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The Influence of Giving Yacolt on The Innovative Production of Black Soldier Fly-BSF *(Hermetia Ilucens)*

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Abstract.*The objective of this study is to find out the effect of giving Yacolt on the innovative production of BSF flies and to find out which Yacolt is better for BSF fly production The method of this research uses the Complete Experimental Design (CED), with its 4 treatments and 3 repetitions, a total of 36 experimental units as the following combination: Y0 = Control (0 ML), Y1 = Yakult (50 ML), Y2 = Yakult (100 ML) and Y3 = Yakult (200 ML).The results of the study showed that the provision of Yacolt with a concentration of 100 ml had a very significant effect on all treatments. the number of BSF fly eggs with treatment Y2: 10.43a had an effect on treatment Y0, 10.43a, Y1: 10.03ab Y3: 9.43bc and Y0: 9.13c. from the results of the study showed that the provision of yakult with a concentration of 100 ml had a very significant effect on all treatments. the number of changes in fly eggs to BSF larvae with treatment Y2: 10.43a had an effect on treatment Y2: 318.33 a, Y1: 200.67 b, Y3: 110.33 c and Y0: 29.00 d and from the results of the study showed that the provision of yakult with a concentration of 100 ml had a very significant effect on all treatments. the number of BSF Magots with treatment Y2 336.33 a had an effect on treatment Y2: 336.33 a, Y1: 204.00 b, Y3: 95.67 c and Y0: 19.33 d.*

Keywords: *Yacolt, Black Soldier Fly (BSF), Innovative Production*

Abstrak. Tujuan dari penelitian ini adalah untuk mengetahui pengaruh pemberian Yakult terhadap produksi inovatif lalat BSF (Black Soldier Fly) serta untuk mengetahui konsentrasi Yakult yang paling efektif dalam meningkatkan produksi lalat BSF. Metode penelitian ini menggunakan Rancangan Percobaan Lengkap (RPL) dengan 4 perlakuan dan 3 ulangan, sehingga total terdapat 36 satuan percobaan dengan kombinasi sebagai berikut: Y0 = Kontrol (0 mL), Y1 = Yakult (50 mL), Y2 = Yakult (100 mL), dan Y3 = Yakult (200 mL). Hasil penelitian menunjukkan bahwa pemberian Yakult dengan konsentrasi 100 mL memberikan pengaruh yang sangat signifikan terhadap seluruh perlakuan. Jumlah telur lalat BSF pada perlakuan Y2: 10,43a berpengaruh terhadap perlakuan Y0: 9,13c, Y1: 10,03ab, dan Y3: 9,43bc. Dari hasil tersebut dapat disimpulkan

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bahwa pemberian Yakult dengan konsentrasi 100 mL memberikan pengaruh yang sangat signifikan terhadap seluruh perlakuan. Jumlah perubahan dari telur lalat menjadi larva BSF pada perlakuan Y2: 318,33a berpengaruh terhadap perlakuan Y1: 200,67b, Y3: 110,33c, dan Y0: 29,00d. Selain itu, jumlah maggot BSF pada perlakuan Y2: 336,33a juga menunjukkan pengaruh terhadap perlakuan Y1: 204,00b, Y3: 95,67c, dan Y0: 19,33d.

Kata kunci : Yacolt, Black Soldier Fly (BSF), Produksi Inovatif

INTRODUCTION

The Black Soldier Fly (BSF), *Hermetia illucens*, has emerged as a highly promising species in sustainable waste management and alternative protein production. Its larvae possess a remarkable ability to convert a wide range of organic waste materials into high-value biomass, rich in proteins and fats, making it suitable for use as animal feed in the poultry and aquaculture industries (Diener et al., 2011; Van Huis et al., 2013). This innovative approach aligns with the growing global need for sustainable solutions to waste management and the demand for alternative protein sources, particularly given the increasing pressure on conventional protein production systems (Gobbi et al., 2024; Gold et al., 2022). The rapid growth rate, short life cycle, and non-pest characteristics of BSF further enhance its appeal as a key player in circular bioeconomy systems, offering a compelling solution for converting discarded resources into valuable products (Hou et al., 2022; Jayanegara et al., 2023).

Recent studies and innovations in BSF cultivation have explored the impact of various feed additives and microbial supplements to enhance larval development and waste conversion efficiency. Among these, probiotics have gained particular interest for their role in improving digestive processes and nutrient absorption. For instance, the application of beneficial microbes has shown promise in optimizing the gut microbiome of insects, leading to improved nutrient utilization and overall growth performance (Erickson et al., 2021; Parra-Ruiz et al., 2023). Yakult, a commercially available probiotic drink containing *Lactobacillus casein Shirota*, has been widely recognized for its positive effects on gut health in both humans and animals (Fukushima et al., 1998). Incorporating probiotics such as those found in Yakult into BSF larval feed could significantly influence the microbial composition in the larval gut, potentially enhancing feed conversion, larval

biomass, and overall production performance, thereby addressing some of the critical bottlenecks in large-scale BSF production (Schmitt et al., 2024; Wang & Liu, 2021).

Despite the established benefits of probiotics in various animal systems, the specific impact of *Lactobacillus casein Shirota* from Yakult on BSF larval development and waste bioconversion efficiency remains underexplored. Previous research has primarily focused on the general application of microbial supplements or different probiotic strains, leaving a gap in understanding the precise effects of this specific probiotic in BSF farming (Mohammadi et al., 2023). Furthermore, there is a lack of empirical data on the optimal concentration of Yakult needed to achieve significant improvements in BSF production parameters, such as egg hatching rates, larval development, and maggot biomass. This research aims to address these critical knowledge gaps by systematically investigating the dose-dependent effects of Yakult on BSF performance, providing valuable insights for optimizing current cultivation practices (Yu et al., 2021).

13 This study's objective is to determine the effect of Yakult supplementation on the innovative production of BSF flies and to identify the optimal concentration of Yakult for 9 enhancing BSF production. The urgency of this research lies in its potential to significantly improve the efficiency and sustainability of BSF farming, contributing to more robust waste management systems and the development of alternative protein sources for animal feed, which are crucial for global food security. The novelty of this study lies in its focused investigation into the specific probiotic influence of Yakult on BSF, offering a unique approach to optimizing insect bioconversion systems by leveraging the synergy between beneficial microbes and organic waste degradation,

RESEARCH METHOD

This research uses the Complete Design of Experiment (DES), with its 4 treatments and 3 repetitions, a total of 36 experimental units as the following combination:

Y0 = Control (0 ML)

Y1 = Yacolt (50 ML)

Y2 = Yacolt (100 ML)

Y3 = Yacolt (200 ML)

The design in determining each unit of each treatment used Complete Randomized Design (CRD) according to (Sudjana, 1991) as follows:

$Yij = \mu + \tau i + \varepsilon ij$

Observation:

Yij = Variable analysis

μ = Overall Mean

τi = Treatment influence on – I

εij = Experiment failure of treatment

Observation Parameters

The parameters for this research observation are as described in the following steps

1. Count of BSF larvae in each parameter Observation at two weeks or 14 days.
2. In the second step, the number of maggots per parameter 20 will be observed
3. This stage observes the BSF larvae developing into larvae
4. Observe the results of each parameter with its weight kg

Data Analysis

All data collected will be analyzed with ANOVA, the results of this analysis showed that there is a significant influence of F count, will continue to be analyzed with DMRT (*Duncan Multiply Range Test* with task (α 0.05) (Mattjik AA and Sumartajaya M. 2000). Anova with Statistical Tools for Agriculture Research STAR Application

RESULTS AND DISCUSSION

Black Soldier Fly Eggs-BSF Fly

The results of the tabulation and summary showed that there was a more significant influence of the supply of yakult material on the growth of bsf larvae in each unit. The results of the continuous analysis with LSD are shown in the following table and graph.

Table 1. Results of LSD continuation analysis for the 95% confidence task for the growth of BSF (gr)

Treatment	Totality BSF's eggs
Y2	10.43a
Y1	10.03ab
Y3	9.43bc
Y0	9.13c
LSD 0.05%	(0.6449)

Exp: The letter that differs in each treatment means that it has the most significant influence on the confidence task (95%).

The results of the LSD continuation analysis are shown in Table 2. It shows that treatment (Y2) with 100ML Yacolt concentration gives more significant influence to treatment (Y0) 0ML, as well as significant influence to (Y1) 50ML and (Y3) 200 ML.

Larval BSF

The results of the tabulation and summary showed that there was a more significant influence of the supply of Yacolt material on the growth of BSF larvae in each unit randomized. The results of the continuous analysis with LSD are shown in the following table and graph.

Table 2. Results of LSD continuation analysis for the 95% confidence task for the Larva BSF (gr)

Treatment	Total of live BSF Flies
Y2	318.33 a
Y1	200.67 b
Y3	110.33 c
Y0	29.00 d
LSD 0.05% (0.6449)	

Exp: The letter that differs in each treatment means that it has the most significant influence on the confidence task (95%).

The results of the LSD continuation analysis are shown in Table 6. It shows that treatment (Y2) with 100ML Yacolt concentration has the most significant influence on treatment (Y0) 0ML, as well as significant influence on (Y1) 50ML and (Y3) 200 ML.

BSF Fly Weight

The results of the tabulation and summary showed that there was a more significant influence of the supply of Yacolt material on the growth of BSF larvae in each unit randomized. The results of the continuous analysis with LSD are shown in the following table and graph.

Table 3. Results of LSD continuation analysis for the 95% confidence task for the Totality of BSF Fly Weight (gr)

Treatment	Totality of BSF Fly Weight
Y2	336.33 a
Y1	204.00 b
Y3	95.67 c
Y0	19.33 d
LSD 0.05% (0.6449)	

Exp: The letter that differs in each treatment means that it has the most significant influence on the confidence task (95%).

The results of the LSD continuation analysis are shown in Table 3. It shows that treatment (Y2) with 100ML Yacolt concentration gives more significant influence to treatment (Y0) 0ML, as well as significant influence to (Y1) 50ML and (Y3) 200 ML.

CONCLUSION

Based on the experimental findings, this study conclusively demonstrates that providing Yakult, specifically at a concentration of 100 mL (Treatment Y2), significantly enhances various aspects of Black Soldier Fly (BSF) production, including the number of BSF fly eggs, the conversion of eggs to larvae, and the total weight of BSF maggots. The results indicate that the 100 mL concentration consistently outperformed the control (0 mL), 50 mL, and 200 mL treatments across all measured parameters, highlighting its optimal effect on BSF development and biomass accumulation. However, a limitation of this study is its singular focus on Yakult as a probiotic source, without exploring other types of probiotics or varying the substrate composition for BSF rearing. Future research should consider investigating the synergistic effects of Yakult with different organic waste types, exploring alternative probiotic strains or combinations, and conducting economic viability analyses of large-scale BSF production incorporating Yakult supplementation to provide a more holistic understanding and practical recommendations for the industry.

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