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OvipositionPreference of the Crop Moth *Crocidolomia Pavonana* Zeller in Several Host Plants of the Brassicacea Family in Tomohon City

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Abstract: The phenomena and problems associated with various control strategies require solutions and answers to ensure control techniques through a deep understanding of the phenotypic appearance and behavior of target pests. The objectives of this study were: (1) to determine the oviposition preference patterns of female *Crocidolomia pavonana* Zell. on several types of vegetable plants from the Brassicaceae family, (2) to analyze the differences in the number of eggs laid by *C. pavonana* on each host plant tested, including determining the most preferred plant for oviposition. The study was conducted in a laboratory using a Latin Square Design (LSD), with 3 treatments and 3 replicates. The sample consisted of 15 pairs of adult insects (moths),placed in the cage. Each cage contain 5 pairs of moths in the same age and three types of host plants; mustard greens, mostar, and Chinese cabbage, with 5 pairs of imagoes placed in each cage. The results showed that oviposition preferences of *C. pavonana* influenced by the type of host plant, with mustard and cabbage tending to be preferred over *Chinese cabbage*. There were differences in the average number of eggs laid by female C. pavonana, namely on mustard greens (33.2 eggs), mostar (45.2 eggs), and Chinese cabbage (38.2 eggs).

Keywords: Chinesse cabbage; *C. pavonana*; mostar; Mustard green; Oviposition preference

Introduction

The pest insect *Crocidolomia pavonana* can select hosts down to the cultivar level, and oviposition preferences in cultivars are correlated with the ecological factor of specific stimulus intensity (Pelealu, 2004; Paat et al., 2012; Paat & Maramis, 2019). Paat (2012) further explained that C. *pavonana* severely damages cabbage crops, with larvae feeding on new crops in the centre of cabbage plants. When the centre is destroyed, the larvae move to the tips of the leaves, then descend to older cabbage crops. Most host plants in the Brassicaceae family attacked by crop caterpillars will be completely destroyed if the caterpillars are not controlled. The damage caused by crop caterpillar larvae is through the centre of the plant, then destroying the entire plant from the centre. The phenomena and problems in various control strategy conditions require solutions and answers for certainty in control techniques through a deep understanding of the target pest's phenotype and behaviour. In-depth research on the morphological characteristics and behaviour of *C. pavonana* can answer control problems that have not yet been accurately targeted (Kumar et al., 2025; Padilha et al., 2025).

The oviposition (egg-laying) behaviour of female herbivorous insects is a key process in pest population dynamics and host-herbivore interactions, affecting larval survival, adaptation, and the reproductive success of the next generation (the *preference-performance hypothesis*). In general, herbivorous insects tend to choose host plants that can support the performance of their offspring, but this pattern can change when alternative plants are available

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simultaneously in the planting environment. Studies on *Crocidolomia pavonana* show that oviposition preferences are influenced by morphological factors and phenological phenomena in host plants, as well as by plant combinations in multiple-choice situations (Karungi et al., 2010).

The cabbage looper (*C. pavonana* Zeller) is one of the most important insect pests of vegetable crops, especially plants of the Brassicaceae family, such as cabbage (*Brassica oleracea*), mustard, and other similar plants, with noticeable damage to the leaves and growing points of plants, which can significantly reduce crop productivity (Tembo et al., 2018; Mpumi et al., 2020). *C. pavonana* belongs to the order Lepidoptera of the family Pyralidae, which is known to have a wide adaptability to various host plants. In its reproductive phase, female *C. pavonana* lays eggs (oviposition) on the surface of host plant leaves, which will later become the main source of attack for the next generation of larvae. The oviposition behaviour of pests is an important stage in the life cycle of herbivorous insects that directly affects pest population dynamics in the field and the damage they cause to plants (Smyth et al., 2003; Kumari & Kaushik, 2016).

Research on oviposition behaviour usually involves testing two or more choices to evaluate where female insects are more likely to lay their eggs. The results of the study show that this preference is not always hierarchical, meaning that plants that are preferred when tested individually are not necessarily preferred when present with other plants. This *contextual preference* factor is important to understand when discussing pest-plant interactions in complex agricultural systems (Jaenike, 1978).

Determining the oviposition preferences of crop caterpillars is very important in understanding the interactions between pests and host plants. These preferences are determined not only by the physiological characteristics of the pests, but also by the chemical, morphological, and phenological characteristics of the host plants available in the cropping environment. Research on the species *C. pavonana*) shows that female insects can exhibit different oviposition preferences depending on the host plant's growth stage or plant species, as well as the combination of alternative plants available in multiple-choice and two-choice experiments.Although research on the oviposition preferences *of C. pavonana* has been widely reported on plants from the Brassicaeae and Brassica spp. families, this study is important to support integrated pest management (IPM), because oviposition preferences can affect the distribution of pest populations in the field and the incidence of attacks on various types of vegetable crops.

The objectives of this research are: 1) Determine the oviposition preference patterns of female *Crocidolomia pavonana* Zell on several types of vegetable plants from the Cucurbitaceae family under experimental conditions, 2) Analyse whether there are differences in the number of eggs laid by *C. pavonana* on each host plant tested, including determining which plants are most preferred for oviposition.

Method

Place and Time of Research

This *research* was conducted in a field laboratory owned by farmers in Kakaskasen I Village, Tomohon City, and lasted 5 months from July to December 2024.

Materials and Equipment

Locally sourced *Crocidolomia pavonana* insects bred from cabbage plants in Kakaskasen Village; water; cotton; honey solution; mustard, Chinese cabbage, and mustard greens as host plants; manure; urea; and Ponsta. Equipment included measuring instruments, rearing cages (60x60x60 cm), preference study cages (100x100x100 cm), gauze, batis cloth, mustard leaves, Chinese cabbage and mustard greens, a binocular microscope, polybag, Petri dishes, collection bottles, brushes, writing instruments, and 70% alcohol.

The research method consisted of 3 treatments, each repeated 3 times. The research was conducted using a Latin square design (RBSL). Fifteen pairs of adult male and female insects (moths) of the same age were taken from the*C. Pavonana* rearing cage. The number of adult insects prepared was in accordance with the number of host plants (3 types) and was repeated 3 times. The imagoes were confined for 48 hours to copulate in plastic jars, then the adult insects that had copulated according to the type of host plant were placed in a preference cage containing three types of host plants. Five pairs of imagoes were placed on each of the host plants, namely mustard, mustard greens, and Chinese cabbage. Every day, the host plants were replaced with fresh leaves. The plastic jars containing the host plants and insects were placed randomly according to the layout (Figure 1).

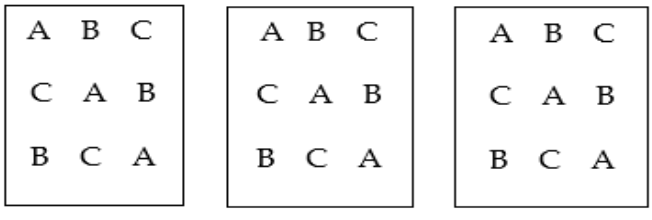

Figure 1. Layout of the host plant experiment in preference cages

Description: A + Mustard Greens C = Chinese cabbage
B : Mostar
A B C = Row
A C B = Column

Each replicate, according to host plant type, was placed in 5 pairs of adult *C. pavonana* imagoes, resulting from maintenance on the host plant, so 3 preference cages were needed for observation. Observation of the laying site and number of eggs laid by adult female *C. pavonana* insects will be observed according to the host plant used.

Statistical Analysis: Oviposition preference of female *C. pavonana* using a Latin Square Design consisting of 3 treatments, namely host plants Mustard, Mustard Greens, and Chinese Cabbage, repeated 3 times. If there is a significant difference between treatments at the 0.05 confidence level, it will be followed up with UBJ.

Result and Discussion

The results of the study on the oviposition preference *of C. pavonana* in laying eggs on host plants mustard, mostar, and pitsai showed differences in the number of eggs, as shown in Table 1.

Table 1. Oviposition Preference *of C. pavonana* toward Mustard, Mostar, and Petsai Plants

Host Plant Type	Number of Eggs Laid Female *C. pavonana*		
	……. origin ……..		
	Mustard	Mostar	Chinese cabbage
Mustard	33.2 a	45.2 a	38.2 a
Mostar	38.4 b	43.8 a	27.4 b
Chinese cabbage	12.8 c	37.0 a	23.0 b

Note: Numbers followed by the same letter are not significantly different
at BNJ 0.05%

Oviposition preference is the behaviour of female herbivorous insects in choosing a specific location or type of plant to lay their eggs. This preference reflects *an adaptive reproductive strategy* in which females choose plants they believe support the survival and development of their larvae. In the insect *Crocidolomia pavonana* (*syn. Crocidolomia binotalis*), oviposition behaviour is influenced by plant characteristics, particularly phenology, chemical compounds, leaf morphology, and the context of other available choices in the experimental or field environment (Smyth et al., 2003).

Based on Table 1, the oviposition preferences *of C. pavonana* for three types of host plants, namely mustard, mostar, and Chinese cabbage, show that *C. pavonana* exhibits significant differences in egg-laying preferences for each combination of host plants and host plant origin. These differences are indicated by the mean number of eggs laid and the letter notation indicating the results of the statistical test. In female *C. pavonana* originating from mustard plants, the number of eggs laid on mustard (33.2 eggs), mostar (45.2 eggs), and Chinese cabbage (38.2 eggs) did not differ significantly (letter a). This shows that females that develop on mustard have a relatively broad adaptability to these three Brassicaceae species as oviposition hosts. This condition is in line with the opinion of Schoonhoven et al (2005) who stated that polyphagous insects tend to have flexibility in choosing oviposition hosts as long as the plants are in the same family and have similar chemical characteristics. In contrast, in females originating from mustard plants, the number of eggs laid on mustard (43.8 eggs) was not significantly different from that on cabbage (38.4 eggs), but was significantly lower on Chinese cabbage (27.4 eggs)**.** These results indicate that Chinese cabbage is relatively less preferred as a medium for oviposition by female insects compared to host plants originating from mustard. The low oviposition on Chinese cabbage is thought to be related to differences in the content of secondary metabolites or in the morphological characteristics of the leaves, which are less suitable for egg laying. In line with the results of research by Eigenbrode & Shelton (1990), who reported that differences in leaf wax layers and surface texture in Brassicaceae plants can affect the oviposition decisions *of C. pavonana*.

The lowest oviposition preference was observed in females originating from Chinese cabbage plants, especially when placed back on mustard greens (12.8 eggs), which was significantly lower than in the other treatments. Meanwhile, oviposition on mustard greens (37.0 eggs) and Chinese cabbage (23.0 eggs) showed higher values but were still lower than the preferences in other treatments. This condition indicates that Chinese cabbage is likely a less optimal host for the early development *of C. pavonana*, so that female insects that develop on this plant show lower oviposition capacity. This phenomenon is consistent with the *preference–performance hypothesis*, which states that females will choose oviposition hosts that can optimally support larval growth and survival (Jaenike, 1978; Renwick & Chew, 1994). Plants with low nutritional quality or high allelochemical content tend to reduce oviposition preference and offspring performance. Several studies have reported that Brassicaceae plants exhibit varying glucosinolate content, which directly affects the oviposition behaviour and larval development *of C. pavonana* (Uhan & Sastrosiswojo,

2003; Sarfraz et al., 2006). In the context of integrated pest management (IPM), particularly in the selection of *trap crops* or crop rotation to suppress the population of *C. pavonana* in Brassicaceae vegetable crops, *C. pavonana* shows a distinct preference for oviposition on different host plants. Mustard and cabbage are preferred oviposition hosts compared to Chinese cabbage, making Chinese cabbage potentially less attractive in integrated pest management strategies.

In addition, the surface of Chinese cabbage leaves is not slippery and has fine hairs, which make it somewhat difficult for female insects to lay their eggs. The selection of host plants by insects is also influenced by physical characteristics of the plants, such as tissue hardness, the presence or absence of thorns, and color

Conclusion

Based on the results of the study, several conclusions can be drawn, including: (1) *C. pavonana* has oviposition preferences influenced by host plant species, with mustard and cabbage tending to be preferred over Chinese cabbage; (2) There are differences in the average number of eggs laid per female *C. pavonana*, namely on mustard greens (33.2 eggs), mostar (45.2 eggs), and Chinese cabbage (38.2 eggs). This research is highly significant and can be applied in integrated pest management (IPM), particularly to ensure that farmers do not solely cultivate Brassicaceae crops—which are preferred by the C. pavonana pest—but instead rotate them with other crop types. This research could be continued by examining the nutritional content of Brassicaceae plants that influence the oviposition preferences of *C. pavonana*

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S.D.: Developing ideas, analyzing, writing, reviewing, responding to reviewers' comments; M.L.: analyzing data, overseeing data collection, reviewing scripts, and writing.

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Conflicts of Interest
The authors declare no conflict of interest.

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