

Results indicated that there is only one type collected *P. xylostella* pupa sample, and this pupa is a solitary parasitoid and also an endoparasit, because there is only one parasitoid in one pupa host, and after identification, the parasitoid is one species of parasitoid on *P. xylostella*, the *Diadegma semiclausum* (Ordo Hymenoptera, Ichneumonidae Family and Genus *Diadegma*) [4][8].

The body of female *D. semiclausum* was black-brown color, with yellow stripes at the tungkai.

At the front abdomen was black, but at the end is greeny-yellow. The ovipositor is long, looks like a tail. The male imago has also black-brown color, but the tungkai is also brown. The *D. semiclausum* parasitoid was attacked *P. xylostella* at IPM area and at non-IPM area. The morphology of parasitoid *D. semiclausum* imago is on Figure 1.



Fig. 1. The morphology of parasitoid *D. semiclausum* imago

In Table 1, the average parasitisation percentage of *D. semiclausum* on *P. xylostella* pupa, at IPM area, is 83.15 %, and at non-IPM area, only 70.82%.

Table 1. The average parasitisation percentage of *D. semiclausum* on *P. xylostella* pupa in Cabbage Farm

Treatments	Sampling (week)							Average
	1	2	3	4	5	6	7	
	..... (individual) .....							
IPM	80.0	67.5	90.0	90.5	83.32	84.16	86.6	83.15
Non-IPM	50.0	57.48	83.32	86.66	77.5	62.5	78.32	70.82

According to Table 1, the parasitisation percentage of *D. semiclausum* on *P. xylostella* pupa in Cabbage Farm both at IPM area and non-IPM area, (83.15% and 70.82%) are still high, it means that the *D. semiclausum* was settled at the Cabbage Farm at Rurukan area.

Until 1993, the pest control of *P. xylostella* at North Sulawesi only using Sevin insecticide, and pyretroid insecticed, but at least the pest was auto immune for this insectised, As biological pest control, the *D. semiclausum* was introduced before year 1990, insome area in Indonesia, in Java, Bali and West Sumatra, but the parasitisation grade was unsatisfied,

because it cannot pressed the population until under the economic ambang batas, [7]. At West Java Province, especially at Pacet area, the trial introducing of *D. semiclausum* was done since 1950. And it was done several times in some area in Indonesia, except in North Sulawesi, and the parasitisation was 82% [8]. In North Sulawesi, the first introduction was done since 1990 in Tomohon area, and it was spread successfully, but in 1991, the Mount Lokon was erupted, and the *D. semiclausum* parasitoid was disappeared [12]. So, in 1993 the second introducing with parasitoid from Lembang, West Java, with parasitisation percentration between 30-80% [11]. The next

introduction was done in 1994, and the parasitisation percentage was 37% [5].

According to Table 1, the parasitisation percentage of *D. semiclausum* was high, both at IPM area (83.15%) and also at Non-IPM area (70.82%) means that the *D. semiclausum* at cabbage farm at Rurukan area, was settled. In cabbage farming at Ethiopia, for three years since introducing *D. semiclausum*, the parasitisation of *D. semiclausum* was increased, and the population of *P. xylostella* was decreased [2]. It means that the pest control to *P. xylostella* is unnecessary using chemical substances, but must use biological agent e.g. parasitoid *D. semiclausum* according to the conservation lingkungan. So, minimalizing the usage of chemical insecticide was also a natural conservation [4].

## CONCLUSIONS

There is only one *Plutella xylostella* parasitoid, *Diadegma semiclausu* on cabbage farm at Rurukan area, Tomohon.

*D. semiclausum* parasitisation percentage on *P. xylostella* pupa was high, with average 83.15% on IPM treatment and 70.82% on Non-IPM treatment.

*D. semiclausum* on cabbage farm at Rurukan area, Tomohon was settled, so they need no special treatment, for *P. xylostella* pest control, and *D. semiclausum* as potential biological control agent, must keep maintained.

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