Effect of shade and cover pore on development of BSF prepupa

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Effect of Shade and Cover Pore on Development of BSF Prepupa

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Abstract. The development of BSF (Black Soldier Fly) insect maintenance has become an important endeavour for alternative animal feed supplies. This works aims to elucidate the effect of shade and pores covering the rearing box on the development of BSF prepupa. This experiment used a completely randomized design arranged in two factors of treatment with five replications. The treatments were Factor A and Factor B. Factor A divided in two environmental conditions consisting of direct sunlight as factor A1 and an indirect sunlight as actor A2. Factor B was the pore percentage of the cover area consisting of B1 5%, B2 15% B3 25%. Four parameters were measured in this experiment: body weight; body length; body width and body thickness. The results of the variance analysis showed that there was an interaction between the two factors on the weight of prepupa larvae. The post hoc test by using LSD showed that the comparison between B1_B2 and B2_B3 was different at the level of P <0.01 however this was not the case in three other parameters in this study. Through these results, we concluded that the prepupa weight was influenced by the shade treatment and the percentage of the pore covering the rearing container.

INTRODUCTION

During recent years the world is still covered by various predictions due to the Covid-19 pandemic where the confirmed cases are still increasing in many countries. That why the most of the attention and policies in development is directed handling the prevention of this disease. Handling and overcoming this disease is related to the aspect of fulfilling nutrition. Efforts to maintain adequate food supply to fulfill community nutrition and to support their immunity [1] and [2].

The use of BSF as an alternative feed has a great potential to develop livestock production like in the pandemic situation. Therefore, BSF cultivation development has a business opportunity as a source of animal protein for livestock, especially to improve poultry production [3]. BSF could increase a useful value of organic waste to be converted into animal feed ingredients as well as organic fertilizer. On the other hand, the effects of shade and cover pores of a cultivation container of these insects is not yet known regarding to the limiting factors in the development of these insects is light and air. In addition to the limited scientific information regarding other factors that affect the development of the maintenance of this insect.

Based on the above background, a study on effect of shade and cover pore on development of BSF prepupa has been carried out to support efforts to develop animal feed procurement that does not compete with human food ingredients.

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MATERIAL AND METHODS

This study used BSF *(Hermetia illucens)* starting from five days old until the larvae reaches prepupa stage on the 20th day old. This study was designed by using a completely randomized arranged with a factorial model. The insects were divided into six groups and 5 replications based on the treatment consisted of two factors (A and B). Factor A consisted a direct sunlight and an indirect sunlight treatment, and factor B was pore area consisted of 5%; 15% and 25% of the total container cover area, namely a plastic box measuring with 18 cm of long and 9 cm of wide. The hole arrangement was adjusted using fine mosquito netting with an area per hole (1.4 mm X 1.4 mm). Data collection was carried out on the 20th day.

RESULT AND DISCUSSION

The data of BSF growth obtained were analyzed and displayed in the following figures: the average of body length measured from the extremity of head to the eleventh abdominal segment average of body weight; body girth and, body width which were measured in the abdomen of the fourth segment as below.

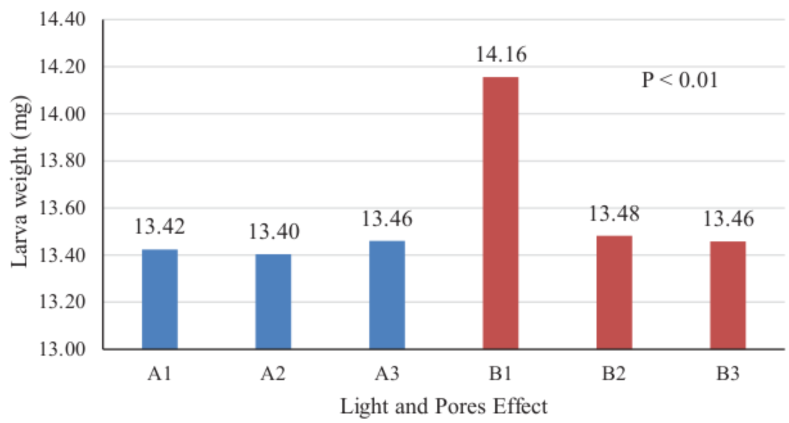

FIGURE 1. The Comparison of Body Weight of BSF Larvae

Figure 1 above shows that the highest weight of BSF larvae was influenced by indirect sunlight treatment in a container having 5% pore holes (B1). This indicates that the experimental BSF larvae adapted to this container conditions even though the 5% air hole was the smallest of the other treatment pores as air ventilation. In addition, individual B1 is a combination of light limiting treatment and pore hole treatment. This average body weight value for containers placed in direct light received a smaller weight response than for containers placed in shade locations. Statistical analysis showed that there was a treatment interaction ($P < 0.01$).

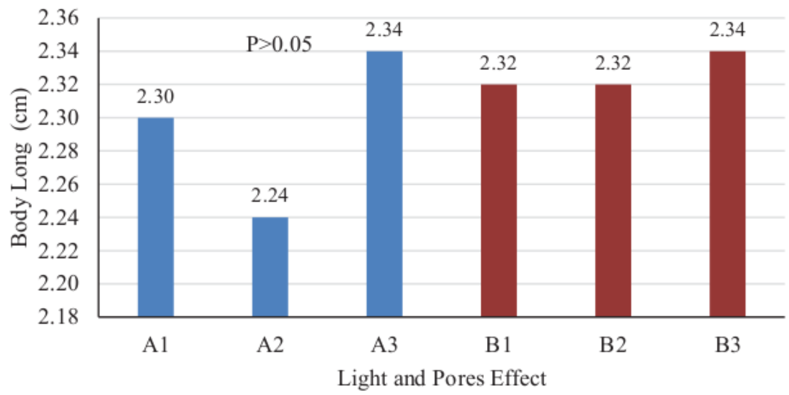

FIGURE 2. The Comparison of Body Length of BSF Larvae

Figure 2 shows that the tendency for the highest larval length was affected by the A3 and B3 treatments. This average thickness number shows a greater tendency for indirect sunlight treatment than the container where BSF lives in direct sunlight. Treatment of this parameter tends to increase in the combination of a 25% aperture placed in indirect sunlight and this response looks the same for a container placed in direct sunlight. This performance indicated that the experimental BSF larvae tended to be more adapted to these container conditions even though the 5% air hole was the smallest of the other treatment pores. The average value of this body length in a container placed in direct light received a smaller weight response than a container placed in a shade location. Statistical analysis showed that there was no interaction ($P > 0.05$) on body length.

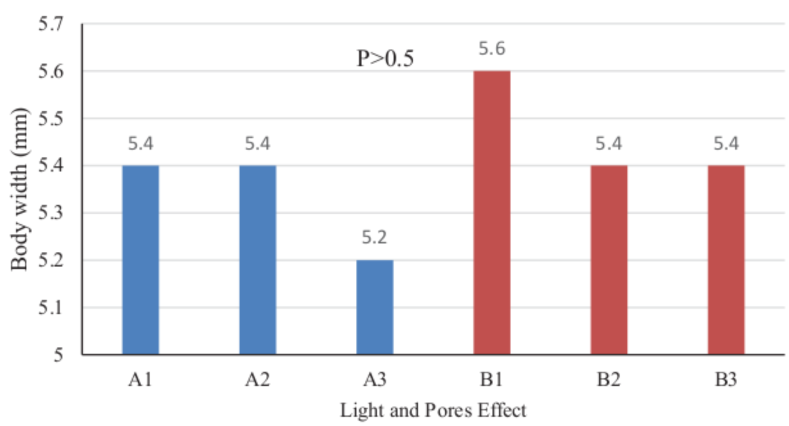

FIGURE 3. The Comparison of Body Width of BSF Larvae

The results of the observations regarding body width show that the highest value of body width larvae was in the B1 treatment group. This average thickness show that indirect sunlight treatment with a pore hole of 5% tends to give a more positive response than a container where BSF lived in direct sunlight. There was no interaction between the treatment combinations on body width (P> 0.05).

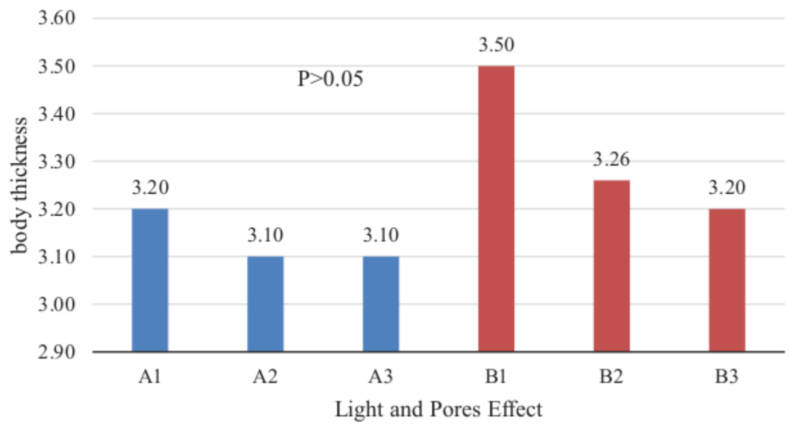

FIGURE 4. The Comparison of Body Thickness of BSF Larvae

The availability of oxygen in the environment in which the insects live will influence the insect body size [4]. Regarding the size of the BSF body thickness, using several air pores sizes in the experimental container has not shown a significant difference. Likewise, when this treatment combined with lighting: even though the results of the statistical analysis of the body thickness parameters do not have an interaction P> 0.05. The image of figure 4 above showed that the highest thickness parameter value of BSF larvae was influenced by treatment B1, which was places in a container that had a pore hole of 5% and placed in indirect sunlight. The treatment used in this study has not been able to affect several parameters of insect development however an extreme cold or hot temperature could experience growth problems of insect as related to the scientific report [5].

CONCLUSION

The combination treatments of sunlight intensity and hole pores influenced the weight of prepupa of BSF (H. illucens) which has the potential to increase alternative feed for livestock. This information can contribute to realize black soldier fly farming in limited space.

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